

electronic publishing in science

Proceedings of the Joint ICSU Press/
UNESCO Expert Conference
February 1996



Edited by
Dennis Shaw and
Howard Moore

Electronic publishing in science

electronic publishing in science

Proceedings of the Joint ICSU Press/UNESCO Expert Conference

February 1996

Conference Chairman: Roger Elliott

Steering Committee Chairman: Kai-Inge Hillerud

Programme Committee Chairman: Dennis Shaw

Local Committee Joint Chairmen:

André Authier and Howard Moore

Edited by Dennis Shaw

and Howard Moore



Published by the United Nations Educational,
Scientific and Cultural Organization,
7, Place de Fontenoy, 75352 Paris, France,
and the International Council of Scientific Unions,
51, Boulevard de Montmorency, 75016 Paris, France

© ICSU Press, UNESCO
and individual contributors, 1996

ISBN: 0-930357-37-X

Layout: Susanne Almeida-Klein
Cover graphic: Rodolfo Almeida

Printed in the UNESCO Workshops

Contents

7	Editorial preface	53	<i>Charles Clark</i> The copyright environment for the publisher in the digital world
11	Conference programme		
13	Chairman's report	68	<i>Bryan R. Coles</i> Electronic publishing in science – where are we now?
17	Conference recommendations		
19	Opening address by Federico Mayor, Director-General of UNESCO	71	<i>Thomas Dreier</i> Copyright issues in a digital publishing world
21	Opening address by Professor J. C. I. Dooge, President of ICSU	83	<i>Paul Ginsparg</i> Winners and losers in the global research village
	Invited papers	89	<i>Sydney R. Hall</i> A scientist's view of the issues and challenges
25	<i>Douglas Armati</i> Tools and standards for protection, control and archiving	95	<i>André Heck</i> From an early electronic-publishing concept towards advanced electronic information handling
36	<i>Edward Barrow</i> Rights clearance and technical protection in an electronic environment	102	<i>Arnoud de Kemp</i> Options for the future: views of a publisher
43	<i>Peter B. Boyce</i> A successful electronic scholarly journal from a small society	106	<i>Joost G. Kircz and Hans E. Roosendaal</i> Understanding and shaping scientific information transfer
48	<i>Vanderlei P. Canhos, Dora A. L. Canhos, Sidnei de Souza and Barbara Kirsop</i> Electronic publishing and developing countries: trends, potential and problems	117	<i>D. G. Law</i> Electronic data archiving and access
		122	<i>Joshua Lederberg</i> Options for the future

- 127 *Harry Lustig*
Electronic publishing: the role of a large scientific society
- 131 *F. A. Mastroddi*
Electronic publishing in science: trends and user demands. A European Union perspective
- 143 *Ann Okerson*
A librarian's view of some economic issues in electronic scientific publishing
- 151 *David J. Pullinger*
Economics and organization of primary scientific publications
- 162 *J. C. Sens*
Electronic publishing via scientific societies
- 168 *Juan Voutsas and Ana Maria Cetto*
Electronic publishing: will it reach the whole world?
- 174 *Robert Wedgeworth and William H. Mischo*
Issues affecting the development of digital libraries in science and technology

Reports of Working Groups

- 182 Working Group 1: Real costs
Anthony Watkinson, Chairperson
- 183 Working Group 2: The electronic archive
Robert Wedgeworth, Chairperson
Patricia Yocum, Reporter
- 184 Working Group 3: Developing countries
Ana Maria Cetto, Chairperson
Lisbeth Levey, Reporter
- 186 Working Group 4: Implications for training and work-styles
John Rose, Chairperson
Yves Epelboin, Reporter
- 187 Working Group 5: Peer review
Bernard Donovan, Chairperson
- 189 List of participants
- 198 Author index

Editorial preface

Dennis Shaw and Howard Moore

The objective of this international conference was 'to identify issues of concern with regard to electronic publishing and to advise on future action for the benefit of science'.

After hearing state-of-the-art presentations by speakers chosen to review the major topics and issues detailed below, delegates were invited to participate in workshops for the discussion of key questions identified in the main sessions. Responses to these questions enabled the drafting of recommendations which were discussed and then approved by the Conference. They are to be presented to the 25th General Assembly of ICSU and have been reported to the Director-General of UNESCO. These recommendations focus attention on the actions which can and need to be taken during the remaining years leading up to the beginning of the 21st century to ensure that the maximum benefit is derived for all concerned with the progress of scientific research by the application of information technology to the distribution of scientific information. Action following the adoption of these recommendations will be decided by members of the ICSU family in consultation with UNESCO where appropriate.

Conference planning

The detailed planning for the conference was the responsibility of ICSU Press which, in collaboration with UNESCO, established a joint Programme Committee to work out the detailed programme. Corresponding members were invited to join this com-

mittee to form the Editorial Board responsible for the Proceedings.

Rather than issuing a general call for papers, the members of the Programme Committee selected experts with established views on each of following topics to prepare and present summaries.

1. Introduction – where are we now?
2. Electronic data storage, access and archiving
3. Tools and standards for protection control and presentation of data
4. Legal and ethical issues in electronic publishing
5. Scientists' view of electronic publishing and issues raised, and views of learned and professional scientific society publishers
6. Economics and organization of primary electronic publishing
7. Options for the future

The summaries formed the basis for the drafting of questions to guide the Working Groups in their discussion of the important issues. In two sessions there was provision for short contributions by delegates from developing countries.

Comments on the outline plan were sought from members of an International Advisory Committee.

Simultaneous interpretation into English and French was provided for delegates in the Main Conference Hall. Working Groups were conducted in English.

Enrolment of delegates

Delegates were nominated by ICSU Scientific Unions, Commissions and Committees, National Members and Scientific Associates, and others were invited to apply through UNESCO. Invitations to those selected to participate were issued by ICSU Press and UNESCO in September 1995. Others, particularly publishers, with an interest in the conference topic were invited to apply for a restricted number of places which were allocated when the main enrolment had been completed during Autumn 1995. The distribution of participants by subject, country and affiliation demonstrates that this method of selection resulted in a valid worldwide conference of experts. There was a bias in favour of physics and related disciplines which probably reflected progress in electronic publishing achieved by IUPAP and its member societies, together with other ICSU Unions such as IAU and IUCr. The membership of the International Advisory Committee was chosen in order to complement the expertise of members of the Editorial Board.

Analysis of participants by country of origin is shown in the table on p. 197.

Planning for the working groups

The *modus operandi* for the working groups was determined by the Programme Committee at its December 1995 meeting. At that time the composition of the conference body in terms of discipline, interests and experience was clear and decisions could be made on such matters as the probable size of the five groups, and how many questions should be addressed to each of them.

Also, since speakers were asked to provide long abstracts (*circa* 500 words) on their topics, followed by a first draft text of their papers including an indication of the vital issues they foresaw, it was then possible to identify several of the matters to be explored in discussion. Participants were notified of the broad subject areas selected for the five working groups and were invited to express a preference.

Publication of proceedings

The proceedings were mounted on the World Wide Web during May 1996 at the following sites:

<http://www.lmcp.jussieu.fr/ICSU/> =

<http://www.grainger.uiuc.edu/>.

For this printed version authors were given the opportunity to amend the text in order to update the paper originally presented at the Conference. In some cases this resulted in a slight change of title.

Sponsors

The Conference organizers wish to express their gratitude to the following who made grants towards the cost of the conference:

International Council of Scientific Unions (ICSU)

UNESCO

ICSU Press

Deutsche Forschungsgemeinschaft

Elsevier Science BV, Amsterdam

Ministère de l'éducation nationale, de l'enseignement supérieur et de la recherche, France

International Development Research Centre (Canada)

The Nuffield Foundation, London

Oxford University Press

The Wenner-Gren Foundation, Stockholm

John Wiley & Sons Inc., New York

The H. W. Wilson Foundation, New York

Committee members

STEERING COMMITTEE

Kai-Inge Hillerud (Royal Swedish Academy of Sciences, Chairman of ICSU Press), *Chairman*
 André Authier (France, Former President of IUCr),
Joint Chairman of Local Committee
 Roger Elliott (UK, Former Chief Executive of Oxford University Press), *Conference Chairman*
 Julia Marton-Lefèvre (Executive Director of ICSU)
 Howard Moore (Chief of Science Publications and Documentation Unit, UNESCO),
Joint Chairman of Local Committee
 John Rose (Programme specialist, Communication Sector, UNESCO)
 Dennis Shaw (UK, Former President of IATUL),
Secretary
 Robert Wedgeworth (USA, President of IFLA)

INTERNATIONAL ADVISORY COMMITTEE

Adnan Badran (UNESCO Assistant Director-General for Science)
 Georges Cosmides (USA, NIH Toxicology Programme, NLM)
 Mike Dacombe (UK, Executive Secretary of IUCr)
 Mihály Ficsor (Assistant Director-General of WIPO)
 Eugene Garfield (USA, Honorary President of ISI)
 Lex Lefebvre (Netherlands, Secretary of STM)
 Edward N. Maslen (University of Western Australia)
 Franco Mastroddi (DG XIII, CEC)
 Simon Mitton (UK, Science Director, Cambridge University Press)
 Kurt Pawlik (Germany, President of IUPsyS)
 Walter G. Peter III (USA, Deputy Executive Director of ASM)
 David Russon (UK, President of ICSTI)
 Kent A. Smith (USA, Past President of ICSTI)
 Juan Voutssas (Mexico, Director of UNAM Information Center for Science and Humanities)
 Mark Wahlqvist (Australia, Monash University (IUNS)).

PROGRAMME COMMITTEE AND PROCEEDINGS EDITORIAL BOARD

Full members

Dennis Shaw, (*ex officio*) *Chairman*
 Bryan Coles (UK, Director of Taylor & Francis)
 Roger Elliott (Conference Chairman – *ex officio*)
 Ekkehaard Fluck (Germany – Director of Gmelin (CODATA))
 L. J. Haravu (India, Information Manager of ICRISAT)
 Tarja Koskinen-Olsson (Finland, Chairman of IFFRO)
 Christian Lupovici (France, Assistant Director of INIST)
 Vitaly Nechitailenko (Russia, IUG)
 Marthe Orfus (ICSTI), *Secretary*
 John Rose (UNESCO)
 Anthony Watkinson (UK, Director of Chapman & Hall)

Corresponding members

Graham Cornish (UK, British Library Copyright Officer)
 Thomas Dreier (Germany, Max Planck Institute for Patent Law and Intellectual Property)
 Howard L. Funk (USA, Vice-President of IFIP)
 Arnoud de Kemp (Germany, Director of Springer-Verlag, Chairman of STM Innovations Committee)
 Ivan Klimes (UK, Director of Rapid Communications of Oxford)
 Lisbeth Levey (USA, Director of AAAS Sub-Saharan Programme)
 Brian McMahon (UK, Project leader IUCr)
 Geert Noorman (Netherlands, Director of Elsevier Science BV)

Conference programme

Monday 19 February

18.00 Reception

Tuesday 20 February

09.30–09.50 Opening addresses by the Director-General of UNESCO, Mr Federico Mayor, and the President of ICSU, Prof. J. C. I. Dooge

09.50–11.05 Session 1

Introduction: where are we now?

Moderator: R. Elliott

B. R. Coles (Imperial College, London): Electronic publishing in science: where are we now?

F. A. Mastroddi (Directorate General Telecommunications, information market and exploitation of research, European Commission, Luxembourg): Electronic publishing in science: where are we now?

V. P. Canhos *et al.* (University of Campinas, Brazil): Electronic publishing and developing countries: trends, potential and problems

11.35–12.50 Session 2

Electronic data storage, access and archiving

Moderator: C. Lupovici

D. G. Law (King's College, London): Electronic data archiving and access

R. Wedgeworth and W. H. Mischo (University of Illinois, USA): Research policies affecting the development of digital libraries in science and technology

14.30–15.45 Session 3

Tools and standards for protection, control and presentation of data

Moderator: D. F. Shaw

E. Barrow (Copyright Licensing Agency Ltd., UK): Rights clearance and technical protection in an electronic environment

D. Armati (Consultant, UK): Tools and standards for protection, control and archiving

A. Heck (Université de Strasbourg, France): Electronic publication and information handling: a few issues and challenges

16.15–17.30 Session 4

Legal and ethical issues in electronic publishing

Moderator: T. Koskinen

T. K. Dreier (Max Planck Institute for Patent Law and Intellectual Property, Munich, Germany): Unsolved copyright issues in the digital and network environment

C. Clark (International Publishers Copyright Council): The publisher in the digital world

20.00 Conference dinner

Wednesday 21 February

09.30–11.00 Session 5.1

The scientist's view of electronic publishing

Moderator: A. Authier

S. R. Hall (University of Western Australia): A scientist's view of issues and challenges

J. Voutssas and A. M. Cetto (Universidad Nacional Autonoma de Mexico): Electronic publishing: will it reach the whole world?

P. Ginsparg (Los Alamos National Laboratory, USA): First steps towards electronic research communication in physics

11.30–12.30 Session 5.2

Views of learned societies and professional scientific publishers

Moderator: A. Authier

J. G. Kircz and H. E. Roosendaal (Elsevier Science, Amsterdam, the Netherlands): Understanding and shaping scientific information transfer

H. Lustig (American Physical Society): Electronic publishing: the role of a large scientific society

P. B. Boyce (American Astrophysical Society): Electronic publishing and the American Astrophysical Society

J. C. Sens (CERN, Geneva, Switzerland): Communication in physics

14.00–15.15 Session 6

Economics and organization of primary electronic publishing

Moderator: A. Lefebvre

A. Okerson (ARL Office of Academic and Scientific Publishing): A librarian's view of economic issues in electronic scientific publishing

D. J. Pullinger (Electronic publisher, *Nature*, Macmillan Journals, UK): Economics and organization of primary scientific publications

15.30–18.30 Working Groups: identification of main issues

Thursday 22 February

09.30–11.00 Reports on initial findings of Working Groups

Moderator: R. Elliott

11.30–12.30 Session 7

Options for the future

Moderator: R. Elliott

A. de Kemp (Springer-Verlag, Heidelberg, Germany)

J. Lederberg (Rockefeller University, USA; Chairman, UNESCO Advisory Council on Global Scientific Communications)

14.30–17.30 Working Groups: drafting of Recommendations

Friday 23 February

09.30–11.00 Summaries by Working Group Chairpersons and distribution of Recommendations

11.30–12.30 Approval of Conference Recommendations

12.30 Conference closes

Electronic publishing: will it reach the whole world?

Juan Voutssas

*Centro de Información Científica y Humanística,
Universidad Nacional Autónoma de México, México*

Ana María Cetto

*Instituto de Física,
Universidad Nacional Autónoma de México, México*

Electronic publishing is a reality today from the technical point of view, and the rate at which new developments are taking place in this field is impressive. For those already involved in electronic publishing, the challenge is to solve specific problems relating to authorship, copyright, editorial procedures, storage and archiving, protection and control of data, payment of services and financing of publishers, assessment of the impact of publications, and so on. It is clear that once the disadvantages and problems raised by the emerging technology are appropriately met, the benefits that will result, both for service suppliers and users, will be considerable.

However, for those countries that are not – or not yet – part of this system of globalization of electronic telecommunications and information management, the issues raised are of a different nature, and have to do rather with infrastructure requirements, and strategies and policies of development. The purpose of this presentation is to offer a reflection, based on data pertaining to different regions of the world, on the need to define development policies and measures to be taken in order to achieve a more active participation of these regions, so that they are more equitably represented in the world of electronic publishing and information management.

We do not think that at this stage it is really necessary to discuss about the advantages and comfort of electronic publishing. Nowadays, it is commonplace for most

scientists of the first world of communications to be able to access, through the multiple services and connections available, an ever-growing amount of electronic material: tables of contents, full texts, journals, dissertations, photos, etc. The fact is there, and it is growing like a snowball rolling downhill. Anyone who takes a look at the statistics of the phenomenon and browses through the networks will realize that there is no use in highlighting electronic publishing: it is a reality.

For this kind of world, the question today is not: electronic publishing, is it possible?, because the immediate answer is: yes, indeed. The incoming development of a new technology, as always, introduces new questions once it is there. For electronic publishing, these questions could be: how to handle authorship; how to define copyright; how to implement editorial procedures; how to attain standard storage and archiving; how to protect and control data; how to pay services and/or royalties; how to get publishing financed; how to assess the impact of publications and, further, the ‘impact of the impact’?¹ It is clear that once the disadvantages and problems raised by the emerging technology are appropriately met, the resulting benefits derived from it can be considerable, both for service suppliers and for users.

This is, more or less, the present general perspective for the users and suppliers of the first world of communications. Let us stress: the *first* world of communications.

What does this mean? To us, it means that there are users who inhabit different worlds of computer services and networking, different levels of information technology, or, as it is known in some parts of Europe, different *télématique* levels. This does not depend upon the country in which the user lives or works; it rather has to do with the power and quality of the plug that he or she has behind the computer. We mention the network's plug because it represents the amount of national, institutional and personal infrastructure and technology backing up this user. Note that we do not mean the total capacity of the nation or the institutions to support this effort for most of the people, but just for this user. In Third World countries there can exist some first world users, and vice versa.

So, as we can see, there are different shades of colour when considering different users in certain countries. This is important when talking about users of scientific information. Certainly in several countries of Latin America, and probably in other countries of the developing world, scientific communities have been privileged with good, and even excellent, links with the international world of electronic information. These elite groups are using with full power, capabilities and enthusiasm most of what is available in this world of electronic networking: mail, BBSs, telnets, FTPs; access to free or even payable databases, journals, pictures, references and documentation, data downloading, surfing the Web, etc.; everything that has been published in electronic media.

These communities are facing the same problems faced by their colleagues in other parts of the developed world of communications, and they are prepared to discuss the questions that have been introduced earlier; the technological environments are alike. We feel that this is part of our commitment as members of the international networked scientific society.

It seems at this point that to achieve such a working level is a matter both of a national policy to provide the telecommunications infrastructure and the human qualified resources required, and of institutional research policies that complete the scenario for the scientific communities. This has been done with certain success in countries like Mexico, Venezuela, Brazil, Argentina and Chile, among others, where core communities of

researchers in the top-level institutions have been so supported. With these experiences, it would seem that simply keeping on that track those groups that are already on it, while recommending the others to follow suit, could be the solution for the countries that initially have no access to electronic publishing, since it is a fact that it provides plenty of timely information for the research purposes of these communities. The main problem here is that for these countries to take such a decision they must afford the high expenses of getting to this point, since they are not suppliers or owners of the technology involved. In many cases it is difficult for these countries to face such investments, in addition to bearing the burden of an increased technological dependence.

But this is only one side of the coin. We have another set of questions besides the initial one. As we said above, it is a matter of shades of colour; there are also many countries where scientific communities have medium-level infrastructure and capabilities (medium-level network plugs), and many more with practically none of this infrastructure (i.e. no plugs at all).

For the bulk of the developing countries, electronic publishing is obviously not – yet – a reality, and the issues of concern are therefore of a very different nature from those that preoccupy our colleagues from the industrialized countries. We should again stress that this part of the world, the so-called developing world, which represents around 80 per cent of the entire planet, is in fact so heterogeneous that it can be hardly be put under a single name. A glance at the statistics shows that in many respects the differences between countries of the South are much more significant than those between some countries of the South and some of the North. These large contrasts are present in most of the standard indicators of development, and also in more specific ones such as number of scientists per capita, scientific productivity, investment in R&D, or communications infrastructure.

Facing such a heterogeneous landscape, and in trying to avoid the consequent risks of overgeneralization, we have restricted most of our analysis in this text to the Latin American sub-continent, although probably many of the statements can be applied to some extent to other regions of the South.

The other side of the coin becomes more evident when we look at the situation of electronic publishing as producers or suppliers; then many more issues are at stake. From this point of view the questions that arise are of the following kind: what scientific literature is produced in Latin America, and who produces it; where do our scientists publish; how are our publications distributed; who are our readers? And then: how would the answers to these questions change by going from printed paper over to electronic publishing?

It is a well-known fact that Latin American science is poorly situated on the world stage. The number of scientists per capita, averaged over the region, is about one tenth of the corresponding figure in industrialized countries. Our share of the total world expenditure in R&D is of the order of 1 per cent. It is not surprising, then, that our scientists produce no more than 1.8 per cent of the scientific articles published in the world's registered journals. As much as 80 per cent of this production comes from just 5 of the 29 countries: those already mentioned above, namely Brazil, Argentina, Mexico, Chile and Venezuela, which means that the remaining 24 countries contribute with less than 0.4 per cent to the registered world production. Further, more than half of these articles are published in the mainstream journals produced in the North.

As to the scientific literature produced and published in the region, then, it is clear that the figures are very low in comparison with the present world production. In fact, all sciences taken together, there are 5,141 active Latin American journal titles registered in the major information services, out of a world total of 143,068 (see Figure 1). Most of these journals are produced by scientific societies and academic institutions: universities and research centres. Usually, a small team of scientists voluntarily take care of the entire editorial work, with much sacrifice, assisted by an equally small team of technical and secretarial personnel. It is characteristic of these journals that they depend to a major extent on government or public institutional funding and must struggle year by year for their survival. Although many of the more established journals have succeeded in coming out regularly for more than four decades, recent financial crises throughout the subcontinent have presented serious risks to their survival.

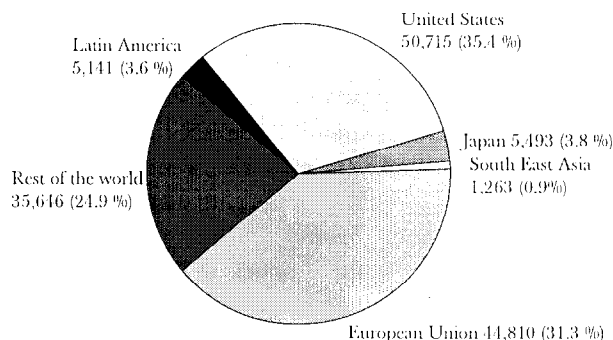


Figure 1. Currently registered journals from different regions of the world. (Number of titles and percentage: Ulrichs CD-ROM w/1995–1996, February 1996.)

The local or regional publications referred to above are mainly distributed within the region itself, a few hundred copies per journal on average. Except for very few titles, the distribution outside the region represents a low percentage, sometimes insignificant. This is evident for anyone who looks at the shelves or browses through the catalogues of academic libraries throughout the world: the scientific literature produced in the developing world is hardly present.

In fact, it is interesting to note that the library catalogues of universities and research institutions normally contain a small subset of journal titles, including even those journals produced in more developed countries. In other words, there are in all countries, in all regions of the world, many titles contributing to small rivers that never flow into the mainstream of scientific literature. And whenever there is a shortage of budget – which is currently the case in many institutions – it is the flow of the small rivers that is cut off more readily, owing to the importance of keeping up to date with the mainstream literature. This policy has had its negative effect on the worldwide distribution of journals from developing countries, even though their subscription prices are considerably lower than those produced in the North.

This leads us to address the next question: who are our readers? It is clear that if our literature is not duly distributed, it is not read either. Another factor that contributes to the scarce use of our literature is, of course, its weak presence in the indices. The number of Latin American journal titles included in the major indexing and abstracting services is very small: for example, in

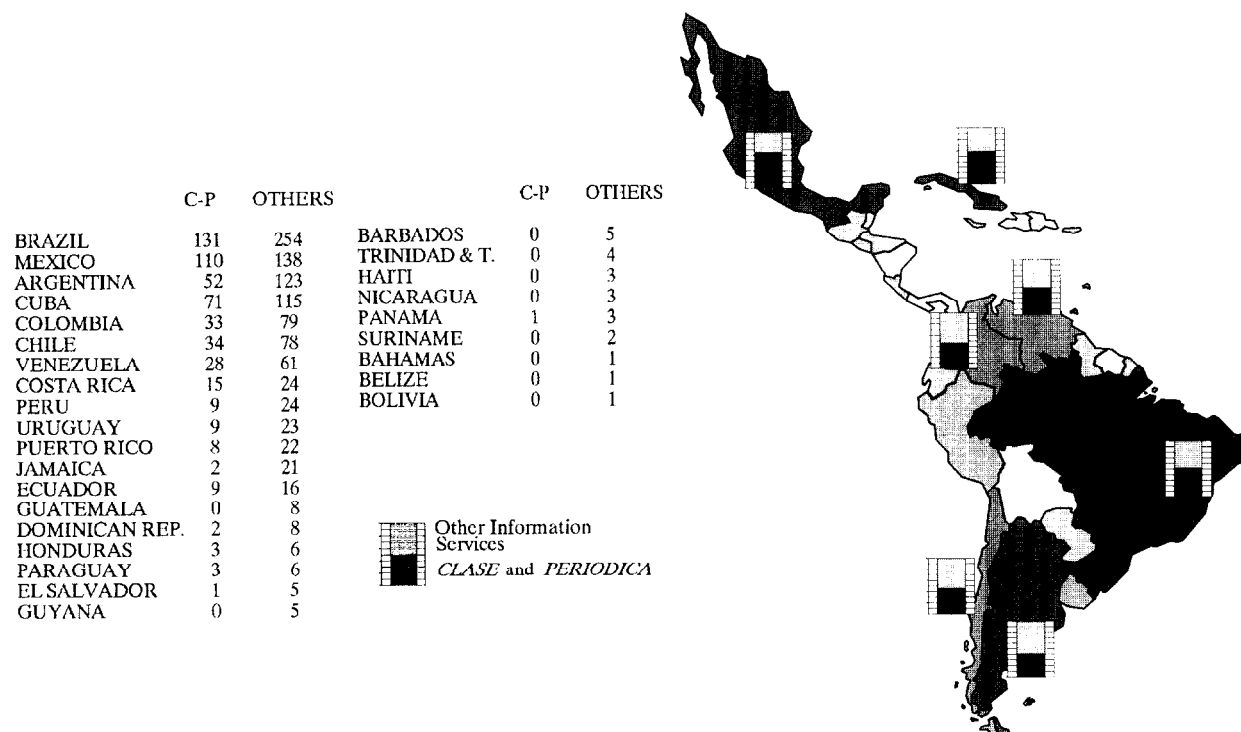


Figure 2. Latin American journals indexed in *Clase* and *Periodica* and other information services.

(Sources: Ulrich's CD-ROM/w 1994; *Clase* and *Periodica*, Bibliographical Databases, CICH-UNAM, Mexico.)

1994 the ISI indexed only 49 of our journals (see also Figure 2). The inclusion of a publication in such indexing and abstracting services can nowadays have a substantial effect on the impact of the publication, and on the importance attributed both by individual scientists and by institutions to this publication. In addition to setting a 'value' to it for institutional purposes – which means adding a value by including it, but also diminishing its value by excluding it from the index or list of abstracts – it influences the readership, to the extent that the colleagues tend to read and cite what is more easily accessible to them and to other colleagues.

Yet one should observe that our local and regional publications are not aimed exclusively at the international readership who have access to a host of scientific literature and have many options to choose from. There are other strong reasons for publishing and distributing our journals, of which we mention only two. On one hand, most of the scientists in the region, except perhaps for those who work at the larger or most established institutions, have very poor access – mainly for economic

reasons – to the literature produced abroad, and depend therefore to a large extent on the scientific information they receive from the region itself. It is not uncommon that the first scientific journals with which a young scientist has some experience, both as reader and as author, are the locally produced journals. Further, the local or regional journals provide natural spaces for the publication of discoveries or results that are of particular interest for the colleagues of the same region; this is the case in important branches of the social sciences, medicine, biological sciences, earth sciences, etc.

Now we come to the point where we ask ourselves: under these conditions, what are the prospects of electronic publishing for our publishers? Who would benefit from it, and how can the benefits be extended?

Certainly, if all publishers had the means and the capacity to distribute their produce in electronic format, there would be no problem, other than those problems that were mentioned at the beginning, which concern the first world of communications. But the truth is that at

present, in Latin America only a few journals have in principle this capacity, those few that are registered even in the most selective international indices and constitute the most conspicuous part of the regional mainstream of printed scientific literature. Sooner or later, and probably very soon, we will see some of these journals circulating in the international electronic network. For these journals, scientific publishing certainly represents a powerful tool, as it helps them enhance their international presence and can even be useful to reduce publishing and distribution costs.

For the rest, things are not so easy. Those journals that hardly have the means to struggle for survival in the present world of printed paper – notwithstanding their intrinsic value – will with more difficulty find their way in the rapidly evolving world of electronic publishing. The risk that these journals remain marginal or even drown forever in the deep ocean of present-day publications, is high. Unless, of course, efforts are made to avert this situation. This is, we think, a task that has to be approached. Which means the need to find measures that can be taken to enhance these journals, so that they are more equitably represented in the world of electronic publishing and information management.

The strategy to reach the high international levels of electronic publishing in Latin America has to start by taking advantage of the current globalization of telecommunications and computing facilities. The first step could consist of compiling, storing and distributing by electronic media, in the form of indices, the basic information about the scientific publications produced today in our countries. This is very important because at the present stage no one in the world – not even we ourselves – has a comprehensive knowledge of what is published in Latin America. This first step would pave the way for the tasks that follow naturally, such as providing tables of contents, abstracts and, eventually, the full contents of the journals, through the same electronic media.

This idea is not exclusively ours. Many colleagues in Latin America share our concerns and have similar expectations. An initiative in this direction has started to gather people from the different sectors involved – publishers, scientists and information specialists – from various Latin American countries, with the intention to create and set up the electronic mechanisms for compiling,

Table 1. Databases (bibliographical and statistical) produced in Latin America and the Caribbean. Source: DIBALC 1992.

Argentina	50	Jamaica	3
Bolivia	1	Mexico	104
Brazil	73	Nicaragua	1
Chile	32	Panama	1
Colombia	29	Paraguay	2
Costa Rica	153	Peru	16
Cuba	138	Puerto Rico	2
Dominican Rep.	7	Trinidad & Tobago	3
Ecuador	4	Uruguay	11
Guatemala	2	Venezuela	15
Guyana	1		

storing and distributing the information related to the scientific publications of the entire region. The strategy is to work in a coordinated way with several established focal points that are already developed and have accumulated valuable experience, and jointly define standards and policies for constructing the indices, with each one of the focal points taking responsibility for their respective zones of influence, in order to collect the information from the weaker neighbours and thus catalyse their own development. (That there already exist a number of information centres with an experience in the construction of databases can be seen from Table 1.) The goal for the near future is thus to obtain a complete Latin American scientific publications index, as the first step towards the final objective of a comprehensive and well-distributed Latin American electronic publishing capacity.

This project has been shaped by the conviction, widely shared by the respective communities, that only if scientific publishing is viewed as an endeavour of all scientists of all nations, each one to the best of their capacities, can a genuine global development of science be achieved. We do not claim a niche for the weaker members of the international community in the global electronic publishing market; what we do expect is that all nations can enter as active partners, and not merely consumers, into the electronic publishing and information management system.

Note

1. We define impact of the impact as the degree of influence that impact indicators have upon personal, institutional, or national policies of research and publishing.

Bibliography

Scientific Publications in Latin America, A. M. Cetto and K.-I. Hillerud (eds.). Fondo de Cultura Económica, Mexico, 1995.

Ulrich's International Periodicals Directory CD-ROM. R. R. Bowker, New Providence, NJ, Winter 1994, Winter 1995–1996.

Clase: Citas Latinoamericanas en Ciencias Sociales y Humanidades and *Periódica: Índice de Revistas Latinoamericanas en Ciencias* (Bibliographic Databases). Centro de Información Científica y Humanística, UNAM, Mexico, 1994.

DIBALC: Directorio de Bases de Datos de América Latina y el Caribe, E. Barberena (ed.). Facultad de Filosofía y Letras UNAM, Mexico, 1992.

List of participants

Prof. ABOU-CHACRA Ragi, Division of Basic Sciences, Lebanese Council for Scientific Research, P.O. Box 11-8281, BEIRUT, Lebanon, Fax: 961 1 822639, Email: cnrs10@calvacom.fr or cnrs@inco.com.lb

Dr ADIPALA Ekwamu, Dept. of Crop Science, Makerere University, P.O. Box 7062, KAMPALA, Uganda, Tel.: 256-41-55 43 42, Fax: 256-41-23 50 02

Ms ALTOFT Rosemary, John Wiley & Sons Ltd., Baffins Lane, CHICHESTER, Sussex, PO19 1UD, U.K., Tel.: 44-1243 779777, Fax: 44-1243 775878

Mr ARMATI Douglas, Consultant, 7A Angel Lane, WOODBRIDGE, Suffolk IP12 4NG, U.K. Tel.: 44-1394 380874, Email: armati@anglianet.co.uk

Ms AUSTIN Enid, Scientific Affairs Division, NATO, B-1110 BRUSSELS, Belgium. Tel.: 32-2 707 4854, Fax: 32-2 707 4232, Email: haaaj.01@kuleuven.ac.be

Prof. AUTHIER André, Laboratoire de Minéralogie-Cristallographie, Université P. et M. Curie, 4, Place Jussieu, 75252 PARIS Cédex 05, France, Tel.: 33-1-44 27 37 84, Fax: 33-1-44 27 27 85, Email: authier@lmcp.jussieu.fr

Mr BA Ousseynou, Délégation aux Affaires Scientifiques et Techniques, DAST, Ministère de la Recherche Scientifique et de la Technologie, DAKAR, Sénégal, Tel.: (221) 21.32.60, Fax: (221) 22.45.63

Dr BADRAN Adnan, Assistant-Director General for Science, UNESCO, 1, rue Miollis, 75732- PARIS

Cédex 15, France, Tel.: 33-1-45 68 10 00, Fax: 33-1-40 65 98 96

Mrs BAHMANI-FARD Tish, ICSU Secretariat, 51, Boulevard de Montmorency, 75016 PARIS, France, Tel.: 33-1-45 25 03 29, Fax: 33-1-45 88 94 31, Email: fard@lmcp.jussieu.fr

Prof. BAKIS Henry, Département de Géographie, Université Paul Valéry, Route de Mende, BP 5043, F-34032 MONTPELLIER Cédex, France, Fax: 33-1-67 14 20 52

Prof. BALASUBRAMANIAN D., Centre for Cellular & Molecular Biology, Uppal Road, HYDERABAD-500 007, India, Tel.: 91-40-673 487, Fax: 91 40 671 195, Email: dbala@ccmb.uunet.in

Mr BARÉ Robert, European Patent Office, P.B. 5818 Patentlaan 2, 2280 HV RYSWYK, The Netherlands, Fax: 31-70 340 3320

Mr BARROW Edward, UK Copyright Licensing Agency, 32 Plaid Road, LONDON SW2 5UR, U.K., Fax: 44-171 436 3986, Email: edward@cla.co.uk

Dr BECKER Edwin, IUPAC, National Institutes of Health, Building 5, Room 124, BETHESDA, MD.2089260520, U.S.A., Tel.: 1 301 496 1024, Fax: 1-301-435 2413, Email: tbecker@nih.gov

Mr BOSWOOD Michael, Elsevier Science BV, The Boulevard, Langford Lane, KIDLINGTON, Oxon, U.K., Fax: 44-1865 843947

Dr BOWEN D.H.M., American Chemical Society,
Room 321, 1155 Sixteenth Street NW, WASHINGTON, DC 20036, U.S.A., Tel.: 1-202 872 4461,
Fax: 1-202 872 6338, Email: mxb96@acs.org.

Dr BOYCE Peter, American Astronomical Society,
2000 Florida Avenue, NW 400, WASHINGTON, DC 20009, U.S.A., Tel.: 1-202 328 2010,
Fax: 1-202 234 2560, Email: p.boyce@aas.org

Mr BROWN David, DJB Associates, 17 Chatham Road, KINGSTON, Surrey KT1 3AB, U.K.,
Tel.: 44-181 241 4728, Fax: 44-181 546 4353,
Email: david@djbrown.demon.co.uk

Prof. BUTTERWORTH Ian, Blackett Laboratory,
Imperial College, Prince Consort Road, LONDON SW7 2BZ, U.K., Tel.: 44-171 594 7851,
Fax: 44-171 823 8830, Email: i.butterworth@ic.ac.uk

Mr CAMERON Jamie, Institution of Mechanical Engineers, 1 Birdcage Walk, LONDON SW1H 9JJ, U.K., Tel.: 44-171 222 7899, Fax: 44-171973 0439

Mr CAMPBELL Robert, Blackwell Science Ltd., Osney Mead, OXFORD OX2 0EL, U.K.
Tel.: 44-1865 206000, Fax: 44-1865 791542,
Email: robert.campbell@blacksci.co.uk

Dr CANHOS V., Basa de Dados Tropical (BDT),
University of Campinas, Rua Latino Coelho 1301, 13087-010 CAMPINAS, Brazil, Tel.: 55 192 42 7022,
Fax: 55-191 42 7827, Email: vcanhos@bdt.org.br

Mr CARLING Bob, Chapman & Hall, 90 Charlton Road, Shirley, SOUTHAMPTON, Hants SO15 5EW, U.K., Email: carling@tcp.co.uk

Prof. CARLSSON Mats, Institute of Theoretical Astrophysics, PO Box 1029 Blindern, N-0315 OSLO, Norway, Fax: 47-22 85 65 05,
Email: mats.carlsson@astro.uio.no

Prof. CETTO Ana Maria, Instituto de Fisica,,
Universidad Nacional Autonoma de Mexico,
Apartado Postal 20-364, 01000 MEXICO DF, Mexico, Fax: 525 6225015,
Email: ana@sysull.ifisicacu.unam.mx

Mr CLARK Charles, International Publishers Copyright Council, 5th Floor, 90 Tottenham Court Road, LONDON W1P 9HE, U.K.,
Fax: 44-171-436 3986

Prof. CLARRICOATS P.J.B., Department of Electronic Engineering, Queen Mary and Westfield College, Mile End Road, LONDON E1 4NS, U.K.,
Tel.: 44-171-975 5330, Fax: 44-181-981 0259,
Email: p.j.b.clarricoats@qmw.ac.uk

Prof. COLES Bryan, Department of Physics, Imperial College, Prince Consort Road, LONDON SW7 2BZ, U. K., Tel.: 44-171-594 7581, Fax: 44-171-564 7580,
Email: b.coles@ic.ac.uk

Mr CORNISH Graham, Document Supply Centre, The British Library, BOSTON SPA, Wetherby, West Yorkshire LS23 7BQ, U.K.,
Tel.: 44-1937-546 123, Fax: 44-1937-546478,
Email: graham.cornish@bl.uk

Mr DE KEMP Arnoud, Corporate Development, Springer-Verlag, Tiergartenstrasse 17, 69121 HEIDELBERG, Germany,
Tel.: 49-6221-487 396, Fax: 49-6221-487 288,
Email: dekemp@springer.de or dekemp@adkathome.de

Dr DENIS Michel, Groupe Cognition Humaine, LIMSI-CNRS, BP 133, 91403 ORSAY, France
Tel.: 33-1-69 85 80 08, Fax: 33-1-69 85 80 88,
Email: denis@limsi.fr

Dr DOI Norihisa, Professor, Keio University /Science Council of Japan, 26262616103 Morooka-cho, Kohoku-ku, YOKOHAMA 222, Japan,
Tel.: 81 45 563 1141 (ext.3377/3378),
Fax: 81-45 560 1262, Email: doi@keio.ac.jp

Prof. DONOVAN Bernard, Ass. of Learned and Prof. Soc. Publishers, 48 Kelsey Lane, BECKENHAM, Kent, BR3 3NE, U.K., Tel.: 44-181 658 0459,
Fax: 44-181 663 3583,
Email: donovan@alpsp.demon.co.uk

Dr DREIER Thomas, Internationales Patent, Urheber- und Wettbewerbsrecht, Max-Planck Institut,

Siebertstr 3, 81675 MÜNCHEN, Germany,
Tel.: 49-621-92461, Fax: 49-89-9246-247

Prof. ELLIOTT Sir Roger, Department of Theoretical
Physics, Oxford University, 1 Keble Road, OXFORD
OX1 3NP, U.K., Tel.: 44-1865-273 997, Fax: 44-1865
273 947, Email: r.elliott@physics.oxford.ac.uk

Dr EL-GAMAL Salwa, Cairo University Center for
Advanced Software Development, Cairo University,
GIZA, Egypt

Prof. EPELBOIN Yves, Laboratoire de Minéralogie-
Cristallographie, Université P. et M. Curie, Case 115,
4 Place Jussieu, 75252 PARIS CEDEX 05, France,
Fax: 33-1-44 27 37 85, Email: epelboin@lmcp.jussieu.fr

Dr EYDGAHI Ali, Iran Telecommunication Research
Centre, University of Teheran, P.O. Box 13445/318,
TEHRAN, Iran, Tel.: 98-21-802 1929,
Fax: 98-21-8778690, Email: cydgahi@ece.ut.ac.ir

Mr FEICHTER Helmut, IUFRO, Seckendorff-
Gudent-Weg 8, 1130 VIENNA, Austria,
Fax: 43 1 877 9355, Email: Feichter@forvie.ac.at

Mr FENNESSY Eamon, The Copyright Group, Inc.,
P.O. Box 5496, BEVERLY FARMS,
MA 91915, U.S.A., Fax: 1-508 927 9936

Dr FLACK Howard, Laboratoire de Cristallographie,
Université de Genève, 24 Quai Ansermet,
CH-1211 GENEVE 4, Switzerland,
Tel.: 41-22-702 6249, Fax: 41-22-781 2192,
Email: howard.flack@cryst.unige.ch

Prof. FLUCK Ekkehard, Direktor, GMELIN-
INSTITUT, Varrentrappstrasse 40/42,
Post Fach 900367, D-60486 FRANKFURT AM
MAIN, Germany,
Tel.: 49-69-7917 210, Fax: 49-69-7917 391,
Email: fluck@mpigm-frankfurt.mpg.d400.de

Mr FORGET Claude, TELEGLOBE,
1000 de la Chauchetière W., MONTREAL,
QC H3B 4X5, Canada, Fax: 1-514 868 6492,
Email: cforget@teleglobe.ca

Ing. FUENTES Rafael, CONICIT-REACCIUN,
Av. Principal Los Cortijos de Lourdes- Edif. Maploca I
Piso 4, Los Cortijos de Lourdes - CARACAS,
Venezuela, Fax: 58-02-2393145,
Email: rfuentes@conicit.ve

Mr FUNK Howard, H.L. Funk Consulting,
7 Diane Court, KATONAH, NY 10536, U.S.A.
Tel.: 1-914-232 3530, Fax: 1-914-232 3530,
Email: hlfunk@psilink.com

Mr GEERTSEN Anders, Munksgaard Int. Publishers,
P.O. Box 2148, DK-1016 COPENHAGEN K,
Denmark, Tel.: 45 33 127030, Fax: 45-33 1293 87,
Email: geertsen @inet.uni-c.dk

Dr GINSPARG Paul, High Energy Physics Theory
Division, Los Alamos National Laboratory,
MS-B285, LOS ALAMOS NM 87545, U.S.A.,
Tel.: 1-505-667 7353, Fax: 1-505-6675585,
Email: ginsparg@lanl.gov

Mrs GUNNARSON Kerstin, The Royal Swedish
Academy of Sciences, Box 5005, S 104 05
STOCKHOLM, Sweden, Tel.: 46-8-673 9505,
Fax: 46-8-15 56 70, Email: kerstin@admin.kva.se

Mr HAHN Saul, Basic Sciences & Networking Dept. of
Library & Technological Affairs,
Organization of American States, 1889 F Street NW,
WASHINGTON DC 20006, U.S.A.,
Tel.: 1-202 458 3359, Fax: 1-202 458 3167,
Email: shahn@umds.umd.edu

Dr HALL Sydney, Crystallography Centre,
University of Western Australia, NEDLANDS 6009,
Western Australia, Tel.: 61-9-380 2727,
Fax: 61-9-380 1118, Email: syd@crystal.uwa.edu.au

Prof. HANSON Owen, Centre for Business System
Applications, City University, Northampton Square,
LONDON EC1V OHB, U.K.

Mr HARAVU Lakshminararimh, Library &
Documentation Services, ICRISAT, PATANCHERU
502 324 AP, India, Tel.: 91-40-596 161,
91-40-241 239, Email: l.haravu@cgnet.com

Prof. Dr HASHISH Mohamed Abdel-Moneim, Cairo University, Faculty of Engineering, GIZA, Egypt, Tel.: (202) 5739118, (202) 5723486

Prof. HEARN Anthony, Astronomical Institute, Postbus 80000, 3508 TA UTRECHT, The Netherlands, Tel.: 31-30 53 52 02, Fax: 31-30 253 52 01, Email: ahearn@fys.ruu.nl

Prof. HECK André, Observatoire Astronomique de Strasbourg, Université de Strasbourg, 11 rue de l'Université, F-67000 STRASBOURG, France, Tel.: 33-88 15 0743, Fax: 33-88 49 12 55, Email: heck@astro.u-strasbg.fr

Mr HEINE Gerhardt, European Commission, D6 XIII/E, JMO B4-11, L-2920 LUXEMBOURG, Luxembourg, Fax: 352-4301 331 90, Email: gerhard.heine@lux.dg.13.ccc.be

Dr HILLERUD Kai-Inge, Executive Secretary, Royal Swedish Academy of Sciences, P.O. Box 50005, S-104 05 STOCKHOLM, Sweden, Tel.: 46-8-673 9500, Fax: 46-8-673 9590, Email: kai@internet.kva.se

Ms HOLMES Aldyth, NRC Research Press, Building M-55, Montréal Road, OTTAWA K1A 0R6, Canada, Tel.: 1-613-993 1931, Fax: 1-613-952 7656, Email: aldyth.holmes@nrc.ca

Ms HOLOVIAK Judy, American Geophysical Union, 2000 Florida Avenue, NW, WASHINGTON, DC 20009, U.S.A., Fax: 1-202 328 0566, Email: jholoviak@kosmos.agu.org

Prof. HOOGENBOOM A.M., IUPAP, Working Group on Electronic Communication, Julianalaan 74, 3722 GS BILTHOVEN, The Netherlands, Tel.: 31-30 28 56 26, Fax: 31-30 25 13 81, Email: hoogen@fys.ruu.nl

Dr HOWDLE Steve, Dept. of Chemistry, University of Nottingham, University Park, NOTTINGHAM NG7 2RD, U.K., Tel.: 44-115 951 3486, Fax: 44-115 951 3563, Email: steve.howdle@nottingham.ac.uk

Mr INGER Simon, CatchWord Limited, P.O. Box 261, ABINGDON, Oxfordshire OX14 3BP, U.K., Tel.: 44-1235 555877, Fax: 44-1235 536500, Email: simon.inger@catchword.co.uk

Mr JINDAL Ian, ITP Journals, 2-6 Boundary Row, LONDON SE1 8HN, U.K., Tel.: 44-171 865 0066, Fax: 44-171 410 6600, Email: ian.jindal@rapidcom.co.uk

Mr JONES Glyn, The Biochemical Society/Portland Press Ltd., 59 Portland Place, LONDON W1N 3AJ, U.K., Tel.: 44-171 580 5530, Fax: 44-171 637 3626, Email: glynj@biochemsoc.org.uk or glynj@portland-pres.co.uk

Dr JONES Dennis, ICL, Lovelace Road, BRACKNELL, Berks. RG12 8SN, U.K., Fax: 44-1919 400 393, Email: dennis.jones@iclnet.co.uk

Mr KADRI Mohamed Salah, Ministere de la Culture, Avenue du 2 mars, Le Kasbah, TUNIS, Tunisia, Tel.: 216-1 262 763, Fax: 216-1 560 832

Ms KESSLER Elisabeth, *Ambio*, Royal Swedish Academy of Sciences, Box 50005, S-104 05 STOCKHOLM, Sweden, Tel.: 46-8-166 251, Fax: 46-8-166 251, Email: elisabct@ambio.kva.se

Mr KIDD Robert, Allen Press Ltd., P.O. Box 70, PALLISADES, NY 10964-00170, U.S.A., Tel.: 1-914 365 2633, Fax: 1-914 365 2633, Email: 73251.1234@compuserve.com

Dr KIMBERLEY Robert, Institute for Scientific Information, Brunel Science Park, UXBRIDGE UB8 3PQ, U.K., Tel.: 44-1895-270 016, Fax: 44-1895-256 710, Email: kimberle@isinet.com

Dr KIRCZ J.G., Van der Waals Zeevan Laboratory, University of Amsterdam, Elsevier, BV, Valckenierstraat 65, 1018 XE AMSTERDAM, The Netherlands, Tel.: 31-20-5255 719, Fax: 31-20-4211 844, Email: kircz@phys.uva.nl

Dr KIRSOP Barbara, Bioline Publications, Stainfield House, Stainfield, BOURNE,

Lincs. PE10 0RS, U.K., Fax: 44-1778 510175,
Email: barbara@biostrat.demon.co.uk

Dr KLIMES Ivan, IITL JOURNALS,
2-6 Boundary Row, LONDON SE1 8HN, U.K.,
Tel.: 44-171 865 0066, Fax: 44-171 410 6600

Ms KNAPP Susan, American Psychological
Association, 750 First Street NE, WASHINGTON,
DC 20002-4242, U.S.A., Tel.: 1-202-336 5500,
Fax: 1-202-336-5549, Email: skk.apa@email.apa.org

Dr KOSKIALA Sinikka, International Federation
of Library Associates (IFLA), Otaniementie 9,
02150 ESPOO, Finland, Tel.: 358-0 4514112,
Fax: 358-0 4514132, Email: sinikka.koskiala@hut.fi

Dr KOSKINEN-OLSSON Tarja, c/o KOPIOSTO,
IFFRO, Hietaniemenkatu 2, 00100 HELSINKI,
Finland, Tel.: 358-0-406197, Fax: 358-0-493 579

Mr LAITINEN Sauli, Technical Information Service,
Technican Research Centre of Finland (VTT),
PO Box 2000, FIN-02044 VT, Finland,
Fax: 358-0 456 4374 Email: sauli.laitinen@vtt.fi

Mr LAW Derek, Library, King's College London,
Strand, LONDON WC2 2LS, U.K.,
Tel.: Fax: 44-171 872 0207, Email: d.law@kcl.ac.uk

Mr LAW Frank, Institute of Hydrology, Maclean
Building, Crowmarsh Gifford, WALLINGFORD
OX10 8BB, U.K., Tel.: 44-1491 832256,
Fax: 44-1491 838800, Email: f.law@ish.ac.uk

Prof. LEDERBERG Joshua, President Emeritus,
Rockefeller University, NEW YORK 10021, U.S.A.,
Email: lederberg@rockvax.rockefeller.edu

Ms. LEER Anne, Oxford University Press, English
Language Teaching Division, Walton Street,
OXFORD OX2 6DP, U.K., Tel.: 44-1865 56767,
Fax: 44-1865 267622, Email: leer@oup.co.uk

Mr LEFEBVRE Lex, STM, Muurhuizen 165,
3811 EG AMERSFOORT, The Netherlands

Tel.: 31-33-65 60 60, Fax: 31-33-465 65 38,
Email: lefebvre@stm.nl

Mr LEMALLEM Mohammed, Institut Agronomique
et Vétérinaire Hassan II, B.P.6214 - Instituts,
10101 RABAT, Morocco, Tel.: 212-7 7 17 45,
Fax: 212-7 77 81 35

Dr LERCH Irving, The American Physical Society,
1 Physics Ellipse, College Park, MD 20740-3844,
U.S.A., Tel.: 1-301 209 3236, Fax: 1-301-209 0865,
Email: lerch @is2.nyu.edu or lerch@aps.org

Dr LESKIEN Hermann, Bayerische Staatsbibliothek, D-
80328 MÜNCHEN, Germany
Fax: 49-89-28638-293, Email: dir@bib.bvb.d400.de

Ms LEVEY Lisbeth, Sub-Saharan Africa Program,
Am. Ass. for the Advancement of Science,
1333 H Street NW, WASHINGTON DC 20005,
U.S.A. Tel.: 1-202-326 6730, Fax: 1-202-289 4958,
Email: llevey@aaas.org

Mr LLEWELLYN Tony, CAB International,
WALLINGFORD, Oxon. OX10 8DE, U.K.,
Fax: 44-1491 832111, Email: T.llewellyn@cabi.org

Mr LOGGER Joachim, ZIB, Heilbronner Strasse 10,
D 10711 BERLIN WILMERSDORF, Germany,
Tel.: 49-30 89604 207, Fax: 49-30 89604 125

Dr LUBECK Scott, National Academy of Sciences,
2101 Constitution Avenue NW, HA-384,
WASHINGTON DC 20418, U.S.A.,
Tel.: 1-202-334 3324, Fax: 1-202-334 2793,
Email: slubeck@nas.edu

Dr LUKSCH Peter, FIZ Karlsruhe,
Gelände des Forschungszentrums Karlsruhe, D-76344
EGGENSTEIN-LEOPOLDSHAFEN, Germany,
Tel.: 49-72 47 808, Fax: 49-72 47 808

Dr LUPOVICI Christian, Université de Marne-
la-Vallée, Bibliothèque, 1 rue de la Butte Verte,
F-93166 NOISY LE GRAND Cédex, France,
Email: lupovici@univ-mlv.fr

Dr LUSTIG Harry, American Physical Society,
4 Washington Place, NEW YORK, NY 10003, U.S.A.,
Tel.: 1-212 998 7695, Fax: 1-301 209 0844,
Email: lustig@aps.org.

Dr MARTON-LEFEVRE Julia, ICSU,
51 Boulevard de Montmorency, 75016 PARIS, France,
Tel.: 33-1-45 2503 29, Fax: 33-1-42 88 94 31,
Email: icsu@lmcp.jussieu.fr

Mr MASTRODDI Franco, Directorate General XIII,
European Commission, DG XIII-E, JMO B4/32,
Bat. J. Monnet, Plateau du Kirchberg,
L-2920 LUXEMBOURG, Luxembourg,
Tel.: 352-4301-33020, Fax: 352-4301-33909,
Email: franco.mastroddi@dg13.lux.cec.be

Mr McMAHON Brian, International Union
of Crystallography, 5 Abbey Square,
CHESTER CH1 2HU, U.K., Tel.: 44-1244-342 878,
Fax: 44-1244-314 88, Email: bm@iucr.ac.uk

Mr McROBBIE Stuart, Oxford University Press,
Walton Street, OXFORD OX2 6DP, U.K.,
Tel.: 44-1865 267679, Fax: 44-1865 267680,
Email: mcrobbie@oup.co.uk

Mr MIKOYAN Alexandre, Center of Geophysical
Computer Data Studies, Russian Academy of Sciences,
P.O. Box 23, MOSCOW 109651, Russia,
Fax: 7-095 133 4339, Email: mik@wdcb.rssi.ru

Dr MØLLER Søren, Roskilde University Library,
P.O. Box 258, DK-4000 ROSKILDE, Denmark
Tel.: 45-4675 7711, Fax: 45-4675 6102,
Email: moller@emma.ruc.dk

Dr MOORE Howard, Science Sector, UNESCO,
1, rue Miollis, 75732 PARIS Cédex 15, France
Tel.: 33-1 45 68 41 44, Fax: 33-1 47 34 20 49,
Email: h.moore@unesco.org

Ms MORRIS Sally, John Wiley & Sons Ltd., Baffins
Lane, CHICHESTER, W. Sussex PO19 1UD, U.K.,
Fax: 44-1243 770122,
Email: GBJSJI@IBMMAIL.COM

Dr NECHITAIENKO Vitaly, Geophysical Center,
Russian Academy of Sciences, 3 Molodezhnas Str.,
MOSCOW 117296, Russia, Tel.: 7-095-930 5649,
Fax: 7-095-930 5509, Email: vitaly@wdcb.rssi.ru

Mr NEDOBITY Wolfgang, Generalsekretariat,
Österreichische Rektorkonferenz, Liechtensteinstrasse
22, A-1090 WIEN, Austria, Tel.: 43-1-310 5656 21,
Fax: 43-1-310 56 56 22, Email: nedobit@reko.ac.at

Dr NEMOGA Karol, Institute of Mathematics,
Slovak Academy of Sciences, Stefanikova 49,
814 73 BRATISLAVA, Slovakia, Fax: 427-496 316,
Email: nemoga@mau.savba.sk

Prof. Dr NEY Bogdan, Polish Academy of Sciences,
Centre for Science Advancement, Palac Kultury i
Nauki, Pokoj 2414, 00-901 WARSZAWA, Poland,
Tel.: 48 22 26 65 12, Fax: 48-22-26 65 12

Mr NIELSEN KNUD Arne, Munksgaard
International Publishers Ltd., P.O. Box 2148, Noerre
Soegade 35, 1016 COPENHAGEN K, Denmark,
Email: kan@mail.munksgaard.dk

Mr NOORMAN Geert, Elsevier Science, Sara
Burgerhartstraat 25, AMSTERDAM 1055 KV,
The Netherlands, Tel.: 31 20 485 2813,
Fax: 31-20 485 2323, Email: g.noorman@elsevier.nl

Dr NYIRENDA Paulos, Chancellor College,
University of Malawi, P.O. Box 280, ZOMBA,
Malawi, Tel.: 265-522 222, Fax: 265-522 046,
Email: pnyirenda@unima.wn.apc.org

Mr ODARTCHENKO Nicolas, International Journal
of Cancer, ISREC, CH-1066 EPALINGES,
Switzerland, Fax: 41-21 652 77 05,
Email: intjcanc isrec-sun1.unil.ch

Ms OKERSON Ann, Yale University, P.O. Box
208240, 130 Wall Street, NEW HAVEN,
CT. 06520-8240, U.S.A., Fax: 1-203 432 7231,
Email: ann.okerson@yale.edu.

Ms ORFUS Marthe, ICSTI, 51, Boulevard de
Montmorency, 75016 PARIS, France,

Tel.: 33-1-45 25 65 92, Fax: 33-1-42 15 12 62,
Email: icsti@paris7.jussieu.fr

Mr O'SHEA Robert, Lindsay Ross International Ltd.,
Foxcombe Court,, Abingdon Business Park,
ABINGDON, OX14 1GA, U.K.,
Tel.: 44-1235 553955, Fax: 44-1235 550559,
Email: linross@dircon.co.uk

Ms PAGE Gillian, Pageant Publishing, 1 Weir Garden,
PERSHORE, Worcs. WR10 1DX, U.K.,
Tel.: 44-1386 561119, Fax: 44-1386 561125

Mr PATOU C., INIST, 2 allée du Parc de Brabois,
54514 VANDOEUVRE-LES-NANCY
Cédex, France, Tel.: 33-8350 46 00 ext.4321,
Fax: 33-83 50 46 50, Email: patou@inist.fr

Mr PHONDKE G., Publications & Information
Directorate, Dr K.S. Krishnan Road, NEW DELHI
110012, India, Tel.: 91-11-5746024,
Fax: 91-11-5787062, Email: pid@sirneted.ernet.in

Dr PULLINGER David, Nature, Macmillan,
4-6 Crinan Street, LONDON N1 9SQ, U.K.,
Tel.: 44-171 843 4764, Fax: 44-171 843 4766,
Email: d.pullinger@nature.com

Mr ROWBOTHAM Graham, INASP, P.O. Box 2564,
LONDON W5 1ZD, U.K., Tel.: 44-181 997 3274,
Fax: 44-181 810 9795, Email: cpriestley@gn.apc.org.

Ms RERAT Kirsten, INRA-CRJ, 78352 JOUY EN
JOSAS Cédex, France, Tel.: 33-1 34 65 2490,
Fax: 33-1-34 65 24 92

Mr RICHARDSON Martin, Oxford University Press,
Walton Street, OXFORD OX2 6DP, U.K.,
Fax: 44-1865 267985, Email: richarm@oup.co.uk

Mr ROSE John, Communications Sector, UNESCO,
1, rue Miollis, 75732 PARIS Cédex 15, France,
Tel.: 33-1 45 68 45 29, Fax: 33-1 45 67 43 58,
Email: j.rose@unesco.org

Dr RUSSON David, The British Library, Boston Spa,
WETHERBY, West Yorkshire LS23 7BQ, U.K.,

Tel.: 44-1937-546 131, Fax: 44-1937-546 246,
Email: david.russon@bl.uk

Mr SAINSBURY George, Auldearn Main Street,
BLEASBY, Nottinghamshire NG147GH, U.K.,
Tel.: 44-636 1 830499, Fax: 44-1636 1 830 175,
Email: gs.books@dcmon.co.uk

Mr SANDFAER Mogens, Technical Knowledge
Center & Library of Denmark, P.O. Box 77,
DK-2800 LYNGBY, Denmark, Tel.: 45-45 25 73 12,
Fax: 45-45 88 82 56, Email: ms@dtv.dk

Mr SEELEY Mark, Elsevier Science, Sara
Burgerhartstraat 25, 1055 KV AMSTERDAM,
The Netherlands, Fax: 31-20 485 2756,
Email: m.seeley@elsevier.nl

Prof. SENS Hans, PPE Division, CERN,
CH-1211 GENEVE 23, Switzerland,
Tel.: 41-22-767 6753, Fax: 41-22-782 7558, Email:
sens@cernvm.cern.ch

Dr SHAW Dennis, Keble College, University of
Oxford, OXFORD OX1 3PG, U.K.,
Tel.: 44-1865-272727, Fax: 44-1865-272 705, Email:
dennis.shaw@keb.ox.ac.uk

Mr SHRESTHA Lalit, Publication Unit, Royal Nepal
Academy of Science & Technology,
P.O. Box 3323, Ronast, KATHMANDU, Nepal,
Tel.: 977-1-213 060, Fax: 977-1-521 373,
Email: ronast@npl.healthnet.org

Prof. Dr Sc. SILEIKA Algirdas, Division of
Mathematical, Physical & Chemical Sciences,
Lithuanian Academy of Sciences, MTP1 Gediminio
pr. 3, 200 VILNIUS, Lithuania,
Tel.: 370-262 21 36, Fax: 370-261 84 64

Prof. SIMMONDS Michael, Department of
Pharmacology, School of Pharmacy,
University of London, 29/39 Brunswick Square,
LONDON WC1N 1AX, U.K., Tel.: 44-171 753 5807,
Fax: 44-171 753 5807, Email: simmonds@ulsop.ac.uk

Mr SMITH Kent, National Library of Medicine,
8600 Rockville Pike, Bethesda MD 20894, U.S.A.,
Tel.: 1-301-496 6661, Fax: 1-301-496 4460

Mr SPILHAUS, Jr. A.F., American Geophysical
Union, 2000 Florida Ave. NW, WASHINGTON D.C.
20009, U.S.A., Tel.: 1-202-939 3219,
Fax: 1-202-328 0566, Email: fspilhaus@kosmos.agu.org

Mr ST. JOHN Gregory, John Wiley & Sons, Inc.,
605 Third Avenue, NEW YORK, NY 10158, U.S.A.,
Fax: 1-212 850 8888, Email: gstjohn@jwiley.com

Mr SWANSON Eric, John Wiley & Sons, Inc.,
605 Third Avenue, NEW YORK, NY 10158, U.S.A.,
Fax: 1-212 850 8728, Email: eswanson@jwiley.com

Prof. TANDBERG Olof, The Royal Swedish Academy
of Sciences, Box 50005, S-104 05 STOCKHOLM,
Sweden, Tel.: 46-8 673 9514, Fax: 45-8 15 56 70,
Email: olof@utland.kva.se

Ms THORNE Joan, Zoological Record,
54 Micklegate, YORK, N. Yorks. YO1 1LF, U.K.,
Tel.: 44-1904 642816, Fax: 44-1904 612793,
Email: jthorne@york.biosis.org

Prof. VAAGAN Robert, Norwegian Academy of
Science and Letters, P.O. Box 7585 Skillebekk,
N-0205 OSLO, Norway, Tel.: 47-22 44 42 96,
Fax: 47-22 56 26 56, Email: vaagan@oslonett.no.

Mr VALANTIN Robert, IDRC, 250 Albert Street,
OTTAWA, Ontario K1G 3H, Canada,
Fax: 1-613 563 3858, Email: rvalantin@idrc.ca

Prof. VAN BLADEL Jean, G. Desmetlaan 22, B9831
ST. MARTENS LATEM, Belgium,
Tel.: 32-9 264 3320 Fax: 32-9 264 4288,
Email: inge.helcu@intec.rug.ac.be

Dr VAN GILS Wouter, Library KNAW, P.O. Box
41950, 1009 DD AMSTERDAM, The Netherlands,
Tel.: 31-20 668 5511, Fax: 31-20 694 2486,
Email: wouter.van.gils@library.knaw.nl

Dr VANDENBOS Gary, American Psychological Ass.,
750 First Street NE, WASHINGTON,

DC 20002-4242, U.S.A., Tel.: 1-202-336 5500,
Fax: 1-202 336 5630, Email: gvb.apa@email.apa.org

Mr VOOGT Leo, IFLA, P.O. Box 95312, 2509 CH
THE HAGUE, The Netherlands,
Tel.: 31-70 3140 884, Fax: 31-70 383 4827,
Email: leo.voogt@IFLA.NL

Dr VOUTSSAS Marquez Juan, Centro de Informacion
Cientifica y Humanistica, UNAM, Ciudad
Universitaria, 04510 MEXICO D.F., Mexico, Tel.: 525
616 2557,
Email: voutssas@selenc.cichu.unam.mx

Dr WAAIJERS Leo, Delft University of Technology
Library, P.O. Box 98 - Schuttersveld 2, 2600 MG
DELFT, The Netherlands, Tel.: 31-15 278 5656,
Fax: 31-15 215 87 59,
Email: waaijers@library.tudelft.nl

Dr WAPPLING Roger, Royal Swedish Academy
of Sciences, Box 50005, S-10405 STOCKHOLM,
Sweden, Tel.: 46-8 18 25 98, Fax: 46-8 18 23 524,
Email: rogerw@fysik.uu.se

Mr WATKINSON Anthony, Director, Chapman &
Hall Publishers, 2-6 Boundary Row, LONDON SE1
8HN, U.K., Tel.: 44-171 410 6904,
Fax: 44-171 522 9624,
Email: anthony.watkinson@chall.co.uk

Prof. WEDGEWORTH Robert, University Library,
230 Main Library, University of Illinois at
Urbana-Champaign, 1408 West Gregory Drive,
URBANA, IL 61801, U.S.A. Tel.: 1-217 333 0790,
Fax: 1-217 244 4358, Email: rwedge@uiuc.edu

Dr WILLIAMS, IUPAC, Bank Court Chambers,
2-3 Pound Way, Templars Square, Cowley, OXFORD
OX4 3YF, U.K., Tel.: 44-1865 747744,
Fax: 44-1865 747510, Email: iupac@vax.oxford.ac.uk

Prof. WYSOCKI Adam, Polish Foundation for Science
Advancement, Palac Kulturyi Nauki, skr. poczt. 27,
00 901 WARSZAWA, Poland, Fax: 48-22-6209174

Prof. YACE Ignace, Departement des Sciences de
la Terre, Université Nationale de Cote d'Ivoire,

BP 972, ABIDJAN 22, Côte d'Ivoire,
Tel.: 225 442098, Fax: 225 440821

Dr YILMAZ Tugrul, Scientific and Technological
Research Council of Turkey, Ataturk Bulvari 221,
Kavaklidere, 06100 ANKARA, Turkey,
Tel.: 90-312 468 53 00, Fax: 90-312 426 9207,
Email: tugrl@heraklit.physics.metu.edu.tr

Dr YOCUM Patricia, University of Michigan,
3026 Shapiro Science Library, ANN ARBOR
MI 48109 1185, U.S.A., Tel.: 1-313 936 3079,
Fax: 1-313 763 9813, Email: pyocum@umich.edu

Dr ZEMSKOV Andrei, Russian National Public
Library for Science and Technology, 16669 Koneva
Str., MOSCOW 123060, Russia, Tel.: 7-095925 9288,
Fax: 7-095921 9862, Email: zemskov@gpntb.msk.su

Geographical breakdown of participants

Australia 1	Morocco 1
Austria 2	Nepal 1
Belgium 2	Netherlands 10
Brazil 1	Norway 2
Canada 3	Poland 2
Côte d'Ivoire 1	Russia 3
Denmark 4	Senegal 1
Egypt 2	Slovakia 1
Finland 3	Sweden 5
France 9	Switzerland 2
Germany 6	Tunisia 1
India 3	Turkey 1
Iran 1	Uganda 1
Japan 1	United Kingdom 46
Lebanon 1	United States 20
Lithuania 1	Venezuela 1
Malawi 1	International agencies 10
Mexico 2	

Author index

- | | | | |
|------------------|----------|-------------------|----------|
| Armati, D. | 25 | Law, D. G. | 117 |
| Barrow, E. | 36 | Lederberg, J. | 122 |
| Boyce, P. B. | 43 | Levey, E. | 184 |
| Canhos, D. A. L. | 48 | Lustig, H. | 127 |
| Canhos, V. P. | 48 | Mastroddi, F. A. | 131 |
| Cetto, A. M. | 168, 184 | Mayor, F. | 19 |
| Clark, C. | 53 | Mischo, W. H. | 174 |
| Coles, B. R. | 68 | Moore, H. | 7 |
| Donovan, B. | 187 | Okerson, A. | 143 |
| Dooge, J. C. I. | 21 | Pullinger, D. J. | 151 |
| Dreier, T. K. | 71 | Roosendaal, H. E. | 106 |
| Elliott, R. | 13 | Rose, J. | 186 |
| Epelboin, Y. | 186 | Sens, J. C. | 162 |
| Ginsparg, P. | 83 | Shaw, D. F. | 7 |
| Hall, S.R. | 89 | Souza, S. de | 48 |
| Heck, A. | 95 | Voutssas, J. | 168 |
| Kemp, A. de | 102 | Watkinson, A. | 182 |
| Kircz, J. G. | 106 | Wedgeworth, R. | 174, 183 |
| Kirsop, B. | 48 | Yocum, P. | 183 |