

PART 1. OVERVIEW OF THE COLLOQUIUM

REPORT ON THE DISCUSSIONS ON LIBRARY AND INFORMATION SERVICES IN
ASTRONOMY DURING IAU COLLOQUIUM 110 (WASHINGTON, D.C., 1988)

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ABSTRACT. This report provides an overview of the presentations and summarises the discussions at IAU Colloquium 110, which was held in Washington, D.C., on 1988 July 26-30 and at the Goddard Space Flight Center on 1988 August 1. The topics included: the publication and acquisition of books and journals; searching for astronomical information; the handling and use of special-format materials; conservation; archiving of unpublished documents; use of computers in libraries; astronomical databases and various aspects of the administration of astronomy libraries and services. Particular attention was paid to new developments, but the problems of astronomers and institutions in developing countries were also considered.

1. INTRODUCTION

1.1 Background to the Colloquium

The concept of a workshop for astronomy librarians was developed during informal discussions at the 19th General Assembly of the International Astronomical Union (IAU) at Delhi in 1985 December. Only a few librarians attended that meeting, and it was clear that discussions on some topics of concern to Commission 5 (Documentation and Astronomical Data) suffered from the inadequate representation of the providers of the services that are used by astronomers. Moreover, it was recognised that a greater face-to-face exchange of information and ideas between librarians would be very valuable, especially for librarians who do not normally have any opportunity to meet other librarians working in astronomy or related fields. It was agreed that the attempt should be made to organise a workshop just before the 20th General Assembly and to encourage a greater attendance by librarians at the Assembly itself so as to promote further interactions between astronomers and those who provide various kinds of information services. After further discussions and correspondence, proposals were submitted to the IAU Executive Committee for holding an IAU Colloquium at the U. S. Naval Observatory in Washington, D.C., in late July and a Joint Discussion early in the Assembly at Baltimore; it was also requested that participants in the Colloquium be entitled to attend the Joint Discussion even if they did not attend the rest of the General Assembly. In spite of their unusual character these proposals and the request were approved; both meetings proved to be very successful and attracted greater attendances than were originally expected. The presentations and discussions at Baltimore have been summarized by Wilkins (1989). There was necessarily some overlap between the two meetings, but to a large extent the programme for the Joint Discussion on 'New Developments in Documentation and Data Services for Astronomers' complemented that of the Colloquium on 'Library and

Information Services in Astronomy'. Some of the topics were considered at the subsequent meetings of Commission 5 and, where appropriate, discussions about further action were taken (IAU5 1989).

The development of the programme of LISA 1988 from my initial outline draft owed much to the efforts of Ellen Bouton and Sarah Stevens-Rayburn, who were co-opted to the Scientific Organising Committee after they had provided very detailed suggestions for both topics and possible contributors. The new techniques of electronic mail and telefax proved invaluable for the subsequent correspondence.

1.2 Basis of the Report

The Colloquium consisted of sessions of various kinds according to the nature of the topic being considered. In some cases the conventional format of formal papers followed by discussion was adopted, but for many topics the programmed contributions were informal and short (5 or 10 minutes at the most), and were intended to provide introductions to general discussions. As a consequence, it would generally have been inappropriate to attempt to associate the record of the discussions with individual printed papers. Instead this report contains, for each topic, summaries of the prepared contributions and of the discussions. The time available for open discussion was often not long enough, and so participants were invited to submit written questions to the speakers; their replies and other written comments are summarised in the report as 'other comments'. In some, but not all cases, the main speakers have provided short papers that are printed after this report, together with some papers that were originally presented in poster form at greater length. References to these papers are given by numbers, in square brackets, which correspond to the numbers given in the table of contents.

The text of this report is based on notes taken by the author and by other participants (see section 8.3) and on notes provided afterwards by some of those who participated in the discussions. Unfortunately, it has not been possible to include all the material that has been provided, but it is hoped that the report does give both a useful record of the facts and ideas that were presented and a fair account of the differences of opinion that were expressed. The text does not always follow the chronological sequence of the spoken words and it does not always name the persons who spoke. The main aim has been to provide a coherent report that will be of value to many who were unable to attend a very stimulating conference.

1.3 Framework of the Colloquium

For most of the participants this was the first time that they had been able to meet their colleagues from overseas even though they might have corresponded on library matters. The formal programme of technical sessions was embedded in a framework of activities that provided many opportunities for informal discussions at a personal level. The initial registration and reception were held in the library of the U.S. Naval Observatory on Wednesday evening and a picnic lunch was held at the Observatory on Saturday; most took the opportunity to see some of

the telescopes and other facilities. A visit to the Library of Congress on Friday afternoon proved to be interesting and instructive, and the buffet that was generously provided at the end of the visit was much appreciated. The final sessions on Monday, August 1, were held at the Goddard Space Flight Center; the papers and discussion in the morning were followed by a tour of the data center; and in the afternoon participants visited the library, some of the main test and assembly buildings, and the visitors' centre. At this point the Colloquium ended, some of the participants returned to Washington while others went to Baltimore for the IAU General Assembly.

At the Dupont Plaza Hotel, where most of the technical sessions were held, there was a hospitality suite that proved to be very popular in the evenings. An adjacent room contained two terminals that were used, especially in the evenings, for live demonstrations of the use of remote databases for the retrieval of astronomical references and data. The Conference banquet on Saturday evening was enlivened by Dr. Gart Westerhout, the Scientific Director of the U.S. Naval Observatory, when he introduced the after-dinner speaker Prof. Gerrit Verschuur, who in turn gave a witty but thoughtful address. The dinner also provided an opportunity for everyone to thank Brenda Corbin, who had done so much to make the Colloquium an undoubted success; she has since written up her impressions of LISA 1988 and her article (Corbin 1988a) gives further details of its non-technical activities.

The Colloquium was opened by Westerhout, who had enthusiastically supported the proposal for the Colloquium and who had been the active chairman of the Local Organising Committee. The President of Commission 5, G. A. Wilkins, then described briefly the background to the Colloquium and expressed the hope that the Colloquium would justify both the decision of the IAU Executive Committee to support it and all the effort that had been expended in preparing for it. At the end of the Colloquium it was clear that this hope had been fulfilled.

2. PUBLICATION AND ACQUISITION OF BOOKS AND JOURNALS

2.1 The publication of astronomical books and journals

2.11 H. A. Abt: The future of astronomical literature [see paper 2]. Helmut Abt, the editor of the *Astrophysical Journal*, spoke first of all about the problems caused by the growth in the volume and cost of astronomical journals; he advocated a wider adoption of page charges and large, general journals. He also considered the ways in which new technology might be used and the possibility of replacing printed journals by a central memory bank that would allow readers to select the papers that they wish to read.

2.12 G. Kiers: The pricing of commercial publications. Gerrit Kiers, of the Kluwer Publishing Company, spoke of the make-up of the prices of commercial astronomical publications. Apart from direct production costs (editing, composition, paper, printing and binding) the commercial publisher has to pay royalties to authors (or to the IAU, in the case of IAU publications), advertising costs, overheads and

dividends to shareholders; most of the publications are sold through agents and booksellers, so that the final sale price is usually at least 50% higher than the amount received by the publisher. The publisher's profit margin is small. Commercial publishers take on specialist books for which the number of copies sold is small, but they must print enough copies to avoid small reprint runs. Moreover, they do not have the benefit of subsidies from page-charges or other sources.

2.13 P. Boyce: The pricing of astronomical journals. [3] Peter Boyce illustrated his talk by reference to the policy and experience of the American Astronomical Society (AAS). The aim is to produce journals of high quality at a price that just balances costs and revenue; the AAS journals are published by the American Institute of Physics (AIP). The Society faces the conflict between rising production costs and falling numbers of subscriptions. New technology will make, at most, a small reduction in production costs; at present, submission of papers in electronic form is not cost effective. It is not practicable to limit the size of the journal to keep down the subscription. Finally, he referred to a paper by Barschall (1988), who advocates that authors should submit their papers to journals that have a low cost per character.

2.14 Discussion. Del Frate wondered whether the high data-rate from the Space Telescope would lead to a corresponding increase in the number of papers published; Abt noted that the International Ultraviolet Explorer (IUE) mission had generated about 1000 papers so far, but he considered that the number of astronomers is the main factor in determining the number of papers that are prepared. Ratnakar enquired about the acceptance rate for the Astrophysical Journal and whether the quality of the submitted papers is falling. Abt said that about 90% of papers are accepted; there seemed to be no evidence for any drop in quality. The acceptance rate in astronomy tends to be higher than that in science generally, and this is in turn much higher than that in sociology. This appears to be due to the small number of astronomical journals and to referees being expected to give reasons for rejection; papers are improved and resubmitted to the same journal. Buscombe was concerned that the delays in publication due to the refereeing process had increased considerably over the past 50 years. Abt said that the average reviewing time for the Astrophysical Journal is 28 days; delays do occur if a paper has to be referred to a second referee or to an arbitrator. Papers are published about 6 months after acceptance. Robinson enquired about Kluwer's pricing policy for proceedings, and was told that the price is largely determined by the number of pages and the estimate of the sales; the mark-up to cover all overheads and provide a safety margin usually varied between 6 and 12% of the production cost. Shobbrook commented that the large difference between the prices of paperback and the hardback editions of the proceedings of IAU symposia is tempting librarians to buy and then bind the paperback edition. Kiers replied that the paperback editions are provided, at the request of the IAU, as a service for individual astronomers and, since this does not give any profit, this would be

withdrawn if the sales of the hardback editions to libraries fall any further. Abt suggested that librarians should patronise journals that imposed page charges since these reduce the costs to the library.

2.15 Other comments. In response to written questions by Knudsen about page charges, Abt pointed out that this system is dominant in the USA, but is not permitted in some countries; there are factors other than page charges which influence authors in the choice of journals for the submission of their papers. Referees and editors have the responsibility to ensure that papers are not verbose or redundant; papers are getting longer largely because projects are becoming more complex and cannot be adequately described in a few words. Stevens-Rayburn was also concerned at the increases in the number of pages and in the number of authors per paper; Abt said that there had been a significant increase in the number of pages per author. Molholt was concerned that external pressures (relating to promotion or grants) were leading to unjustified increases in the number of papers per author.

Ilyas drew attention to the savings that would follow from the more widespread adoption of a large page, double-column format for journals. This reduces the volume of paper used and leads to savings in the costs to the publisher of production and postage and to the librarian in shelving and binding. He also advocated greater standardization between astronomical journals in their requirements for the style of the manuscripts and the inclusion of the titles of papers in references. He pointed out that the relative cheapness of journals that have page charges is of benefit to developing countries.

2.2 The problem of international acquisition

2.21 H. Knudsen: Introduction. In introducing the members of the panel on the problems of international acquisition, the moderator, Helen Knudsen, recalled that Weigel had attended a meeting of astronomical librarians at the IAU General Assembly at Hamburg in 1964. [The record of the meeting of Commission 5 at Hamburg (IAU5 1966, p. 106) states that "Dr Pecker made a personal statement calling attention to the absence from Commission 5 of both astronomical librarians and editors of astronomical journals ..."; it was decided to set up a permanent working group of the Commission. It appears (IAU5 1966, p. lxxvii) that the International Federation of Library Associations formed a Working Group of astronomy librarians at its meeting in The Hague in 1966, and Weigel spoke there on the classification system of the Library of Congress. The working group of Commission 5 was allowed to lapse in 1970 (IAU5 1971, p. 88).]

2.22 O. B. Dluzhnevskaya: Problems in the U.S.S.R. [4] Olga Dluzhnevskaya said that in the USSR the amount of western currency that is allocated to scientific librarians is sufficient to pay for only the principal astronomical journals; very little is available for the purchase of monographs. She requested that more western publications be made available by exchange, either directly with observatories or through the Academy of Sciences. She drew attention to the recent editions of the General Catalogue of Variable Stars and to its supplements.

2.23 J. Weigel: Difficulties for western nations. [5] Jack Weigel mentioned two sources of difficulty that are encountered by western librarians in obtaining journals and books from the Soviet Union and other parts of the world; the small number of copies printed and the lack of timely information about new publications. He agreed that greater use of flexible exchange agreements could be useful, but many observatories, for example, no longer produce their own publications. He suggested that there is also a need for a greater exchange of information about new publications, and he wondered if the IAU Information Bulletin might increase its coverage beyond IAU publications.

2.24 S. S. de Guerra: Problems of developing countries. [6] Selma de Guerra said that the problems in developing countries also arise mainly from the lack of foreign currency, but they are compounded by the demands for advance payment and by delays and losses in the post. She would like to be able to obtain books on approval and she finds that central purchasing by a group of institutions in the same area is helpful. Other sources of difficulty are the different subscription years of journals and dealers who are not interested in titles that are not easy to obtain.

2.25 Lui Jinming: Problems in China. [7, 8] Lui Jinming drew attention to the procedures and problems of the purchase of publications, which are similar to those in other countries. Chinese astronomical journals are, however, produced in observatories, which would like to receive other journals in exchange. Chinese librarians would also like to receive more preprints even though, as he recognised, China is not able to produce well-printed preprints for exchange.

2.26 Discussion. In opening the discussion, Knudsen urged the librarians present to ensure that the preprints of their organisations are sent to the libraries of countries such as China. Schmitz suggested that publications might be better distributed in machine-readable form, rather than in printed form, but this raised a chorus of objections; in particular, it was considered by Knudsen that observatories that have problems in obtaining journals would have greater problems in obtaining and then using, say, magnetic tapes, which vary in format and require the use of expensive equipment. Warren pointed out that authors should, however, supply machine-readable versions of data tabulations to one of the principal data centres. Wilkins suggested that a major obstacle to full exchange arrangements is the inability of western astronomers to read papers in languages like Russian and Chinese; he suggested that publications intended for exchange should be translated into English or, as a minimum, should contain long abstracts in English. Shobbrook considered that the title and contents pages of all journals should be given in English, as well as in the original language, so that the journals can be correctly identified and the papers can be easily catalogued for retrieval purposes. Hutchins requested a list of Chinese journals for which an English-language edition is published in China. They include: *Acta Astronomica Sinica*, *Acta Astrophysica*

Sinica, Publications of the Beijing Astronomical Observatory, and Progress in Astronomy; the translations are not published at the same time as the originals.

Buscombe congratulated those responsible for making the General Catalogue of Variable Stars so widely available and said that copies of some catalogues of the Northwestern University are available on request. Mattei enquired where preprints and reprints should be sent to ensure that recent findings are incorporated in the catalogue, and was told that they should be sent to the Library of the Academy of Sciences of the U.S.S.R. in Moscow.

3. SEARCHING FOR ASTRONOMICAL INFORMATION

3.1 Words for searching

3.11 L. D. Schmadel: Indexing terms. [9] Lutz Schmadel, the editor of Astronomy and Astrophysics Abstracts (AAA), said that AAA uses about 100 subject categories for arranging the abstracts and now uses a list of about 1500 primary terms and 700 secondary terms, as well as object designations, in preparing the index. Each document is indexed by not more than 5 keywords. The Working Group on Abstracting Guidelines has suggested (Schmadel 1985) that there should be a standard list of keywords, but as yet there is no agreement on the form of compound terms or on such matters as spelling and the form of abbreviations.

Wilkins referred briefly to the draft of an IAU Vocabulary that had been sent by P. Lantos, the chairman of the Working Group on Classification. It contains about 1150 terms; they have been divided into eight subject areas. It was to be considered by Commission 5, which would decide whether this Vocabulary should be included in the new IAU Style Manual. [The decision was 'no'.]

3.12 V. Alladi: A Review of classification systems. Vagiswari Alladi described and compared the principal characteristics of the four classification schemes that are currently used for astronomy.

Universal Decimal Classification (UDC): this is a faceted hierarchical system in which the current schedule for astronomy (52) was prepared with the participation of members of Commission 5. The user must have a good knowledge of the subject. The revision process is slow and cumbersome.

Library of Congress (LC): This is very convenient for US users since the Library of Congress assigns the numbers for books. The schedule for astronomy (QB) is very limited especially in respect of recent developments.

Physics and Astronomy Classification Scheme (PACS): this is a four-level hierarchical arrangement used for arranging abstracts; it is not good for the arrangements of books and it does not cover topics outside physics. [See 13b]

Astronomy and Astrophysics Abstracts: this provides only a list of about 60 subject headings in astronomy that may be related to the principal astronomical headings in PACS. It is not suitable for use outside AAA.

In using any classification scheme there is always the problem that any book or paper is rarely concerned with only one topic; UDC does, however, provide ways of specifying the various topics or aspects covered. Since there is no unique way in which this can be done, relevant items may be missed, especially in manual searches. In AAA the index in each volume is provided to assist in the retrieval of relevant abstracts, but the index terms used may not include the keywords given in the paper.

3.13 G. A. Wilkins: Revision of UDC 52. [10]. Wilkins explained why he considered that Commission 5 should participate actively in the revision of UDC 52, and he invited interested participants to meet in the evening to discuss how best this could be done. [Several of the librarians present offered to help, but more participation by astronomers is needed.]

3.14 R. M. Shobbrook: The IAU thesaurus of astronomical terms. [11]. Robyn Shobbrook first of all expressed her delight that the discussions in Delhi in 1985 in which she had participated had led to this colloquium. The discussions in Delhi had indicated the need for a thesaurus of astronomical terms and she had agreed to initiate the development of one. Such a thesaurus, which will show preferred and related terms, will be invaluable to librarians, and it should also be important for users of bibliographic databases. A draft listing has been prepared with the assistance of a panel of helpers, but a considerable amount of effort will be required to complete and check the thesaurus. In particular, assistance is needed from astronomers, and appropriate computer facilities must be available.

3.15 Discussion. Buscombe recalled the frustration that he had felt as a result of delays in books being made available because of the lack of classification numbers; he had resorted to assigning LC numbers himself for his catalogues. He had also noted that the classification schemes used were out of date and did not recognise the existence of subjects such as radio astronomy. [The latter criticism does not apply to LC or UDC, in which the appropriate codes are QB475 and 52-77.] Shobbrook admitted that there are often delays in cataloguing books in large university libraries and that the classification schedules are not completely satisfactory; she also saw the need for better communication between librarians and astronomers since, for example, a cataloguer needs to understand both the subject matter and the system used for classification. Bryson confirmed the need for the involvement of working astronomers by reference to her experience in compiling the terms for R and S in the draft thesaurus; the sources that she had consulted had contained terms that are no longer in use. Collins would like to see new terms included quickly in the thesaurus, but the classification scheme should not be changed frequently. Molholt considered that the use of classification numbers for locating books on

shelves will become less important as more users browse through the database rather than the books; it is, however, desirable that books be indexed in greater depth, at least down to chapter level.

Much of the discussion concerned the development and application of the thesaurus. Kulkarni suggested that it would be useful to study non-astronomical publications, such as *Mathematical Reviews*, which include some astronomical material. Lubowich enquired whether the use of descriptor pairs would be recommended to add further precision; Shobbrook replied that terms could be combined by the use of Boolean-logic operators. Davies referred to the question posed by Alladi about the desirability of having only one classification scheme for astronomy; she felt it would be more important to encourage the use of one thesaurus by the classification schemes. Stevens-Rayburn enquired whether the various sources, such as the American Institute of Physics (AIP) would use the new thesaurus; if not, it would add to the present confusion. Shobbrook commented that her Director also wanted an assurance that the thesaurus would be used; she hoped that the discussions at the Colloquium and at the following IAU General Assembly would lead to the services giving their support to the further development of the thesaurus. Knudsen drew an analogy with the SAO star catalogue, which combined data from different catalogues and became a de facto standard for certain purposes; she considered that the thesaurus would combine other lists of terms in an effective way and would become the standard. Molholt stressed the importance and value of the new thesaurus and offered encouragement and support in the continuation of the work; she had been involved in the creation of a thesaurus for art and architecture, and so was well aware of the amount of effort and costs involved. She felt that a well constructed, comprehensive vocabulary, which has been validated by both subject specialists (namely astronomers in this case) and by information specialists (namely librarians, abstractors and publishers), is of critical importance to every discipline as information moves from print to electronic format.

Various suggestions for the funding of the completion and maintenance of the thesaurus were put forward, including UNESCO, and an appeal to the major astronomical institutions; it was suggested that one of the principal abstracting services might offer appropriate facilities, although Davies feared that this might lead to over emphasis on terms for, say, space technology or physics. Wilkins suggested that a Working Group of Commission 5 should control the thesaurus.

3.2 Facilities for searching

3.21 H. Z. Knudsen: Astronomy and Astrophysics Monthly Index. Knudsen (1988) described the *Astronomy and Astrophysics Monthly Index* as "cheap, quick and dirty"; it does, however, cover a wide range of serial publications and gives complete information about conference proceedings. All authors are listed alphabetically on the yellow pages, and there is a permuted titles section on white pages. The index is available on magnetic tape with appropriate search routines.

- 3.22 L. D. Schmadel: Astronomy and Astrophysics Abstracts. [12]. Schmadel described the new procedures of the Astronomisches Rechen Institut (ARI) at Heidelberg for the production of the familiar and invaluable Astronomy and Astrophysics Abstracts. The aim is complete and accurate coverage with emphasis on fast delivery and the provision of tools for information retrieval. The magnetic tape containing the text is used for the composition of the printed volumes and for inclusion in the physics database of the Fachinformationszentrum (FIZ) at Karlsruhe.
- 3.23 D. A. Lubowich: Products of American Institute of Physics (AIP). [13a] The publications of AIP cover about 10% of the world's output of astronomical papers. The bibliographic information about each paper is included in the AIP database and is made available in a variety of ways. Each entry has a PACS subject code [13b] and pairs of descriptor terms (keywords).
- 3.24 J. Rey-Watson: On-line bibliographic resources. [14] Before reviewing briefly each bibliographic database that contains significant amounts of information about astronomical publications, Joyce Rey-Watson drew attention to the SIMBAD database of the Strasbourg Data Centre (CDS). This has the advantage that it is possible to search by the name of an object, even if the name does not occur in either the title or the abstract, or by appropriate properties of the objects of interest (see also 5.32 and [39, 40]).
- 3.25 W. Lück: Physics Briefs. [15] Wolfgang Lück said that the Physics Briefs database PHYS is made available by FIZ (see 3.22) through the STN network, which has nodes at Frankfurt, Columbus and Tokyo. The astronomical entries are now compiled in collaboration with ARI and will include the AAA classification code and index terms as well as the PACS codes, keywords, and object designations. On average there are 2K characters per entry and searches may be made on 24 fields and their intersections.
- 3.26 M. Collins: The INSPEC database. [16] Mike Collins said that the INSPEC database has a very broad coverage and includes the principal astronomical journals. New services for searching for chemical compounds and numerical data are now available.
- 3.27 Discussion. The participants had ample opportunity to ask further questions and to gain experience of the use of the databases mentioned in the preceding short contributions since the speakers also gave demonstrations of the use of two terminals that had been brought to the hotel. During the meeting Knudsen added that the A & A Monthly Index cannot be put on diskette for a personal computer (PC). Lück said, in response to an enquiry by Dravins, that the AAA data will not be made available separately on magnetic-tape (as had been announced earlier by ARI). Serban suggested that the author and subject indexes of AAA and of the astronomical sections of Referativnyi Zhurnal and Bulletin Signaletique should be combined together. Russo drew attention to the European Space Information System [17], which involves 5 laboratories in the current pilot project.

3.3 Getting the documents

3.31 J. Bausch: US Union List of astronomical serials. [18] Judith Bausch said that discussions on a Union List of the US holdings of astronomical serials started in 1972 and the first edition was distributed in 1983; librarians were invited to submit additional information for inclusion in a new edition.

The second edition is now being prepared on a Macintosh diskette; additional titles and information such as ISSNs are being added. The list will include non-US holdings that are notified. In response to a question by Kitt about the format in which information should be submitted, Bausch requested that the format given in the first list should be followed, and she added that guidelines are available on request.

3.32 A. R. Macdonald: UK Union list of serials. [19] Angus McDonald said that the decision to compile a UK union list of serials was made at a meeting of astronomy librarians in 1981. The list is based on the holdings of five astronomy libraries, but it is not restricted to astronomical serials. The list was distributed as computer printouts, but on-line access or microfiche would be more suitable.

3.33 Discussion. Fishburn suggested that it would be better to form a separate European union list rather than to add European holdings to the US list. Bausch and Corbin both considered that the aim should be to form an international list, and should cover historical series as well as current journals.

Knudsen said that access to European resources has proved to be very valuable. Huang considered that the extension of the US list would be very useful. Information about astronomical organisations from which librarians and others may wish to obtain information is given in the directories published by the Strasbourg Data Centre [20].

3.34 G. Russo: Introduction to computer networks. [21] Guido Russo listed the four main wide-area networks (WANs) that are used for scientific purposes by the scientific communities in North America, Europe and some other places around the world. Gateways between them allow both the transmission messages by electronic mail (e-mail) and remote login, which allows a user to carry out processing on a distant computer. Planned increases in transmission rates will remove some of the current limitations. It is possible to make connections to the networks through the X25 packet-switching system (PSS) of the international public telephone networks; this is often cheaper than the use of a leased line.

3.35 C. R. Benn: Introduction to electronic mail. [22] Chris Benn, who is the co-author of a world electronic-mail guide (Benn & Martin, 1989), claimed that e-mail is bringing about a revolution in astronomy and that it is quick, cheap and easy to use. Librarians are already finding it to be a good way of making enquiries about wanted

items. There is a need for greater standardisation in addresses. The system could be used for the distribution of astronomical news and for the exchange of software.

3.36 Discussion. Collins said that amateurs are also using e-mail for the reporting of discoveries, but there needs to be a system to filter out misidentifications, as in the case of reports to the IAU Telegram Bureau. Laloë said that the IAU Circulars are available by e-mail to those who subscribe to the printed version. Mattei enquired if there is a way of knowing that an e-mail message had reached its destination. Benn replied that some systems have an acknowledgement capability and the sender should be told if the message is not delivered within a stated time. Shobbrook pointed out that local software can be used to simplify the input of addresses or to provide alternative routes.

3.4 The dissemination and retrieval of information

3.41 S. Laloë: Review. [23] During the review and forward-look session Suzanne Laloë gave a brief, but densely-packed review of the methodology and aids for the retrieval of information from the point of view of a librarian. She discussed: types of information required, including the need to keep up with new work in the field; tools that are available, including the importance of a good classification system to aid browsing amongst the books in the local library; indexes and words for searching; other services, in which the key element is cooperation; and the variety of sources of information. Finally she emphasised the importance of the simplest method: to talk and ask questions.

4. THE HANDLING AND USE OF SPECIAL-FORMAT MATERIALS

4.1 Preprints and reprints

4.11 A. Ratnakar: Importance of preprints. [24] Aspari Ratnakar spoke first of all about procedures for handling preprints at the Raman Institute in India, where the main interest is in radio astronomy and which receives about 500 preprints per month. Since preprints are not distributed regularly to all observatories he suggested that all authors should be asked to send one copy to a nominated place which would prepare a consolidated list on a subscription basis; he also suggested that journals should be asked to make available lists of papers that had been submitted for publication.

4.12 M. Gómez: Handling of preprints. [25] Maria Gómez, the librarian at La Silla in Chile, said that preprints are displayed in special racks in the 'Astronomy Lounge' for one month before being moved to the Library. Reprints have diminished in importance, as well as in number, and are only retained if the original journal is not taken by the Library. She considered that e-mail may eventually make preprints obsolete.

4.13 E. Bouton and S. Stevens-Rayburn: The NRAO/STScI system for preprints. [26] Ellen Bouton and Sarah Stevens-Rayburn jointly described the cooperative project between the National Radio Astronomy Observatory (NRAO) and the Space Telescope Science Institute (STScI) for the maintenance of a database of information on preprints. The considerable amount of effort required is justified because preprints are the most heavily used part of the library collections. The system provides clear evidence of the publication of very similar papers in different places. The list of acquisitions is distributed bi-weekly (at no charge) on paper and by e-mail.

4.14 Discussion. There appeared to be general agreement that it would be useful if complete information about preprints could be available from one source. Bouton and Stevens-Rayburn agreed to try (within the limitations of their resources) to make their listing more widely available, and so all authors should be encouraged to send their preprints to NRAO or STScI; each library has, however, only one assistant. Buscombe was concerned that preprints are often superseded by later versions; Stevens-Rayburn said that the reference to the published version is given in the listing as soon as it is known. Sachtschal expressed the view that preprints should be distributed only for papers that had been accepted for publication. Wilkins commented on the request by Ratnakar for lists of submitted papers; he felt that editors would be reluctant to issue such lists since they could be used to discover which papers had been rejected; some journals already published lists of papers that have been accepted.

Primack suggested that the effort of collecting information about preprints and other sources of astronomical information should be shared between several libraries; she suggested that queries could be posed and answered by electronic mail. This could, however, impose a considerable burden on the host institutions and so a bulletin-board system appears to be more appropriate. Kulkarni suggested that the preprint database could be distributed on diskettes; Knudsen indicated that she would consider doing this for non-western libraries, although Ratnakar pointed out that many libraries do not have appropriate computing equipment.

4.2 Non-printed materials

4.21 C. O. R. Jaschek: Survey of non-printed materials. [27] Carlos Jaschek was, unfortunately, prevented from attending the Colloquium but the summary of his talk was read out to provide a review of the advantages and disadvantages of different media (microfiche, magnetic tapes, diskettes and optical discs) for the storage and retrieval of information.

4.22 C. Van Atta: Sky-survey materials. [28] Cathy Van Atta gave an informative survey of the procedures used at the National Optical Astronomy Observatories (NOAO) at Tucson to store sky-survey materials (prints, films and plates), whose value she estimated to be about one million dollars. At NOAO these materials are the responsibility of a scientific photographer, but about 20 of the participants indicated that they had the responsibility for the care of such materials.

4.23 M. E. Gómez: Handling of microfiche. [29] Maria Gómez discussed the procedures and problems involved in the storage and use of microfiche which are received from a variety of sources. Unfortunately, some of them are poorly produced and lack proper referencing information. Each microfiche is identified by an assigned serial number and is indexed by author, title and publication.

4.24 Discussion. It was emphasized during the discussion that professional advice should be sought about the use of plastics for the storage of photographic materials as some can affect the emulsion or print surfaces quite badly. Van Atta said that prints are sometimes kept between glass sheets; in reply to a question she said she had been advised that it is not wise to keep plates on wooden shelving. The Ohio overlays are stored with the plates and prints at NOAO and STScI. Van Atta has a useful list of atlases etc. that are shelved with the prints of the Sky Survey, and will send a copy on request.

Buscombe commented that catalogues on microfiche are available from CDS and can be used conveniently with a portable reader. Wang wondered whether there was any way in which microfiche could be connected to computerised retrieval systems and enquired how specific material can be found. Hutchins considered that the microfiche should be kept in the pocket in the journal and not stored separately.

Fishburn drew attention to the need to provide retrieval facilities for slide collections, which can be quite large. ESO catalogues them on a database in 10 subject categories; for each slide details of the title, producer, copyright, reference numbers, etc. are kept.

Kiers considered that microfiche would be superseded by a new storage medium which is marketed under the name of 'softstrip'. The information, which may be text, data, software, graphics or sound, is encoded in a condensed binary form that can be printed on plain paper. The printed 'data strips' can be read by an inexpensive reader that can be connected to a personal computer. Kluwer Publishers are experimenting with its use in journals. Dudley added that the strips can be photocopied even if partially obscured by some stains, but not if the paper is creased. [The system is a joint venture of Cauzin Systems, Inc., (Waterbury, Conn., USA) and the Eastman Kodak Co. It is marketed by separate companies in Europe; their administrative headquarters is Softstrip International Ltd., 53 Bedford Square, London, WC1B 3DP, England.] Hutchins called attention to the inclusion by Pergamon Press of softstrips that contain the tables of contents of their journals in the computer-science field.

Sachtschal asked for advice on the handling of magnetic tapes that contain catalogues, etc. Primack expressed the view that the tapes are best kept by the computer department, which should have a suitable air-conditioned environment for their storage as well as the facilities for reading and copying them. The library should have to keep appropriate documentation about the contents and formats of the tapes. Mattei said that the AAVSO tapes are copied at least once every 3 years. These recommendations appeared to be generally agreed, although Leblanc said that at DAO the tapes are on-line, as otherwise they are

not used. Warren [30] has provided a useful review of appropriate procedures for building and maintaining a library collection of astronomical catalogues in machine-readable form.

Kulkarni asked for information about the availability of non-bibliographic databases. Hutchins advised him to consult the publications of CODATA (see section 5.11) and Rey-Watson drew attention to the demonstrations by INSPEC of on-line access to numerical databases.

4.3 Observatory publications

4.31 K. Kaminska: A view from eastern Europe. [31] Kinga Kaminska, opened the panel discussion on observatory publications by presenting the view of a librarian from an observatory (in Warsaw) that had lost a lot of its stock during the war and that had only very limited funds for the purchase of books and journals. She welcomed observatory publications that could be obtained by exchange and she drew attention to the need for a clear numbering system for each series.

4.32 M. Cummins: Classification of observatory publications. [32] Marlene Cummins, the moderator of the panel, pointed out that traditionally observatory publications have been shelved according to place, but this is inadequate and leads of many problems, especially as many types of publication are issued by observatories and other astronomical institutions. She now uses the Anglo-American Cataloguing Rules (AACR2) to classify them. Reprints are kept only when the journal is not held.

4.33 A. Fishburn: Procedures in a small institute. [33] Anne Fishburn gave a detailed account of the procedures used in her library for handling observatory publications and similar items, such as preprints and reprints,. She also drew attention to the need to ensure that copies of all such publications are sent to the editors of Astronomy and Astrophysics Abstracts and to the value of keeping up the exchange system. She did, however, regard the handling of reprints as a waste of resources. She recommended that librarians ensured that the word 'librarian' or 'library' occurs in the address given for the exchange of publications and that acknowledgement cards are returned whenever they are enclosed with the publications.

4.34 J. Gantz: Further comments on observatory publications. [34] Joan Gantz described some of the facilities and procedures of the library of the Mount Wilson and Las Campanas Observatories. She referred to the problem of identifying publications which are printed only in unfamiliar scripts; photocopies of the title pages are kept in a file for comparison with newly received issues and for showing to visitors who might be able to translate them. The Observatory now sends out only its Annual Report, but she is grateful for all material received in 'exchange'.

4.35 Discussion. Cummins said that her institution sometimes sends out a subscription to J. RAS Canada in lieu of observatory publications for exchange purposes. Before opening up the discussion, she asked for a show of hands by those who wished to receive copies of reprints rather than a list; only a few did so. Fishburn commented that responding to requests for reprints is itself quite costly. Matthei said that AAVSO has a large library but no budget for journal subscriptions, so that it welcomes reprints for exchange purposes.

Weigel pointed out that observatory publications (including original contributions, reprints and annual reports) may be fully catalogued and integrated with other serials (including journals). He recognised that it is expensive in effort, but it does have the virtue of consistency and simplifies both retrieval by readers and reshelving by library staff.

Bouton enquired about the extent to which libraries are responsible for the distribution of observatory publications and obtained quite a large (15) affirmative response. Rey-Watson noted that SAO Reports were published at the rate of only one or two each year and the distribution of preprints had been cut back to save money; preprints may be requested by subject area. Primack considered that observatory publications (including preprints) are often sent to university departments rather than to the main university library, and so she would welcome more information about them; she recognised, however, that others felt that such a library should not hold preprints, for example. Knudsen said that the suggestion had been made that a list of editors of observatory publications should be prepared by PAM; it seems clear, however, that the librarian is usually a suitable contact for enquiries about such publications, which often have no single editor.

Marion Schmitz started a lively discussion by enquiring about the value and handling of Ph.D. theses. It was soon established that many libraries do hold such theses and that they are of interest to both staff and visitors; Stevens-Rayburn said that she also tries to obtain the theses of visiting astronomers. Laloë's view that each institution should keep and catalogue the theses of all persons who worked or studied there was generally agreed. Leblanc said that all US theses may be obtained from University Microfilms and his institute has a standing order for microfiche copies; paper copies are only obtained to meet definite requirements; European theses are listed on the INIS database, and are also available on microfiche. Barbara Ford-Foster said that non-US theses can be obtained through the Center for Research Libraries in Chicago, although membership may be required. Buscombe pointed out that theses are listed in AAA.

4.4 The management of astronomical peculiarities

4.41 C. Hutchins: Review. [35] In her brief review of session 3, Carol Hutchins referred first of all to the variety of ways in which librarians deal with preprints and to the need for more information about the policy and practice in countries, such as the USSR and China, that are, at present, unable to produce preprints easily. She noted that reprints are less important now, but she considered that

observatory publications are an indispensable part of any astronomical collection, even though they present problems and their use is difficult to assess.

5. ASTRONOMICAL DATA CENTRES

5.1 Surveys of astronomical data centres

5.11 Introduction. The session on astronomical data centres was held at the Goddard Space Flight Center (GSFC) and the participants were welcomed by Jim Green (Head of the National Space Science Data Center) on behalf of Frank B. McDonald (Associate Director and Chief Scientist), who was unable to attend. It had been intended that Carlos Jaschek would give an introductory review of the activities of the Strasbourg Data Centre (CDS) and of its links with other data centres, but he had been unable to travel to Washington. Although CDS was primarily concerned with star catalogues on magnetic tape, it now includes data on a much wider variety of astronomical objects (but excluding Solar System objects) and the data are also available on microfiche and on-line. Copies of the magnetic tapes are distributed, as a matter of course, to the astronomical data centres at GSFC and the Astrophysical Institute at Potsdam, so that the data are more readily available in North America and Eastern Europe.

The information bulletin that is published twice each year by CDS contains a wide variety of articles about relevant topics, as well as information about its current services. A directory of astronomical data sources has been published by CODATA (Jaschek 1980); it covers data on the Sun and Solar System, but is now rather out of date. The CODATA Newsletter gives information about current activities and publications on data for science and technology; it is available from the CODATA Secretariat, 51 Blvd. de Montmorency, 75016 Paris, France.

5.12 J. Green: The National Space Science Data Center. Green gave a general review of the role and holdings of the NSSDC, which is the largest of NASA's data centres. The data archive covers the Earth and planetary sciences as well as astrophysics and space plasmas; at present it contains, for example, 20 thousand magnetic tapes and 41 thousand microfiche. Information about the data and some key datasets are available on-line through many networks; optical discs are used for on-line data storage. A new astrophysics master directory shows where data are held. The Astronomical Data Center (ADC) cooperates closely with CDS and holds over 500 catalogues; about 30 catalogues will be made available on CD-ROM. The current objectives are: (a) to transfer more data from off-line to on-line status; (b) to complete a data restoration programme for old tapes; (c) to compress the data for both transmission and storage; and (d) to extend the on-line service to full 24-hour coverage.

5.13 Discussion. During the discussion the following points were made by Green and Warren. A manual about the use of the master directory is in preparation; Warren will be the contact for any problems. The catalogues on CD-ROM will be in the form of ASCII files

with FITS headers so that they can be loaded into ordinary computer memory for processing. The Center does not hold raw observational data, although this possibility is under consideration. On-line access from countries that are not linked to any of the scientific networks is possible through the use of public PSS telephone lines.

Ratnatunga enquired whether arrangements could be made with editors of journals to ensure that most catalogues published in journals are made available on machine-readable media from a single data centre. Warren commented that the data centres do contact authors after publication in order to acquire data for archiving and dissemination. There have already been discussions about the possibility of editors sending copies of submitted papers to data centres to check that all objects are designated properly; this would also serve to alert the data centres to papers containing useful data.

5.2 Archiving of observational data

5.21 C. R. Benn: The La Palma data archive. [36] Chris Benn described the procedures that had been developed for the archiving of the digital data that are recorded during observations with the three telescopes on La Palma that are managed by the RGO; much of the software has been written in the Netherlands. The data recorded represents both the received signal and the status of the telescope, of the detector and of weather at the time of observation. The data are copied on La Palma so that the observer can take home a copy for reduction and analysis, while the original is eventually sent to the UK for inclusion in the data archive, which is regarded as a national facility. A catalogue of the observations is compiled by RGO and the observed data are made available for general use after one year. Each observer is expected to identify the objects observed, but a test showed that for about 10% of the entries the objects could not be recognised easily, although they could be deduced from status data (Benn and Martin 1987). An international directory of observations, coupled with access to such data archives, would be of great benefit.

5.22 F. Ochsenbein: The ESO data archive. [37] Francois Ochsenbein explained that the ESO data-archive project is not yet fully tested. The rate of data acquisition is expected to be about 5 to 10 gigabytes per year (GB a^{-1}) per telescope. Optical discs will be used in addition to magnetic tapes and video cassettes for data storage. The general procedures and policy are similar to those for the La Palma archive. An observer may request, in exceptional cases, that the list of observed targets be omitted from the catalogue during the initial 1-year 'proprietary period'.

5.23 C. Imhoff: The IUE data archive. Cathy Imhoff gave a brief introduction to the International Ultraviolet Explorer project since the participants would have the opportunity to see the IUE Control Center on their way to lunch. The IUE data archive has been in existence for much longer than those for ground-based telescopes. In his talk Green mentioned that the IUE archive contains data for 61 thousand images on mass-storage devices. On-line access via SPAN has

led to a large increase in the number of requests for data. A description of part of the IUE archive was given in the poster paper by Barylak et al [38].

5.24 Discussion. Warren commented that archiving the data from ground-based observations is more complex than for spacecraft data since there are usually more instruments that can be used in a variety of ways and conditions. In reply to a question, Benn said that there are no plans to insist on the use of standard designations for objects observed by the La Palma telescopes; the questioner commented that the need for a standard way of identifying the objects observed had already been recognised in the IUE project.

5.3 Access and retrieval

5.31 V. Thomas: SPAN. Valerie Thomas described the Space Physics Analysis Network (SPAN) and how it could be used to obtain access to astronomical data (Green 1988). There are four major nodes in the USA and another in Europe (at ESOC); there are links to other networks and also to Japan, Australia, New Zealand and Chile. Various explanatory documents and a directory are available. Warren said that it is hoped that SPAN will adopt ISO standards so as to increase still further its value to the international astronomical community.

5.32 P. Dubois: SIMBAD. [39 and 40]. Pascal Dubois explained that the SIMBAD database contains at present about 2.5 million (M) identifiers (names) of astronomical objects, 1 M measurements and 0.75 M bibliographic references. The retrieval of references and/or data can be by name, by position, or by some combination of criteria, such as range of magnitude or radial velocity. The ambiguity and multiplicity in the names of objects presents a major complication, although the user need specify only one name. The main database is in Paris and access is possible by PSS or ordinary telephone lines, as well as through various networks. Warren said that a direct link from GSFC to SIMBAD is to be established for the benefit of users in North America.

5.33 B. Jacobs: DAVID. Barry Jacobs explained that the Distributed Access View Integrated Database System (DAVID) will provide a method of joining databases of different formats in such a way that the user can use just one enquiry language and need not be aware of the different characteristics and operating environments of the databases to which he refers. Various layers will be interposed between the database and the "library" of the local area network to which the user has access. The system will be used with the Space Astrophysics Data System and SPAN.

5.34 J. Price: The LC optical-disc project. During the visit to the Library of Congress on July 29, Joe Price, the Head of the Science and Technology Division, gave a brief talk about a pilot project on the use of optical discs for the storage of information. The capacity of a disc is such that it is feasible to store images of the documents rather than bibliographic information about the documents, and 100 discs may be mounted in a "juke box" which allows access to any disc in a few seconds. The user of the system in a reading room of the library can, for example, read almost immediately on the screen of the terminal

the text of a selected paper without having to wait several hours (or even days) for the retrieval of the paper copy of the journal. Tests were also carried out with music, drawings and photographs.

When answering questions, Price said that the results had justified the concept and that equipment for full-scale operation would be ordered once a proper choice of standards could be made. In the long term it may be possible to abandon the storage of the original documents. The system could be used to store optical images, but there would be a considerable loss in resolution.

5.35 Discussion. There was no time for further discussion of these contributions, but the participants then went on a brief tour of the NSSDC facilities; those who attended the IAU General Assembly were able to see demonstrations of the use of SPAN and SIMBAD in the exhibition area.

6. CONSERVATION AND ARCHIVING

6.1 Conservation of books, photographs and instruments

6.11 M. Roosa: The care of books. [41] The contribution by Mark Roosa, of the National Preservation Office in the Library of Congress, began with an audiovisual presentation on the care of ordinary books in libraries. This showed vividly the damage that could be caused, for example, by shelving books too loosely or too tightly and by compressing their spines when making photocopies. He then went on to discuss the special care that should be taken of rare books. Boxes may be used to provide physical protection, but the most important task is to control the environment - light, temperature and humidity - in order to reduce the rate of chemical degradation. When such books are being used they should not be opened fully, but supported on foam pillows or stands; the pages should be held down lightly; and any temporary marker slips should be acid free and should be removed quickly.

The exhibition of books involves extra risk of damage; for example, a display case acts like a greenhouse. A few simple rules are: do not place display cases near radiators or in direct sunlight; do not place lights inside the display cases; avoid fluorescent lights and, if possible, fit UV filters; support open books in cradles; and use narrow bands of polythene to hold pages down.

6.12 J. Dudley: Conservation from the perspective of a librarian. Janet Dudley, who had been Senior Librarian and Archivist at the Royal Greenwich Observatory, illustrated her talk by reference to her experiences at the RGO, which has a very extensive archive of documents, some of which predate the founding of the Observatory in 1675, as well as a collection of rare books. After her appointment she had eventually obtained approval to set up a conservation laboratory and to employ a professional conservation officer and a half-time assistant. (Unfortunately, the recruitment of the assistant was blocked, and so, until recently, the conservation officer had to carry out all the work himself; in the past year or so he has had some occasional untrained help.) A major task has been to improve the

storage conditions of the documents, many of which had been folded and bound in thick volumes, which were kept on open shelves. The documents were separated, unfolded when necessary, and placed flat in boxes made from acid-free materials. The more important documents were cleaned and deacidified, and the most valuable early documents were repaired; the latter task is time-consuming and requires considerable skill and knowledge. Similarly, some of the most valuable books in the collection have been treated, rebound and boxed; the original covers have been kept separately. She mentioned two basic tenets of conservation: the first is never to do anything that is irreversible (e.g., protective backing paper must be removable); and the second is never do anything that obscures or changes the custodial history (e.g., do not bleach the paper to make it look cleaner). Moreover, a detailed record of what has been done should be kept; photographs showing, at least, the initial condition of the document are very useful for this purpose. The RGO archive includes a great deal of photographic material (plates, film and prints), which has been given special attention; for example, the 100-year-long series of photographs of the Sun have been placed in purpose-made protective sleeves, after first copying any data recorded on the original decaying envelopes.

6.13 M. Vargha: The care of obsolete instruments. [42] Magda Vargha, gave a brief history of the library of the Konkoly Observatory from 1635. Although it is traditional for librarians to keep the book collection intact, she pointed out that astronomers do not normally attempt to preserve obsolete instruments. It is sometimes difficult to identify the purpose and/or manner of use of some instruments that have survived. She recommended that librarians should aim to collect records of all the instruments of their observatories in addition to keeping books about instruments.

In this context it is appropriate to draw attention to the following resolution (IAU 1966):

The International Astronomical Union requests all concerned to save from damage or destruction astronomical instruments of historical interest: these are considered to be important documents in the history of science. Where it is not possible to preserve such instruments in situ, directors of observatories and others are requested to do everything possible to ensure that they are preserved in museums.

6.14 Discussion. Shobbrook asked for advice on the control of 'silver fish' (an insect found in books and mouldy places), which had reached the AAO library in the books purchased from the Radcliffe Observatory (UK/South Africa). Roosa advised against seeking help from a local pest-control officer who might rush in with a spray that would affect the people in the rest of an air-conditioned building; careful consideration is needed. The Yale Library froze infested volumes to kill such insects. Kitt warned against putting books and document boxes directly on the floor; they should be placed on slatted boards to allow the circulation of air and to reduce the risk of accidental water

damage. Dudley suggested that all librarians should make 'disaster plans'; for example, to find a local refrigeration plant that would take books or documents that had been soaked by water from fire hoses.

Worley had used many old volumes when gathering data for a large astronomical database and had found that many of the pages were brittle and that even careful use had caused much damage. Moreover, the leather bindings were often in poor condition, and he wondered what could be done to preserve them. Roosa suggested that they be boxed or wrapped in polyester but rebinding might be necessary. Dudley suggested that cleaning and dressing the leather would be beneficial.

Corbin confirmed that astronomers are careless of obsolete instruments and gave examples of past dumping by the U. S. Naval Observatory; on one occasion a curator from the Smithsonian Institution had been alerted and he had rescued them from the dump truck. She urged librarians to endeavour to ensure that important instruments are preserved.

6.2 The archiving of correspondence and other unpublished documents

6.21 J. Dudley: General problems of the archiving of astronomical records. Janet Dudley reviewed the principal problems that arise in archiving the unpublished records of the activities of an astronomical institution; she hoped that her comments, although based on the situation in England, would be widely applicable. There is a great variety in the type of documents and other forms of records that are generated in the administration of the activities and in the scientific work that leads to the published papers. The administrative papers may be organised in a systematic way, but there is often little control over the filing of the papers of individual astronomers, who may regard them as personal property. In selecting which records should be kept and which may be destroyed it is necessary to bear in mind that some records may prove to be valuable for research purposes which are quite different from those for which they were produced. Nevertheless, a balance must be struck between the risks of destroying worthwhile records and the costs of storage and conservation of worthless records. The retention of records should not be left to chance, but a regular review and appraisal procedure should be adopted. She summarized the criteria for selection and guidance on procedures that are discussed in her paper (Dudley 1989).

6.22 S. Débarbat and A.-M. Motais de Narbonne: Correspondence, unpublished papers and data. [43, 44] Suzanne Débarbat and Anne-Marie Motais de Narbonne presented jointly their views of the importance of the preservation of correspondence and other unpublished documents that are generated in the course of astronomical research. Their comments confirmed and complemented those by Dudley, and were illustrated by some examples of the value, and difficulties of use, of old documents in the archives of the Paris Observatory. Finally, Narbonne suggested that a joint working group on archives should be set up by IAU Commissions 5 and 41.

6.23 Discussion. During the brief moment that remained for discussion before lunch, Vargha put forward the view that the best way to preserve old documents is to publish them; in that form they are then available to many persons. [Editor's comment: the enormous volume of such material would make publication in book form prohibitively expensive, although copies of important collections are sometimes available on microfilm. The main problem today is how to ensure that an adequate record of current activities is available to the researchers of the future.]

6.3 Maintaining the historical record

Brenda Corbin [45] gave an overview of the sessions on conservation and archiving. She sought an indication of views about the suggestion that a joint working group of Commissions 5 and 41 should be established to draw up guidelines for use in the selection of material for archiving; a show of hands indicated a wide measure of agreement on this point. She emphasised that conservation is relevant to institutions that have only modern material as well as to those with historical collections. She considered that optical discs would supersede microfilm as a way of making back-up copies of unique material and of ensuring that journals will continue to be available (Corbin 1988b), but she hoped that the U. S. Naval Observatory would continue to keep its paper copies!

7. OTHER LIBRARY ACTIVITIES

7.1 Library administration: the role of astronomers

7.11 The views of the Panel. A panel of three members, namely William Buscombe, Marek Krosniak and Marek Wolf, had been invited to open a discussion on the role of astronomers in the administration of libraries. Owing to a misunderstanding, none of them had been educated as a librarian, and all three took the viewpoint of an astronomer. Buscombe spoke as the user of a large university library in which the selection and processing of the astronomical collection was done by persons who were not familiar with the subject, and he drew attention to some of the problems that arise in such a situation even when astronomers were consulted; there were often no astronomers on the library committee. Krosniak considered that it is not sufficient for astronomers to serve in an advisory capacity on a library committee. He argued that it is easier for an astronomer to pick up librarianship than for a librarian to pick up astronomy, although he did accept that librarians should be recognised as full members of the astronomical community. Wolf considered that only an astronomer can choose what to buy, can introduce new terminology correctly and can teach young astronomers about the holdings of the library.

7.12 Discussion. Corbin was the first professional librarian to speak. She pointed out that most astronomical libraries have committees composed of astronomers who choose books for the collection, but who sometimes cannot agree on the choice. Wilkins spoke as an astronomer who had seen how much time was wasted by astronomers on such

committees; he had been asked to take on the administrative responsibility for the RGO library but he had pressed for the appointment of an experienced, professional librarian. Such a person has a deeper knowledge of library techniques and resources (such as reference books) and a broader view of the role of the library, and can make decisions about book and journal acquisitions after appropriate informal consultations with members of the user community, which is likely to include engineers and other specialists. April Love also disputed the view that astronomers know best about collection development; many astronomers take a very narrow view that is greatly affected by their own research interests. She gave an example of a well-known astronomer who had objected strenuously to the purchase of books on the history of astronomy for a university library even though there was a degree course on the history of science on the campus.

7.2 Use of computers in libraries

7/21 E. Sachtschal: Use of computers in small libraries. [46] Edith Sachtschal described the ways in which a computer is used for the ESO library. There are separate databases for preprints and observatory publications and for periodicals. A wide variety of lists can be generated and the printed output is produced using LATEX software; renewal letters can be produced in three languages.

7.22 S. Stevens-Rayburn: Use of computers to improve library services. [47] Sarah Stevens-Rayburn gave examples of the wide range of uses of computers at the Space Telescope Science Institute. The database covers all the holdings of the library including books, and the system can provide statistical information as a selection aid. The library is strongly dependent on the computer system, but microfiche and listings are kept for back-up purposes when the computer is down or overloaded.

7.23 Wang Ya-hong: Computer system of the Shaanxi Observatory. [48] Wang Ya-hong described briefly the computer system for library management and information retrieval that had been developed at the Shaanxi Astronomical Observatory. It runs on IBM personal computers and consists of subsystems that cover a very wide range of purposes. It is expected that it will be adopted in many institutes of the Chinese Academy of Sciences.

7.24 P.-H. Dale: A proposal for cooperation between libraries. [49] Paul-Henri Dale drew attention to a library software package that had been developed jointly by universities in Dortmund and Leuven, and he suggested that a sub-group of astronomical libraries should be formed within the existing users group for this software.

7.25 Discussion. Wilkins said he had seen the Shaanxi system in operation and he had been impressed by its facilities; Chinese characters could be displayed and printed. Li said that it is planned to include the abstracts of Chinese papers in the system. There was, unfortunately, then no time for further discussion of these contributions but later Wilkins suggested that more use should be made of diskettes (floppy discs) and CD-ROMs for making information available to institutions that do not have easy access to international

computer networks. He gave as examples the availability of diskettes that are more than equivalent to the Astronomical Almanac and of CD-ROMs that replace bulky volumes of abstracts in other disciplines. The poster paper by Robyn Shobbrook [50] provides an example of the conversion of a library-card catalogue to computer files that can be transferred on tape to other remote sites or accessed from remote terminals.

7.3 Support of remote observatories

7.31 E. Bouton: Report on group meetings. Ellen Bouton reported briefly on the discussions about the support of remote observatories that had been held during the evening of July 28. Very great differences in size, distance and facilities had been found; there were many differences in the procedures for dealing with, for example, the ordering of books and journals. A common problem was that the headquarters librarian has responsibility but not control, and it is difficult to ensure that someone at the remote site does take care of the day-to-day operations of the library.

7.32 Discussion. Many of the points raised during the lengthy discussion have been mentioned in the accompanying paper by Bouton and Gómez [51]. Shobbrook emphasised the value of providing a guide to the resources at the remote site; this should include such details as the location of copying facilities. This is particularly important if the resources are split between several buildings since funding is rarely sufficient for more than one copy. She carries out a stocktaking every two years and has been pleased to find that the losses from the remote site are much less than those from the headquarters library. Knudsen and Lastovica considered that astronomers could help themselves by giving more thought in advance to their likely needs for information as well as for equipment. Quick and reliable transport of materials is a common need, but sometimes this is vitiated by the lack of appropriate support and procedures at the remote site to ensure that the materials are made available immediately after receipt. Warren put the view of an astronomer that the journal collection at the remote site should be for reference only, and that microfiche are adequate. Some of the budget should be used to provide background reading for cloudy nights, but the remote site should not be used as a dump for surplus stock. In some cases, recreational reading should be provided for families as well as staff; Wilkins mentioned that Janet Dudley used to go beyond the call of duty by sending to La Palma video tapes of popular television programmes.

7.4 Resource sharing and cooperative activities

7.41 E. Lastovica: Introduction to the panel discussion. [52] Ethleen Lastovica introduced the panel discussion on resource sharing by pointing out that this is the essential theme of the conference, but that the discussion should concentrate on how help could be provided to institutions that were in the greatest need.

7.42 B. Gertner: The exchange of duplicates. [53] Barbara Gertner stressed the importance of the exchange of duplicates for small libraries in countries such as Poland whose currency is not convertible. She recognised that the exchange is often not equivalent and she noted that there had been a dramatic fall in the number of lists of duplicates which she received. She hoped that the personal contacts made at the Colloquium would prove to be very useful.

7.43 M. Vargha: Another view of the exchange of duplicates. Magda Vargha said that although she came from a similar country she had a different opinion of the value of the circulation of lists of duplicates. She felt that this was expensive and often useless since only a few items are of interest. Instead she suggested that one organisation should act as a clearing house for both offers and wants. She too saw great value in personal contacts.

7.44 J. Davies: Resource sharing in a local community. [54] Jenny Davies explained that her prepared contribution was concerned with resource sharing within the Commonwealth Scientific and Industrial Research Organisation (CSIRO) and other organisations in Australia, such as the Anglo-Australia Observatory. She had been surprised to find out how extensive the cooperative arrangements were, and she felt it was time to extend them internationally.

7.45 A.-M. Motais de Narbonne: Information sharing. [55] Anne-Marie Motais de Narbonne considered that it is more important to share information than documents. Every library, however small, has local information that could be of interest to others, and the spreading of electronic mail and telefax offers the opportunity to set up an international information-exchange programme.

7.46 Discussion. Sachtschal opened the discussion by drawing attention to the possibility of obtaining back runs of journals from retired astronomers and to the risk that import duties might be payable even for gifts. Bouton volunteered to act as a clearing house for lists of duplicates. Knudsen said that she would send a copy of the next SLA/PAM Newsletter to all registered participants. Ilyas reminded participants of the book donation programme of the Third World Academy in Trieste (to which attention had been drawn in IAU Commission 5 Newsletter No.3); he considered that a network of contact points should be set up, but it was pointed out that the participants in the Colloquium could serve this purpose. The poster paper by Huang Bi-kun [56] discusses the importance of the exchange of serials and other publications for the Chinese astronomical society. In response to a request by Davies for a list of organisations distributing material to developing countries, Fishburn drew attention to a recent letter in Nature about the Australian programme for collecting surplus books and journals for distribution to tertiary institutions in South-East Asia and the Pacific (Watters 1988). Corbin felt that the discussion confirmed the need for an international union list of the holdings of astronomy libraries. Van Atta pointed out that material that is sent should be properly wrapped since empty envelopes are of little value.

Wilkins said that resource sharing would be the main topic of a joint meeting of Commissions 5 and 46 at the IAU General Assembly (IAU5 1989).

7.5 Miscellaneous contributions

7.51 J. Price: Library of Congress. During the afternoon visit to the Library of Congress on July 29, John Price, the Deputy Head of the Science and Technology Division spoke about its work and resources. The Division holds about 3.5 million scientific books, 7.5 million reports and 60 thousand serials; there is also scientific material in other divisions. The Science Reading Room is open to the public and is in the John Adams Building. The Division issues 'Tracer Bullets' on a wide variety of topics to provide leading references to the literature. Special projects undertaken by the Division include: the bibliography on Comet Halley, which was prepared by Ruth Freitag (who acted as treasurer for the Colloquium), and for which the addendum now outnumbers the original; a bibliography on 'cold regions', and the Antarctic in particular; and the book 'The Tradition of Science' by Leonard Bruno (IC, 1987). The Division holds complete sets of the standards of ISO, USA (ANSI), USSR and China. In answer to questions, he and Joe Price (the Head of the Division) gave further information as follows: the Division has 6 reference librarians (although the nominal complement is 9); rare scientific books are kept by the Rare Book Division; the Division aims to keep one copy of every scientific 'book' (except for clinical medicine and technical agriculture), including, for example, all the reports issued by NASA; if a loan request cannot be met from stock, an attempt will be made to obtain a copy, but if necessary other services (for example, the British Library Document Supply Centre) will be approached; and the publisher of a book must supply a copy to Library of Congress if copyright in the USA is claimed or registered.

7.52 G. A. Wilkins: The role of IAU Commission 5. George Wilkins opened the review and forward-look session on July 30 by giving his views on the future role of IAU Commission 5, of which he is the President. He first of all explained that Commission 5 differs from most other commissions in that it is regarded as an advisory sub-committee of the IAU Executive Committee and membership of it is not counted against the rule that a person shall not be a member of more than three Commissions; moreover, the President serves two 3-year terms, not one as is usual. Most, but not all, of the technical activities of the Commission are carried out by working groups, whose members need not be members of the Commission, although they often become members. The working groups on astronomical data and on designations are likely to continue as at present; the group on classification and information retrieval will need to include the development of the thesaurus of astronomical terms, while the group on abstracting guidelines ought to be replaced by a revised group on editorial policy whose members would be involved in the improvement of the Style Manual. This Colloquium has shown clearly that we need to devise some way of developing the contacts and ideas that have been generated here and, in particular, Commission 5 should become more actively concerned with library affairs; this will probably be best

achieved by establishing close links with the Physics-Astronomy-Mathematics Division of the Special Libraries Association (SLA/PAM). It also appears that the Commission should be involved in the development of guidelines for archiving, but this would need to be done in cooperation with Commission 41 on the history of astronomy. It has also been suggested that the Commission might be the appropriate place for a working group on such topics as electronic-mail and the exchange of computer software. He saw a busy and productive 3-year period ahead; he hoped to continue to produce the Newsletter and he requested that more items for inclusion be sent to him by members and others interested in the activities of the Commission.

7.53 J. W. Weigel: The organisation of activities. Jack Weigel spoke briefly on points that had arisen during session 6, of which he had been chairman. He considered that the general view was that astronomy libraries should be run by professional librarians, rather than by part-time astronomers, although the enthusiasm and knowledge of interested astronomers should be harnessed. It is clear that many libraries of eastern Europe, Asia and other continents still depend heavily on the exchange of publications and duplicates, and more needs to be done to facilitate this process. Both IAU Commission 5 and SLA/PAM are relevant to the task of extending the cooperation between libraries. He recommended that librarians from countries other than those in North America should get involved in PAM, which should develop links with the astronomers in Commission 5.

7.54 Discussion. Pauline DiGioia suggested that one way by which the 'haves' could assist the 'have-nots' would be for each 'have' to 'adopt' one of the 'have-nots'. Astronomers in the former could be encouraged to make available surplus material that could be offered to the latter, who would know that they could turn to the former for advice and assistance. [Subsequently, Marlene Cummins, of the University of Toronto, offered to help to organise such adoptions; any librarian who is interested in giving or seeking help is invited to write to her.] Janet Mattei expressed the wish that more astronomers had been present at the Colloquium to see and hear the evidence of the devotion of astronomy librarians to their work and of their concern to help others. She went on to say that she had used the INSPEC database and had found ten references to 'softstrip'; she felt that this new technique could revolutionize the activities at AAVSO and elsewhere.

Wilkins welcomed Weigel's recommendation that more librarians should join PAM, and he suggested that consideration should be given to holding regional meetings outside North America; it would be fruitful to hold a meeting in Europe, for example. Rey-Watson drew attention to the SAO poster paper [60] on documentation for computer software; she hoped that the collection would be kept up-to-date, and that material could be made available on loan. Finally, Kulkarni said he had been disappointed that there had been no discussion of user education, which he felt to be very important, particularly as computer-aided instruction (CAI) techniques are now available. He suggested that this topic be considered at a separate session at the next meeting.

7.6 The future of astronomy libraries

7.61 P. Molholt: The future of astronomy libraries. [57] Judy Bausch introduced Pat Molholt; she referred to her long-term membership of PAM and to her past presidencies of both PAM and SLA; although she began her career in an astronomy library, she is now carrying out research on artificial intelligence. In her stimulating address, Molholt indicated the ways in which she considered that new technology and the application of artificial-intelligence (AI) techniques will change still further the role of the library and of the librarian. More information will be available in electronic form and expert systems will be able to assist the enquirer to find wanted information directly. (Current systems usually provide information about where the required information might be found.) There will be less personal contacts between the users and the librarians, who will be designing systems and organising knowledge,. To conclude her address she showed a video giving a vision of a future in which a computer (with aural and oral facilities) is able to organise the social life of a university lecturer as well as to assist him in the preparation of a lecture. She admitted, however, that as yet computers do not have the power to understand and use natural language in such an advanced way, nor to pull together many different kinds of information to produce new results.

7.62 Discussion. Westerhout thanked Molholt for her scholarly and challenging talk and then opened a general discussion by asking whether such fast retrieval of information could be expected. Molholt felt that such speeds would be achieved on a timescale of 15 to 20 years. Garrison expressed his concern at the way in which the high costs of the new facilities are 'locking out' those groups who cannot afford them, or who for political reasons cannot obtain them. He instanced the use of electronic mail which is not available to many major astronomical centres so that the astronomers concerned cannot participate actively in the affairs of the Commission of which he is president. He feared that the gulf would become much wider unless the problem is addressed now. Dudley wondered whether the human mind could keep up with the new systems, but Molholt felt that there be a corresponding development in aptitude for working in an electronic environment.

Stern enquired about how electronic publications would be paid for when there are no paper copies to buy. Molholt admitted that economics will be a real problem, but already it is necessary to pay for access to bibliographic databases; she then referred to the problems of rewarding the creators of the information and of copyright in the new environment. Weigel wondered who will be responsible for archiving the information on a permanent basis when the current databases are commercialised; Molholt admitted that there is no agency in the USA that has this responsibility, although she felt that some European countries are better organised. Buscombe had the further concern that the system could be destroyed almost 'at the flick of a switch' with a result that would be comparable to the burning of the library at Alexandria by Justianian. On that sombre note the session was closed.

8. CONCLUSIONS

8.1 Other papers. Some of the poster papers and other material that were made available at the Colloquium do not fit easily under any of the headings used in this report of the proceedings and so they have been included in part 8. They cover such topics as the history of information exchange in astronomy [58], the identification of research in progress [59], notes on activities in particular countries or institutions [60-63], and a summary of the responses to the questionnaire about astronomy libraries [64].

8.2 Actions to follow. The presentations and discussions during the Colloquium were clearly of great benefit to those who took part; they provided information about current activities and ideas that could be followed up by individuals on return to their home institutions. Some of the discussions showed the need for further cooperative action, either within the information-service community or within the wider astronomical community represented by the IAU. The following list of such actions is given to serve as a check list for consideration in SLA/PAM, in IAU Commission 5 and at the next appropriate international conference.

Section	Action
2.2	Improve international distribution of publications
3.13	Revise UDC classification for astronomy (52)
3.14	Complete development of the thesaurus of astronomical terms
3.33	Construct international union list of astronomy serials
3.35	Simplify and encourage use of e-mail for information exchange
4.14	Develop an international system for listing of preprints
4.22	Provide guidance on the storage of photographic records
4.3	Encourage the better distribution of observatory publications
6.12	Provide guidance on the conservation of books and documents
6.13	Encourage the preservation and documentation of obsolete astronomical instruments of historical interest
6.22	Set up a joint working group with IAU Commission 41 to provide guidance on the selection of unpublished documents for archival purposes.
7.52	Encourage wider membership of SLA/PAM and set up link with IAU Commission 5
7.54	Set up a programme in which the 'haves' provide advice and assistance to the 'have-nots'

Many of the matters were discussed again during the IAU General Assembly at Baltimore at Joint Discussion 1 (Wilkins 1989) and in the meetings of Commission 5 (IAU5 1989). In some cases it was decided to set up new working groups in Commission 5, but for others no formal procedures have yet been established. Much has still to be done!

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