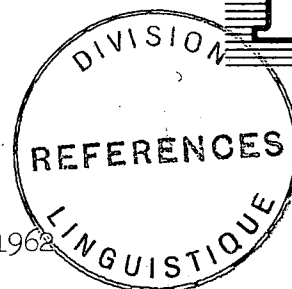


UNITED NATIONS ECONOMIC AND SOCIAL COUNCIL



Distr.
GENERAL

E/3618
24 April 1962
ENGLISH
ORIGINAL: ENGLISH/FRENCH



Thirty-fourth session
Agenda item 14 (b)

QUESTIONS RELATING TO SCIENCE AND TECHNOLOGY

Co-ordination of the results of scientific research

Survey on the organization and functioning of abstracting services in the various branches of science and technology

Submitted by the United Nations Educational, Scientific
and Cultural Organization in pursuance of resolution
804 A (XXX) adopted by the United Nations Economic and
Social Council at its thirtieth session, Geneva, July 1960.

Note by Language and Meetings Service

The symbol (*) indicates that what follows is a provisional English translation made, in the absence of the original English source material, of a title or passage quoted by the editors in French.

CONTENTS

	<u>Page</u>
INTRODUCTION	6
Economic and Social Council resolution 804 A (XXX). Co-ordination of the results of scientific research (Annex I.1)	9
I. HISTORICAL BACKGROUND	11
UNESCO International Conference on Science Abstracting, June 1949 .	11
Abstracting Board of the International Council of Scientific Unions	17
International Conference on Scientific Information, November 1958 .	18
<u>Current trends in scientific research</u>	19
II. PRIMARY SCIENTIFIC PUBLICATIONS	21
Texts containing original scientific information	21
Scientific journals	22
Four families of scientific journals	23
Habits and disciplines of primary scientific publications	25
Code of Good Practice for Scientific Publications	27
Serial and non-periodical publications	30
The adequacy of primary publications	30
III. TYPES OF ABSTRACTS; ADVANTAGES AND DISADVANTAGES. SYMBOLS AND STANDARDIZATION OF ABSTRACTS	33
Types of abstracts	33
Detailed abstract. Indicative abstract. Title. Author abstract. Homotopic abstract. Synopsis.	
Use of author abstracts	39
List of titles	41
<u>Current Contents.</u> <u>Chemical Titles.</u> <u>Biochemical Title Index.</u> <u>Index Chemicus.</u>	
Symbols and standardization	46
Guide for the Preparation and Publication of Synopses (Annex III.1)	47
Recommendation ISO/R 214-1961 (Annex III.2)	50
IV. PERSONAL CONTACTS, ABSTRACTS AND/OR TITLES	53

CONTENTS (continued)

	Page
V. DESCRIPTION AND TYPES OF ABSTRACTING SERVICES	58
Abstracting services and periodicals relating to all fields of natural sciences	58
Documentation Centre of the <u>Centre national de la recherche scientifique (CNRS)</u> , Paris	59
All-Union Institute for Scientific and Technical Information of the USSR Academy of Sciences, Moscow	63
Abstracting services and periodicals devoted to a single scientific field	66
<u>Biological Abstracts</u>	67
<u>Chemical Abstracts</u>	69
Abstracting services and periodicals devoted to a single technical field	73
Abstracting services and periodicals in developing countries	73
<u>Centro de Documentación Científica y técnica de México;</u> <u>Indian National Scientific and Technical Documentation</u> <u>Centre, New Delhi, and other Centres</u>	74
VI. REVIEW OF ABSTRACTING AND INDEXING PERIODICALS IN DIFFERENT BRANCHES OF SCIENCE; SURVEY BY SUBJECT AND BY LANGUAGE; DUPLICATION AND GAPS	77
Periodicals on the mathematical and physical sciences	79
Periodicals on the chemical and biochemical sciences	91
Periodicals on the biological sciences	101
Periodicals on the agricultural sciences	113
Periodicals on the geological, geographical and geophysical sciences	131
Some conclusions	133
Abstracting periodicals from the standpoint of language	136
Duplication	145
Methods of preparing abstracting periodicals	146
Views of the International Scientific Unions	152
Analysis of replies to the questionnaire sent to the Scientific Unions	162

CONTENTS (continued)

	<u>Page</u>
Conclusions	163
Disadvantages of the present situation. Users' wishes.	
Policy for improving the situation with regard to abstracts . .	164
Technology	170
Technological Digests	171
Aeronautics	173
Automobile industry	174
Building and public works	175
Railways	179
Chemical industry	181
Paper industry	183
Iron and steel industry	184
Welding and allied processes	186
Textile industry	191
Industrial safety	192
VII. MECHANICAL PROCEDURES AS TOOL TO ASSIST ABSTRACTING	195
From manual to mechanized systems	195
The preparation of documents	196
Mechanical abstracting	196
Coding	196
Analysis and retrieval	198
The present tools and equipment	200
Punched card tools. Punched card machines. Computers.	
Programming. The input equipment. The output equipment.	
Photographical systems	200
Applications	204
Minicards	204
Magnacards	206
AVCO	208
Euratom	208
<u>Index Medicus</u>	211

CONTENTS (continued)

	<u>Page</u>
Imperial Chemical Industries	212
American Chemical Society	214
Center for Documentation and Communication Research, Western Reserve University	216
ASTIA	218
Hoffman-Laroche-Sandoz	221
<u>Unité</u>	223
Filmorex	225
<u>Gmelin Institut für Anorganische Chemie und Randwissenschaften</u>	229
USSR activities	231
Trends and Conclusions	232
The term "documentation". Standards	232
The technical development	233
The network of knowledge. Videotape and machines. Associative memory. Photoscopic memory. Character recognition. Other developments	234
The indexing problem	239
Summary	242
VIII. OTHER QUESTIONS DIRECTLY OR INDIRECTLY CONNECTED WITH ABSTRACTING	246
Translations	246
Standardization	249
Copyright	249
IX. PROSPECTS FOR THE FUTURE ORGANIZATION OF ABSTRACTING SERVICES	251
Projects for a world centre of scientific documentation	251
Single journal of abstracts	254
National centres	256
Regional centres	257
X. CONCLUSIONS AND RECOMMENDATIONS	259

INTRODUCTION

At its thirtieth session, the United Nations Economic and Social Council adopted resolution 804 (XXX), entitled "Co-ordination of the results of scientific research". In the operative part of section A of that resolution, which is reproduced in full in annex I.1, the Council: "Deems it necessary that a survey on the organization and functioning of abstracting services in the various branches of science and technology should be prepared as a basis for possible subsequent action in this field". In addition, UNESCO is requested "to prepare, in consultation with the United Nations and the related agencies concerned, a survey of this kind for submission to the Council at its thirty-fourth session".

The UNESCO Secretariat has accordingly prepared a draft report on the basis of information obtained both from periodicals, reports and other sources of written information and through consultation with professional and scientific organizations and with specialists in the field of scientific and technical documentation. In accordance with the Economic and Social Council resolution, the Secretariat consulted, in particular, the interested organizations of the United Nations family; the competent international non-governmental organizations (the International Federation for Documentation, the Scientific Unions, the Abstracting Board of the International Council of Scientific Unions, the International Federation of Library Associations and the International Organization for Standardization); and the International Advisory Committee on Bibliography, Documentation and Terminology. The Secretariat wishes to thank these organizations for their valuable assistance.

It has been UNESCO's consistent desire to make this report a joint effort by the organizations and specialists working in the field of scientific documentation in general and, more particularly, in the field of abstracting services. In addition to its consultations as described above, the UNESCO Secretariat therefore gave the preliminary draft a limited circulation among a number of interested governmental and non-governmental organizations and specialists, with a view to improving the survey, filling the gaps, and correcting any errors which might have crept in. Their suggestions, comments

and additions have been embodied in the report wherever this was possible. Other comments were received too late for inclusion in this text, but it may be possible to incorporate them in the final version of the report.

This collaboration anticipates in some degree the active participation UNESCO hopes to obtain from these same organizations and specialists in preparing and carrying out its plan for increased assistance in the international organization and co-ordination of all aspects of scientific documentation. The Economic and Social Council's intention to use the report "as a basis for possible subsequent action in this field" offers a further argument for strengthening and expanding this collective effort.

According to present plans, a complete list of the organizations and specialists that provided material or were consulted during the preparation of the report will be issued with the final text of the report.

Even at this stage, however, it is possible to state that the Secretariat had at its disposal material supplied under contract by:

- the Abstracting Board of the International Council of Scientific Unions and, in particular, Professor C. Baron (for the pure science part of chapter VI);

- the International Federation for Documentation (IFD) (for chapter VII, the various parts of which were prepared on IFD's responsibility, and under its supervision, by the Stichting Studiecentrum voor Administratieve Automatisering, Amsterdam).

In addition IFD kindly supplied:

- material prepared by Mr. G. Koster, Centrum voor Landbouwpublikaties en Landbouwdocumentatie, Wageningen, for the appendix (chapter VI) on agricultural science periodicals;

- much of the material - prepared by Mr. R. Perrault (St. Germain-en-Laye) and Miss Y. Isambert (Bibliothèque nationale, Paris - which was used in the "Technology" section of chapter VI.

The UNESCO Secretariat made extensive use of the material thus supplied, and the editors of the report^{1/} supplemented it with information which they received directly from the interested organizations or services or obtained from various sources, including their own archives.

^{1/} Dr. A. Pérez-Vitoria, Chief of the UNESCO Division of International Co-operation in Scientific Research, was responsible for preparing and assembling material for the report, for arranging the necessary contacts with the specialists and the national and international governmental and non-governmental organizations concerned, and for drafting the report jointly with Professor G.A. Boutry, General Secretary of the Abstracting Board of the International Council of Scientific Unions and Professor of Electronics, who kindly gave UNESCO his valuable assistance.

ANNEX I.1

Economic and Social Council of the United Nations

Thirtieth Session, 5 July-5 August 1960

Resolution 804 (XXX). Co-ordination of the results
of scientific research 1/

A

The Economic and Social Council,

Recalling its resolution 695 (XXVI) of 31 July 1958 and General Assembly
resolution 1260 (XIII) of 14 November 1958,

Noting the recommendations concerning scientific documentation contained
in the survey on the main trends of enquiry in the field of the natural sciences,
the dissemination of scientific knowledge and the application of such knowledge
for peaceful ends,^{2/} the information on this subject included in the survey of
international relations and exchange in the fields of education, science and
culture,^{3/} and the appeal for international co-operation made by the International
Conference on Scientific Information.

Considering that in the scientific and technical field many gaps as well as
duplication exist in respect of documentation, and that any improvement, if it is
to be effective, must be envisaged at the international level,

Recalling that, in conformity with the spirit of the Universal Declaration
of Human Rights and of the Constitution of the United Nations Educational,
Scientific and Cultural Organization, documentation, the results of scientific
research and technical advances should be made generally accessible,

Recalling also that exchanges in these fields are of the greatest importance
to the international community,

1/ United Nations, Official Records of the Economic and Social Council,
Supplement No. 1, pages 22-23.

2/ E/3362 and Corr.1.

3/ E/3352 and Corr.1.

Considering that, to ensure a greater benefit from the efforts made and the resources spent on abstracting services all over the world, it is essential that the organization and functioning of these services should be better known,

1. Deems it necessary that a survey on the organization and functioning of abstracting services in the various branches of science and technology should be prepared as a basis for possible subsequent action in this field;

2. Requests the United Nations Educational, Scientific and Cultural Organization to prepare, in consultation with the United Nations and the related agencies concerned, a survey of this kind for submission to the Council at its thirty-fourth session.

I

HISTORICAL BACKGROUND

Although scientific periodicals first made their appearance during the seventeenth century (the Gazette de France in 1631, the Philosophical Transactions of the Royal Society, London, in 1665, and the Acta Eruditorum in Germany in 1682), it was not until the nineteenth century that some of the major scientific abstracting or indexing periodicals began to emerge: the Chemisches Zentralblatt, in Germany in 1830; the Engineering Index, in the United States in 1884, and Science Abstracts, in the United Kingdom in 1898. These were followed, early in the present century, by Chemical Abstracts (1907) and the Agricultural Index (1916) in the United States, and by the Physikalische Berichte (1920) in Germany. A few years later, in 1926, Biological Abstracts was first published in the United States; in the USSR, the first Referativny Zhurnal dealing with chemistry, appeared in 1938, to be followed by several others during the fifties. The first issue of the Bulletin analytique (now the Bulletin signalétique) appeared in France in 1940. Since 1952, publications such as the Boletín del Centro de Documentación Científica y Técnica (Mexico), the Insdoc List (India) and the Bulletin of the Scientific and Technical Documentation Centre - now the Documentation Bulletin of the National Research Centre (Cairo) - have appeared, with the help of UNESCO, in countries establishing scientific documentation services for the first time.

However, it did not appear pertinent in this brief historical chapter to go back beyond 1949 when, from 20 to 25 June, UNESCO held its International Conference on Science Abstracting, attended by 167 delegates representing twenty-six countries, six United Nations organizations and twenty-two other international organizations. The subject-matter of that Conference was virtually the same as that of this report. The letter of invitation to the Conference stated:

"The purpose of the Conference will be to consider and take action to improve and develop abstracting services for the natural sciences, both pure and applied, and to consider methods of increasing their usefulness to scientists with regard, at the same time, to the related problems of indexing and accessibility of the recorded publications."

/...

The discussions were grouped under the following main headings: definitions; types of abstracts; authorship of extracts; methods of publication; methods of distribution; selection of abstracts; language problems; subject distribution of articles and abstracts; co-ordination of abstracting services and future organization of science abstracting.

The general review made of the subject at the Conference thus affords an appropriate point of departure for the present study and may serve as its background or historical basis. Two publications may be mentioned as reference documents: the preliminary report⁽¹⁾ and the final report⁽²⁾ of the Conference, both of which were prepared by Dr. Thérèse Grivet. On page 175 of the latter report, the Final Act describes the "Present Situation" - in June 1949 - in the following terms:

"There are many hundred journals containing abstracts. Some cover a wide field, others specialize. There is some duplication, yet many gaps exist. Scientists in some countries do not have direct access to enough abstracts. Information published in some languages is abstracted many times over, while that in others is insufficiently covered."

Twelve years have elapsed, but this description is still valid. There are several dozen more reviews publishing indexes or abstracts of scientific articles, and the gaps are certainly fewer, but in other respects, including duplication of effort, the same situation exists in 1961, despite the advances undoubtedly made in mechanical processes. This fact is probably the best justification for the Economic and Social Council's decision to have this report prepared.

Taking a close look at the Final Act of the Conference we find under the heading "Gaps", a recommendation that "immediate consideration be given to the extension of listing, abstracting and indexing to fields in pure and applied science not now covered, in particular in agriculture and applied biology". It is also stated that "there is a need for information about new scientific and technical apparatus and equipment, including information contained in patent specifications and industrial publications".

Some improvements may be noted under the following headings.

/...

Languages

"It is recommended that in general, consideration be given to the publication of abstracts in languages additional to those in which they are available at present; in particular, attention be urgently given to agricultural abstracts for countries where agricultural problems are acute."

Although the publication of abstracts in Russian and in several East European languages has expanded considerably and the same appears to be true of those in Chinese, the situation with regard to other little-used languages still leaves much to be desired.

The attainment of independence by many countries gives particular urgency to the recommendation concerning documents on agriculture.

Co-operation among Abstracting Services

The development of co-operation whether on a geographical basis or by disciplines, was naturally recommended, and two recently established services are mentioned as examples: the Abstracting Services Consultative Committee, covering the United Kingdom and the interests of the Commonwealth, and the UNESCO Co-ordinating Committee on the Abstracting and Indexing of Medical and Biological Sciences.

These two Committees no longer exist, but similar new organizations have been established elsewhere: for example, the National Federation of Science Abstracting and Indexing Services, which comprises the major abstracting and indexing services and periodicals of the United States. Effective international co-ordination has been initiated and developed through the Abstracting Board of the International Council of Scientific Unions, a body which was set up following the UNESCO Conference, as will be explained later in more detail.

Regional and Subject Committees on Abstracting

The Conference recommendation for the establishment of such committees, also reflected the desire, already mentioned, to develop co-operation between the users, authors and publishers of abstracts.

Among the results of these recommendations we may mention the work of the Abstracting Board of the International Council of Scientific Unions, mentioned above, and a tentative effort, begun by UNESCO in 1953-1954, to foster the establishment of national scientific abstracting committees. This attempt, which was unsuccessful in its original form, yielded better results at both the national and the regional level when the efforts of the scientific and technical Documentation Centres established with UNESCO assistance (see chapter V) had been brought to bear.

Homotopic abstracts^{1/}

The recommendation on these abstracts was implemented and disseminated in the Guide for the Preparation and Publication of Synopses, which the Conference also suggested. The results obtained are indicated in chapter III of this report.

The Final Act also includes some recommendations designed to facilitate the preparation and use of abstracts. These cover, for example, bibliographical rules, a directory of indexing and abstracting services, lists of scientific periodicals and of periodicals currently abstracted, lists of references and tables of contents, and regional bibliographical centres.

In the case of most of these recommendations, either no action had been taken at all or else no appreciable progress has been made. Since the recommendations themselves were fully justified, this negative result reveals the wide gap between, on the one hand, the participants' enthusiasm and knowledge of the problems and, on the other, the limited resources actually available for their solution.

Terminology and Nomenclature

Although the "publication at appropriate intervals of lists of new terms in science and technology, with definitions and translations in various languages" has been achieved only sporadically and without over-all planning, considerable progress has been made both qualitatively and quantitatively, in the

^{1/} See the definition in chapter III.

Reviser's note: The Final Report of the International Conference on Science Abstracting uses two expressions for the French résumé homotopique: "homotopic abstract" in definition 1.1222 (page 34) and "synopsis" in recommendation 11 (page 178).

publication of adequate multilingual technical dictionaries. This is best demonstrated by the successive additions of new titles to the four editions of the Bibliography of interlingual scientific and technical dictionaries⁽³⁾ which have been published by UNESCO since 1951.

Copyright

This thorny question was not overlooked by the Conference participants, although they confined themselves to recommending dissemination of the "Fair Copying Declaration" of the Royal Society, London.

The Final Act also mentions "classification and mechanical selection" and recommends that the foundation should be laid for "a standardized international coding for use with such devices" (i.e., mechanical or electrical devices for the selection of documents).

While the problem of code standardization still remains unsolved, recognizable progress has been made in the use of mechanical procedures, which are the subject of chapter VII of this report.

We have intentionally kept back for final comment the recommendation on a "single abstracting journal for physics". The physicists attending the Conference were particular keen and active, as is shown by recommendation No. 10, which was included in the Final Act on their initiative.

"10. Abstracting Journal for Physics

It is recommended that:

- 10.1 Consideration be given to the proposal for the publication, under the auspices of a single internationally controlled organization, of a single international general abstracting journal for physics, both pure and applied, including astrophysics and the geophysical sciences, and for such branches of engineering as it may be appropriate to include;
- 10.2 A committee composed of representatives of the organizations responsible for the existing general abstracting services in this field, and of the interested international scientific unions be convened to carry this proposal into effect, if it deems it desirable, by such means as giving existing abstracting journals a more international character;

- 10.3 This committee gives attention to the proposals that the abstracts presented in the journal be mixed, some in English, others in French; and that it be in sections which might be published separately, while leaving to the appropriate time the definition of these sections and of the frontier zones for which only selected abstracts would be published."

The International Union of Pure and Applied Physics took up this recommendation at once and, with a view to examining the prospects for its implementation, proposed to ICSU the establishment of a joint committee composed of representatives of physics and related sciences and technologies. ICSU granted this request, and the (*) Joint Committee held its first meeting in Paris on 20 December 1949 simultaneously with a meeting, organized by UNESCO itself, of users of physics abstracts.

The work of this Joint Committee soon revealed, as matters stood in scientific circles, a good many serious drawbacks to the idea of establishing a single bilingual abstracting periodical. As the Committee's work progressed, it became increasingly clear that the solution put forward in resolution 10 of the 1949 Final Act, however desirable in theory, would encounter formidable obstacles in practice. The Joint Committee thought it a better plan to establish co-ordination between the major English-language periodical publishing physics abstracts (Science Abstracts) and the major French-language periodical in the same field (the Bulletin analytique du Centre national de la recherche scientifique). That course was agreed upon, and the Committee immediately drew up and sent to the editors of all major physics periodicals a set of rules which they were asked to apply voluntarily in order to facilitate the work of the two major abstracting journals. The Committee also instituted close co-operation between the editor of Science Abstracts and the editor of the Bulletin analytique du Centre national de la recherche scientifique.

At the request of the same two journals, the Committee remained in operation. In 1950 the German physics abstracting periodical Physikalische Berichte was reviewed and it very soon became apparent that ties of co-operation would be desirable with this new partner as well. By 1951 it was clear that the Joint Committee would always have work to do, and that once the task of organizing, reducing duplication and increasing efficiency was successfully

completed in the physics field, similar efforts in other branches of science would have to be considered. In 1952, on the joint initiative of UNESCO and ICSU, the Joint Committee was replaced by the Abstracting Board, which was incorporated in Belgium. Since its foundation, the ICSU Abstracting Board has been subsidized regularly by UNESCO and by the International Council of Scientific Unions.

The Board's work has expanded at a steady pace. It now deals with publications in English, French, German and Russian, and with the physical, chemical and biological sciences. Its members include the following major abstracting journals:

Bulletin signalétique du CNRS (physics, chemistry and biology)

Physics Abstracts

Physikalische Berichte

Chemical Abstracts

Chemisches Zentralblatt

Referativny Zhurnal (physics, chemistry and biology)

Biological Abstracts.

The member journals undertake to co-operate with one another under the Board's guidance and to strive for the improvement and more general use of author abstracts so as to make abstracts and indicative notices simpler, quicker and cheaper to prepare. The Board organizes the exchange of proofs and periodicals among its members, with the assistance of the principal scientific publishing houses throughout the world. It prepares regular lists of non-periodical or serial publications (records of conferences and round tables, Government publications, etc.) and circulates them to its members. The Board maintains five language correspondents in the United States, the United Kingdom, Scandinavia, Germany and Japan respectively. It has made surveys on the publication of original scientific reports and on biological documentation. It has issued various publications which are mentioned in the bibliography of this report. On the Board's initiative, late in 1960, a (*) Co-ordination Committee was set up between ICSU, the International Federation for Documentation (IFD), the International Organization for Standardization (IOS) and the International Federation of Library Associations (IFLA), enable the various international

organizations concerned with scientific information and documentation to co-ordinate their activities as closely and as effectively as possible in the future. The Chairman and prime mover on this Committee is the Director of UNESCO's Department of Natural Sciences.

Another event of importance in this brief historical summary was the International Conference on Scientific Information held at Washington in November 1958 under the sponsorship of three United States organizations: the National Science Foundation, the National Academy of Sciences-National Research Council, and the American Documentation Institute. The purpose of this Conference was to bring together on an international level scientists and information specialists for discussion of current research progress and problems concerned with the storage and retrieval of scientific information. Seventy-five papers, selected by the Programme committee and distributed among seven areas, formed the basis for the discussions, in which many of those attending the Conference took part. The papers and summaries of the discussions were published in two volumes⁽⁴⁾. This report will make frequent reference to the considerable amount of material on information, research and results which these two volumes contain, not only in area 2, entitled "The Function and Effectiveness of Abstracting and Indexing Services", which has a direct bearing on this study, but also in the other six areas, entitled: 1. The Literature and Reference Needs of Scientists: Knowledge now available and methods of ascertaining requirements; 3. Effectiveness of Monographs, Compendia and Specialized Centers: Present trends and new and proposed techniques and types of services; 4. Organization of Information for Storage and Search: Comparative characteristics of existing systems; 5. Organization of Information for Storage and Retrospective Search: Intellectual problems and equipment considerations in the design of new systems; 6. Organization of Information for Storage and Retrospective Search: Possibility for a general theory; 7. Responsibilities of Government, Professional Societies, Universities, and Industry for Improved Services and Research.

We shall have occasion to revert to several of the points made during the discussions in the various areas. Consequently we shall not attempt to summarize the principal points which were raised at the closing session but which were not submitted for formal approval by the participants; these take up the last

thirteen pages of the Proceedings. However, it would seem useful to mention one specific point, which was really a recommendation. Many specific suggestions, partial solutions and new points of view in addition to new factual information were presented during the Conference and in the working papers. It was urged that these be worked over, digested and studied in and through a continuing activity of the Conference. Rather than waiting a number of years before holding another large general conference, it was urged that there be organized a series of smaller symposium-conferences on restricted and specialized areas and particular topics, both those of the subject areas of that Conference and new ones. These should be organized "on a more truly international basis than was possible for the present occasion. Without a deliberate follow-up much of the value of the Conference would be lost".

In the survey of Current trends in specific research⁽⁵⁾ published by UNESCO and the United Nations and prepared by Professor P. Auger with the collaboration of the organizations of the United Nations family, questions of scientific documentation are taken up on the very first page, with comments on the steady increase in the number of scientific periodicals. Further on, however, in the general recommendations, these questions receive less prominence than might have been expected in view of the importance of documentation to scientific research. Considerations of brevity did not prevent the author from making some very pertinent recommendations regarding an international agreement on the standardization of article titles to facilitate indexing and coding. Recommendations were also made on the desirability of research into methods of publication other than the printing of articles in specialized periodicals; extension of the practice of publishing periodical reviews; the filling of existing gaps through the creation of reviews as needed, or by conversion of existing periodicals which overlap others; and the publication of articles in several languages.

This preliminary chapter ends here because, although there is no lack of material for a retrospective bibliography of abstracts, even a mere listing of the articles, publications and records of meetings on this subject would take up a number of pages that would swell this report far beyond reasonable bounds.

Bibliography

- (1) Grivet T., Present State of Science Abstracting Services and Possible Improvements. Preliminary report to the International Conference on Science Abstracting. Document UNESCO/NS/SAC/1. 1949.
- (2) International Conference on Science Abstracting (UNESCO, Paris, 20-25 June 1949). Final report. UNESCO, 1951, 192 pages.
- (3) Bibliography of interlingual scientific and technical dictionaries. Fourth edition. UNESCO. Paris 1961. XXXVI + 236 pages.
- (4) Proceedings of the International Conference on Scientific Information (ICSI). Washington D.C., November 1958. 2 volumes: National Academy of Sciences, Washington 1959, XVIII + 1635 pages.
- (5) Auger P. Current trends in scientific research. United Nations and UNESCO, 1961, 245 pages.

II

PRIMARY SCIENTIFIC PUBLICATIONS

I. Texts containing original scientific information

Original scientific information, that is to say the description of new scientific knowledge, is to be found, at several degrees of development, in three categories of texts:

- (A) Preliminary research reports: these are reports prepared by scientists in charge of research work for the speedy information of a limited number of people belonging in general to a certain group (members of the same laboratory, members of several associated companies or government offices, etc.). Such reports are, as a rule, not printed. A limited number of copies of such reports are prepared and find their way in a limited number of libraries. As a rule, such reports are not sold and are not made available to the general scientific public. However, they are mentioned here because they are quite often cited in the bibliographies of scientific papers.
- (B) Scientific papers (proper): these are supposed to be finished products. A scientific paper should describe clearly, freely, and completely a research work undertaken by its author or authors, together with the conclusions arrived at and the results obtained. Accordingly the bulk of a scientific paper is extremely variable. Scientific papers are practically always printed, sometimes in scientific journals, sometimes in serial or isolated publications.
- (C) Letters to the Editor: restricted reports do not announce a discovery to the public at large. A scientific paper will do this, but the preparation of such a document is a long undertaking and, in most cases, a time interval varying between three months and more than one year will elapse before the paper, accepted by an editor, will actually be distributed to the public in its printed form.

One therefore easily understands the appearance and existence of "Letters to the Editor" and the multiplication of such letters which came to take place at the time when the normal circuits of scientific information began to get clogged: letters to the Editor are short announcements of results obtained without complete description of the methods and apparatus employed; one understands, therefore, that they should always be considered as a preface to a scientific paper to be published at a later date.

II. Scientific journals

The World List of Scientific Periodicals listed some 32,000 titles of scientific periodicals in its 1952 edition. In its 4th edition, in preparation, the total number listed has risen to circa 50,000. These numbers are of a startling order of magnitude: if we suppose for instance that each of the journals listed has printed in the course of one year a mean number of 500 pages, we come to the conclusion that the total number of pages published by the journals listed in the year 1959 was of the order of 25 million pages. Admittedly this does not only contain scientific papers and letters to the editor, though there is no doubt that these two kinds of scientific texts provide most of the bulk which has just been estimated.

Scientific journals are of course of greatly varying importance: their scope and coverage, their reputation (national or international), and even the level of thought prevalent in their pages will vary widely. As a consequence, the number of their subscribers (a very large majority of scientific journals is sold only by subscription) will vary within very wide limits: in the course of a preliminary investigation on the publication of original scientific information, ICSU Abstracting Board examined the case of some 166 journals printed in thirteen countries. In this sample, the smallest number of subscribers to one journal found was circa 250 and the largest was 26,000. It would seem that practically no scientific journal has an output larger than 25,000 copies. The reader will be interested to compare these numbers to that of the potential readers of scientific literature, that is to say persons having an academic or engineering degree in science or technology and engaged at least for part of their time in research or in teaching at

University level: this can be estimated as falling between 4 and 6 million throughout the world. It can be seen that we have in the scientific press, a situation which is very different from that of the ordinary press which publishes newspapers and reviews printed in a much larger number of copies as compared to the number of people who read them.

III. Four families of scientific journals

A sample examination will quickly show that a scientific journal can always be classed in one of the four categories or families which will be now discussed:

- (A) Scientific Society or National Journals (example: "Proceedings of the Royal Society, London"): these journals have long been alone in the field of primary scientific publication. They were initiated in several nations by learned societies, some of them as early as the end of the seventeenth century. In the beginning these journals reproduced the proceedings of the societies responsible for their publication. Later the journals printed scientific papers submitted to the Secretary and or to the editor of the journal itself.

It is a remarkable fact that these old-established journals have increased in their numbers during the last fifty years at a much slower rate than the rate of increase in the quantity of scientific and technical information offered for publication. It is also a remarkable fact that many of these scientific journals appear to have resisted the expansion of the bulk they publish: this second phenomenon can be explained almost completely by the fact that most of these journals are not commercial enterprises and that the publication of many of them has to be subsidized. Many such publications use a refereeing system for accepting papers for publication. This is intended to maintain a high general quality and at the same time to limit the bulk.

With the advent of industrial development in the middle of the nineteenth century and later, new national scientific societies interested in industrial and applied research were created. Most of

these also established their own journals: a second generation of national journals was thus born. Notable examples of such journals are the "Proceedings of the Institute of Radio-Engineers" (USA), "Journal of the Iron and Steel Institute" (Great Britain), "Chimie et Industrie" (France), etc...

- (B) Concern or privately owned journals: (example: "Bell System Technical Journal"). Journals of this type are published by an individual, a company or a group of companies and the scientific information which they publish is restricted to that coming from a scientific or technological group controlled in some way or in some degree by the publisher. While the journals in the first category are almost all of the same level, concern journals will vary from the semi-commercial auto-advertising magazine to the highest level of scientific and technical publication. The number of journals falling into this family is not large; it does increase in time, however at a very slow rate.
- (C) International specialized journals: (example: "Tetrahedron"). Journals falling into this category have all appeared late in the history of scientific publications. In almost all cases they can be described as journals dealing with a rather narrow chapter of science (e.g. Infra-red physics, nuclear reactors physics, etc...), published on an international basis, that is to say welcoming contributions from all sources; these journals are always put by their publisher under the aegis of a committee of scientists chosen for their international reputation; international specialized journals, almost without exception are owned and managed by professional publishers and are commercial enterprises. Their number, which was almost zero thirty years ago, has grown since at an extremely rapid rate.
- (D) Scientific newspapers (example: "Nature", "Science"). Journals of this category are really comparable in the field of science to newspapers in the general field of information. They are published at frequent intervals (even weekly) and they carry, as a rule,

letters to the Editor, other articles giving original scientific information, reviews articles and news of interest to the scientists and professional public. These journals have a wide audience and their number is very limited: there are three published in the English language, one published in German, one in French, etc...

IV. Habits and discipline of primary scientific publications

The title of this paragraph is not intended to be humorous; however it must be owned that habits in scientific publications are extremely variable and discipline almost non-existent. The following will comment briefly this rather disturbing statement:

- (1) Acceptance of papers for publication: no general rules. A sampling study showed that for 2/3 of the journals listed under categories (A) and (B), a referee or committee of referees was consulted before acceptance of a paper. In many instances the editor of a journal falling under category (C) will canvas scientific circles for copy.
- (2) Charges and fees: journals falling under categories (A) and (D) do not usually pay any fee or honorarium to the author of a paper which they have published. On the contrary, several of these journals mainly located in the United States of America will insist that the research institution to which the author belongs should pay to the journal a charge proportional to the length of the paper accepted for publication. This "page charge" is established on the principle that a given research cannot be considered as finished as long as its results have not been published. Therefore, publication, being the last phase of research, should be paid out of research funds. Such a policy should of course exclude subsidization of the journal itself by grants. Journals falling into category (C) frequently pay the authors of the papers which they publish.
- (3) Authors abstracts: frequently the original paper published in a journal is preceded or followed by an abstract summing up the main features of the paper and giving the conclusions or results obtained. Such abstracts, when prepared by the author and the

editors, according to certain rules which have been stated at length by the Royal Society and by UNESCO and published under the title "Guide for the Preparation and Publication of Synopses" (document UNESCO NS 51.D.10aA/05.XI.51), in English, French, German, Russian, Spanish, will save the editors and staff of abstracting journals a large amount of time, work and money: provided that the editor of the journal accepts the waiving of copyright concerning the author's abstracts only, the abstracts can be purely and simply reprinted by the abstracting journals, a swift and extremely cheap process.

However, there is no general agreement that all original scientific paper appearing in a journal should be accompanied by an abstract prepared by the author and revised by the editor. There is also no general agreement that copyright should not be stressed in the case of the reproduction of authors' abstracts. The Guide for the Preparation of Synopses which was mentioned above seems to be unknown by more than 60 per cent of the editors of scientific journals.

- (4) Multiple publications of the same scientific information is a frequent occurrence. Suppression of part of the information described, in order to protect national, company or private rights is also very frequent. In a few fields of science where research is mainly carried under secrecy rules, a new type of style seems to have been born in the course of the last few years: a few papers have appeared, written in such a way as to be incomprehensible to the lay reader. One may wonder why such papers are ever published. The answer seems to be that, when the subject treated will cease to be secret, it will be possible to show that the authors of the "incomprehensible" papers were the first or one of the firsts to enter a new field of inquiry.

The preceding remarks will explain why the ICSU Abstracting Board, in co-operation with UNESCO, the "Fédération Internationale de Documentation", the International Organization for Standardization and the International Federation

of Library Associations, has prepared a "Code of Good Practice for Scientific Publications". This short document, translated from its original French text, is reproduced below.

(*) CODE OF GOOD PRACTICE FOR
SCIENTIFIC PUBLICATIONS 1/

I. THE ABSTRACT

- (1) Every original text intended for publication in a scientific or technical journal or periodical should be accompanied by an abstract prepared by the author himself.
- (2) Pending international standardization, the abstract should be prepared in accordance with the rules laid down and advice offered in the Guide for the Preparation and Publication of Synopses prepared, printed, circulated and periodically revised by UNESCO (document NS/37.D 10 a).^{2/}

II. NATURE OF THE TEXT

- (3) On delivering his manuscript to the editor of the periodical in which he wishes it to appear, the author should specify as exactly as possible the category of original scientific literature in which the text is to be classified:
 - (a) Original scientific papers.
 - (b) Interim reports or preliminary notes.
 - (c) Reviews of existing information.
- (4) A text should be classified as an "original scientific paper" if it is in such a form that a qualified research worker, sufficiently specialized in the same branch of science, can on the basis of the information it contains, and of that information alone:

1/ In the field of natural sciences.

2/ This Guide has been officially adopted by the International Council of Scientific Unions.

- either reproduce the experiments and obtain the results described within the margin of error specified by the author,
 - or repeat the author's observations and appraise his conclusions,
 - or check the accuracy of the analyses and inferences which led the author to his conclusions.
- (5) A text should be classified as an "interim report" or "preliminary note" if it contains one or more new items of scientific information but is not in such a form that the reader can verify that information in the manner described in paragraph (4).
- (6) A "review of existing information" is not intended to disclose new scientific information; it is a collection, analysis and discussion of information already published on a given single subject.

III. DRAFTING

- (7) The historical or critical introduction, which is often useful, should be kept as brief as possible; the author will be careful not to draw up a scientific paper in the same form as a review of existing information.
- (8) Syntax will be kept as simple as possible. Only words to be found in a common dictionary should be used. If this requirement cannot be met, the author will ensure that the neologisms he proposes to use are internationally accepted scientific and technical terms.^{1/}
- (9) In drafting the text, care will be taken to avoid omitting all or part of the methods used or any significant results. If the author is obliged, by considerations of industrial property or security, to limit the scientific information he wishes to publish on his subject, the text should be submitted under category (b) (interim reports or preliminary notes) and not under that of "papers". This is an absolute moral obligation on the scientific author.^{2/}

^{1/} It is recommended that the origin of neologisms used should be stated. If the author is obliged to coin new words he should describe how they were formed, give their etymology and define them. The author should take care not to distort the meaning of accepted terms of art in the field of knowledge in which he is working.

^{2/} It is, admittedly, self-evident that a description of facts observed or of methods used should never be consciously distorted in any publication.

- (10) Explicit reference will be made to any work previously published by the same or another author which must be known in order to place the submitted text in the context of scientific development. It will be made clear whether previous publications wholly or partly duplicate the submitted text.
- (11) No reasoning or evidence will in any circumstances be drawn from private communications or from secret restricted publications.^{1/}
- (12) In drafting, the author will abide by the international rules concerning the abbreviation of the titles of periodicals, the order of bibliographical citations, symbols, abbreviations, transliteration, terminology and the presentation of articles. He will use a coherent and clearly specified system of measurement units.

IV. RECOMMENDATIONS TO EDITORS AND PUBLISHERS OF SCIENTIFIC JOURNALS

- (1) On accepting a scientific article for publication, the editor of a journal should ensure that the author himself specifies whether his text is in category (a) (original scientific papers), (b) (interim reports or preliminary notes) or (c) (reviews of existing information).
- (2) When the accepted text is printed, the editor will indicate, at the head of the abstract, in which of the above three categories the printed text should be classified.
- (3) Pending international standardization, the editor will ensure, on accepting a scientific text for publication, that the author's abstract required to accompany the text has been prepared in accordance with the instructions given in the Guide for the Preparation and Publication of Synopses (cf. recommendation I, paragraph (2), and notes).
- (4) In order to ensure that author abstracts may be freely reproduced anywhere and at any time, the editor and publisher of a journal should state clearly in its pages that author abstracts may be reproduced.

^{1/} It is not the intention to prohibit all allusion to conversations or private communications, but it is pointed out that it seems unsound to make an assertion or advance a conclusion merely on the basis of an unauthenticated conversation.

The expression "restricted publication" is used to mean a publication neither available free of charge nor on sale to the general scientific public.

It will be seen that all the proposals contained in the preceding text are almost self-evident. It is hoped that the publication of this text and an appeal made to the editors of leading scientific journals, academies and learned societies will provide general acceptance by authors and publishers of a minimal self discipline which will greatly help improving the quality of original scientific information while at the same time reducing its yearly bulk.

- (5) Serial and non-periodical publications: Scientific papers and reports quite often find their way into publications which cannot be listed as journals: these serials are in general not bound to printing issues of about the same bulk at regular time intervals; in most cases each issue is limited to one paper or report and is published whenever it is thought advisable by the body or institution governing the serial. The prototypes of such publication are the several collections of reports published by the United States of America Bureau of Standards.^{1/} Non-periodical publications are a serious problem in scientific information dissemination and conditioning: scientists and documentalists living abroad can never be sure that they have been able to track and to procure all such serials which have appeared in a given nation. In very many cases, it happens that a serial number is out of print by the time a foreign library gets aware of its existence.

The adequacy of primary publications

The increasing inadequacy of the scientific periodical, as a method of communication has been mentioned by Coblans⁽¹⁾ and others. Although this is not the place to discuss fully this problem it should at least be mentioned. Too long a delay in the publication of the papers; high cost of publication and, consequently, high subscription rates; too many periodicals, are some of the reproaches made in regard to the present system of primary publications. A

^{1/} It should be noted here that the U.S. Department of Commerce is publishing regularly lists of such reports, printed under Government supervision. This is, in fact a very useful specialized abstracting service (U.S. Government Research Reports, issued twice a month).

number of alternatives has been suggested. In a report sponsored by UNESCO⁽²⁾ Phelps and Herlin have reviewed the proposed solutions and have studied in more detail the possible replacement of the conventional primary publication by reprints as proposed by Bernal in 1948⁽³⁾ and again recently by Auger⁽⁴⁾. In their conclusions, Phelps and Herlin stated: "It is our conviction that the case for replacement of the scientific periodical by a system of separates distributed either from a central depository or by individual societies has not been proved" ... "On the contrary, the many objections to the plan as recorded in the literature reviewed ... Our own experience in the Engineering Societies Library with preprints of our societies shows that the man-hours required to receive and prepare separates for use are many times the number of man-hours required to handle the same number of papers received as papers in periodicals.

The experiences of the three societies which tried and abandoned the distribution of separates as an alternative to journal publication, the experience of the Engineering Societies Library in handling separates, and the published literature critical of proposals to replace the periodical by separates convince us that a system of separates distribution is not a practical solution to problems of scientific communication".

In this matter even the slightest changes are not accepted - sometimes on the basis of contradictory reasons. One of the editors of this report (APV) has suggested a trial of a new form of editing scientific primary publications, to be carried out through an existing periodical.

According to this proposal the selected periodical, while continuing the publication of papers in full as usual, and with the usual delay, will also publish abstracts of the papers as soon as received by the editor. Unless the editor takes the responsibility of preparing these abstracts, it would be compulsory for the authors to provide at least a summary in the same language as the paper. A supplementary improvement would be to prepare also abstracts in other common languages. These abstracts would be published very rapidly in separate sheets several issues ahead of that publishing the full paper.

The subscribers will be offered the choice between two forms of publications: (a) the ordinary one; (b) the abstracts.

/...

If (b) is chosen, the subscriber who will receive the abstracts only will be able to obtain, free or at a special low price, a microfilm (or photostat) of any full article of interest to him, according to the abstracts received. The number of articles allowed free to every subscriber should be calculated in accordance with the subscription rate, cost of photo-reproduction, etc. The final aim should be to provide the "(b) Subscriber" all the articles needed at much lower cost and much quicker than through the ordinary subscription.

All the editors contacted have rejected the proposal. Some of them, because they do not believe in the value of the idea, others because they fear that it might ruin their present system of conventional publication.

In spite of these reactions, or because of them, it would be especially interesting if one new scientific periodical could be started under this proposed scheme.

Bibliography

- (1) Coblans, H. "New methods and techniques for the communication of knowledge". UNESCO Bull. Libr. XI, No. 7, 1957, pp. 153-175.
- (2) Phelps, R.H. and Herlin, J.P. "Alternatives to the scientific periodical. A report and bibliography (121 entries)". UNESCO Bull. Libr. XIV, No. 2, 1960, pp. 61-75.
- (3) Bernal, J.D. "Provision scheme for central distribution of scientific periodicals". In: Royal Society Scientific Information Conference, 1948. Report and papers submitted. London, The Royal Society, 1948, pp. 253-7.
- (4) Auger, P. Current trends in scientific research. United Nations. UNESCO 1961.

III

TYPES OF ABSTRACTS; ADVANTAGES AND DISADVANTAGES

SYMBOLS AND STANDARDIZATION OF ABSTRACTS

It may be useful at this point to attempt the definition^{1/} of the term "abstract" and of various types of abstracts. In general, use has been made of the definitions adopted by the UNESCO International Conference on Science Abstracting.

An abstract may be defined as "a summary or analysis of a publication or article accompanied by an adequate bibliographical description to enable the publication or article to be traced".

Three, or even four, types of abstracts may be distinguished according to content:

1. The detailed abstract, which describes the principal arguments and gives the principal data in the original publication or article. It may be critical, if the abstractor gives his own appraisal of the article, or informative, if he does not.
2. The indicative abstract, which is a short abstract written with the intention of enabling the reader to decide whether he should refer to the original publication or article.
3. The title of the article, which is the simplest type of abstract.

In addition, there are:

The author abstract, which is an abstract written by the author of the original article;

The homotopic abstract, which is one appearing concurrently with the original article, in the same issue of the journal, and under the editor's responsibility.

^{1/} Problems of language and terminology always arise in reports of this kind. Without claiming to have solved all such problems, the editors nevertheless hope that they have made themselves generally understood.

"Synopsis" is a term adopted by the Royal Society to describe an author's summary of a scientific paper which is published simultaneously with the paper itself after editorial scrutiny by the editor of the journal in which it is published.

This word accordingly means something which is both an author abstract and a homotopic abstract.

It is self-evident that type 1 is more difficult and expensive, and takes longer to prepare than type 2, and type 2 than type 3. It is less self-evident that, as regards usefulness to the reader, type 2 is superior to type 3 and type 1 superior to type 2. This inference, which at first glance appears logical, is subject to qualifications, as we shall see further on.

It should be noted at the outset that critical abstracts are becoming increasingly rare except as reviews of publications, i.e., critiques of recently published books or important articles. As early as the UNESCO Conference it was reported on the basis of an IFD survey that, of the 273 abstracting services which had answered the questionnaire so far, only 17 per cent indicated that they made critical abstracts. More recently, in 1959, not one of the abstracting periodicals listed by IFD in the fourth edition of its Index Bibliographicus⁽¹⁾ mentioned this type of abstract, although it is included in the classification in the beginning of the volume. Even assuming that this point was overlooked in a few cases, the number of critical abstracts is negligible. This is confirmed by Herner⁽²⁾ in a study of 457 abstracts, only three of which, or 0.6 per cent, were critical abstracts.

This is not surprising when we consider the high degree of specialization and hence the number of specialists who would be required for the preparation of critical abstracts, as well as the cost and time it would involve.

Although a distinction between informative and indicative abstracts is conceivable in theory, it is a difficult one to make in practice. Length is not a decisive factor. Furthermore the main purpose of an abstract, even when of considerable length, is to indicate whether or not the original article should be consulted. This limitation should be borne in mind in deciding whether author abstracts are sufficient or whether it is necessary to continue having abstracts "made to order" by the abstracting periodicals' own staff.

It may clarify the issue to take a down-to-earth example from daily life. A man who needs a new suit will certainly prefer to have it made to measure, so that he can choose the cloth, colour and style he likes best, and so on. This, however, will be possible only if he has the money to pay for the tailoring and the time to wait for its completion. Furthermore, there must be enough manpower available to make the suit to measure.

However, if a large number of suits must be turned out rapidly at reasonable prices, and if the skilled labour force cannot be increased indefinitely, the suits will have to be mass-produced and not made to measure. Standardization makes it possible to improve the quality, increase the speed and reduce the cost of manufacture so as to satisfy an expanding clientele. With a few minor differences, the problem of using author abstracts can be described in similar terms.

One of the editors of this report (GAB) makes this comment⁽³⁾:

"If the work of an abstracting journal is to be useful, it must be rapid, complete and accurate."

As regards rapidity, the laboratory worker needs to receive condensed information very promptly; in the physics field, for example, the situation would not be regarded as altogether satisfactory if the time-lag was allowed to exceed two weeks! What causes the delay between the appearance of an original paper in a scientific journal and the date when an abstract of that paper is supplied to the interested public by an abstracting journal or documentation service? The delay is due to three factors:

- (a) The time required for the original literature to reach the editor's office and to be broken down and assigned to the various abstractors;
- (b) The time required for the staff of the service or journal to study and abstract the papers;
- (c) The time required to return the completed abstracts to the central office, to arrange and classify them, and to prepare, print and circulate a fascicle or set of cards.

It would appear impossible a priori to eliminate any of the operations listed under (c). However, since they are physical operations, they can be speeded up and, in some cases, reduced in cost even now by the use of mechanical or optical techniques.

These, however, are not the major delaying factor. The greatest contributors to delay are the operations listed under (b), their consequences, and the related operations mentioned under (a). Why does the editor of an abstracting journal always feel compelled to set up a scientific general staff^{1/} to make abstracts of the papers which he wishes to bring to his readers' attention? The answer to this question is an extraordinarily interesting one. It will be found to derive from two considerations:

Historical: When abstracting journals and documentation services first appeared on the scene, it had never occurred to the scientific reviews publishing original papers and articles that they should accompany them with abstracts. At that stage of scientific development, therefore, the editor and his staff had to prepare all the abstracts unaided.

Psychological: Later on it became the practice, in publishing original papers, to insert at the head of each paper a short abstract written either by the author or by someone else. In many cases, the abstracting journals then refused to use author abstracts, on the ground that the author always tended to exaggerate the importance of his own work and to include in his abstract claims or assertions which did not appear in the article itself - in other words, to show a bias which reduced the value of the abstract as information. Others considered that the author's abstract would probably fall short of the criteria applied by the abstracting service.

These two considerations call for some comment. They were true in the past, but will not be true much longer.

It might be felt that these reasons were exaggerated, and a study made by Hermer⁽⁴⁾ appears to confirm this feeling, although it covered only a small number of abstracts. Hermer sought an answer to the question whether abstracts in the various abstracting publications differ so greatly in structure, content and emphasis as to necessitate independent preparation or whether they are similar enough to permit co-operation or exchange. After a careful study of abstracts

^{1/} Its members are scarcely ever employed full-time. They are laboratory workers, teachers and engineers who take on this extra and, usually, ill-paid work in their spare time. Sometimes young fellowship-holders are required to write a number of abstracts as part of their duties; some services even employ undergraduates.

from more than 200 scientific articles published in at least two abstracting periodicals out of nine, Herner concluded that, even where author abstracts were not used, there was little detectable subject slanting. Where author abstracts were used, there was of course none.

When it is realized that the preparation of the abstracts accounts for half the cost of publishing an abstracting journal and for more than half the time required, it is evident that there is much to be gained by finding a way to eliminate the need for this process. There is one, and only one, way to do this: by making it the general practice for the author to prepare the abstract, ensuring that no original paper is published without such an abstract, and persuading the editor of every scientific periodical to see to it himself that the abstract of each paper is accurate, honest and informative; this is perfectly feasible provided that the author obeys some elementary rules.

The UNESCO Conference made a recommendation on these lines, and two further recommendations:

- (a) That the abstracts thus prepared should be used whenever an abstracting service considers this practicable,^{1/} with the aim of reducing the delays and costs of abstracting;
- (b) That a standard guide for the preparation of such abstracts should be provided for the use of editors and authors. The Guide for the Preparation of Synopses issued by the Royal Society, London, was suggested as a basis for discussion.

Such a Guide has been prepared, and contains the elementary rules referred to above. It is reproduced in full in annex III.1. The Guide has been widely circulated by UNESCO, directly from its Paris headquarters, through its science co-operation offices at Cairo, Djakarta, Montevideo and New Delhi, and through the technical assistance missions which have participated in setting up scientific documentation centres in several countries. In addition the Abstracting Board of the International Council of Scientific Unions has, for the past eight years, conducted an intensive and continuous campaign to make the

^{1/} A concession to those who opposed the use of such abstracts.

publication of author abstracts the general practice. Through the combined efforts of the two organizations, the Guide has been published in English, French, German, Japanese, Polish, Russian and Spanish.

The results of the campaign have not been entirely encouraging. Although the ICSU Abstracting Board estimates that 90 per cent of the original physics papers, and 75 to 80 per cent of the original chemistry papers printed in 1960, were accompanied by author abstracts, it notes in its (*) "Summary inquiry on the publication of original scientific information" that the editors of only 38 per cent of the journals covered by the inquiry said that they knew of the Guide for the Preparation and Publication of Synopses. Although this inquiry covered only 166 journals in thirteen countries or groups of countries (Australia, Belgium, Canada, France, Germany, India, Italy, Netherlands, Scandinavia, Switzerland, United Kingdom, United States of America), the following comments, which accompanied the inquiry figures, compel agreement:

(*) "Considering that this document was issued at the end of the Conference on scientific information held by UNESCO in 1949, and that for the past ten years UNESCO and the ICSU Abstracting Board have been striving continuously to circulate the document and make it known, it must be admitted that, to all appearances, the information and publicity techniques used by the international associations are very ineffective in reaching the editors of scientific journals. This ineffectiveness must be due, at least in part, to the fact that there does not appear to be any national association of editors of scientific publications, nor, a fortiori, any active international federation of such associations. Consequently, all information concerning international co-operation must be communicated from person to person - a singularly unsuitable procedure where the information in question is to be communicated to 26,000 people 1/ living all over the world."

1/ Or 32,000, which is the approximate number of editors of scientific periodicals.

These figures are the more surprising in that, at least in theory, readers, authors and editors are in general agreement on the usefulness of publishing an abstract of each article, or even several abstracts in different languages. The difficulties arise in making that agreement effective. Authors are not always in a position to prepare abstracts in a language other than that of the article.

Editors often advance the same argument, adding that the publication of abstracts means spending more on paper and on texts in several languages, and takes longer. This is quite true; and represents a serious handicap for periodicals already faced with difficulties of all kinds. It does not apply, however, to periodicals which are on a sound financial footing and which are published in countries with no shortage of translation, printing and other facilities. Yet, generally speaking, it is in these very periodicals that abstracts are completely lacking in many cases.

Furthermore very few primary publications mention whether the editor is responsible for preparing or revising the abstracts which appear with the original article. In practice, therefore, the tendency is to regard the author abstract and the synopsis as one and the same.

The more important abstracting journals make at least occasional use of author abstracts, particularly for articles from primary periodicals published in little-known languages. Biological Abstracts uses them consistently and has arranged with the editors of many primary publications, and in some cases with the authors themselves, to receive abstracts directly, even in advance of publication. There is everything to be gained by making the use of author abstracts a consistent general practice. This view is not shared by those responsible for the seventeen publications of the Commonwealth Agricultural Bureaux, who are firmly in favour of abstracts made "to order", to suit what they regard as their readers' needs.

Generally speaking, then, the editors of these journals and the directors of documentation services are slow to abandon the preparation of abstracts and to accept author abstracts ready-made. It is evident that certain very simple well-known psychological factors are still at work, as conversations with those concerned readily confirm. Although the conditions which prevailed in the past

are now disappearing, they have not been forgotten, and these persons fear that, if matters take a turn for the worse, they will regret the loss of their skilled staff abstractors. Again, there is still a lack of confidence in author abstracts, even although their quality is improving rapidly as a result of the steady pressure exerted by ICSU, UNESCO and other organizations. Most important, however, is the persistent idea that abstracts should be "made to order" because every editor or documentation service director feels that the outlook and needs of the particular public he serves require special attention. This obviously militates against the use of that ready-made, mass-produced article, the author abstract.

However, it will be appreciated that the general use of author abstracts helps not only to speed up the work of abstracting journals and documentation centres, but also to make it more accurate. Does anyone seriously believe that, with specialization proliferating as it is, the editor or information service director can still find in his own country, for every paper, an abstractor who is both:

- (a) fully abreast of the subject of the paper, and
- (b) fully at home in the language in which the paper is written?

In fact, as Herner states in the conclusions to his paper mentioned above, author abstracts are acceptable for abstracting publications, and indeed, when one is published with the article, use is generally made of it in abstracting periodicals even if this is not stated. In the discussion on his conclusions some doubts were still expressed, despite the figures he quotes. Of 207 signed or initialled abstracts, 46 were verbatim copies, and 199 merely variations of the author abstracts. This represents 79.5 per cent of the abstracts examined. Considering that these were abstracts signed and published by nine of the best abstracting periodicals in the world, one can readily imagine the real extent to which author abstracts are used where the abstracts are left unsigned or the periodical is less prominent.

The acceptance or rejection of the author abstract is no longer an issue. The preparation, dissemination and use of this type of abstract are a necessity at all stages of documentation. The only remaining problem is to start and keep up a campaign designed to show the authors of all work published what they must

do, and why it is necessary, to make the best possible job of the abstracts they have to make from their papers.

We find here yet another illustration of the general law governing international co-operation in science abstracting: nothing can be done unless a few tolerable imperfections are overlooked for the sake of progress towards greater unity and efficiency.

It has already been pointed out more than once that speed is an essential factor in disseminating scientific information. Speed of publication is the main virtue of title lists or bibliographical lists of scientific articles. However, it is not the only one; a considerable merit of this type of publication is its relatively low cost. It is because of these two factors - speed and economy - that the scientific documentation centres set up with UNESCO assistance at Cairo, Mexico City and Near Delhi issue their bibliographical bulletins in the form of title lists.

On the other hand, titles are sometimes vague or inadequate, and it is often impossible for the reader to tell from the title whether the article is worth reading in full.

The simplest form of publication is reproduction of the tables of contents of primary periodicals. This can be done by photographic methods, which further increase the speed of publication, reduce the cost and eliminate sources of error entirely. No detailed classification of the material is made, other than that dictated by the periodical's particular sphere of interest, and the titles are given in the original language.

Despite its simplicity, this system was not widely used in the past, but it appears to be gaining popularity in a modern, rapid form in the Current Contents published by the Institute for Scientific Information, Philadelphia.

Published in weekly issues of more than 100 pages, "Current Contents" lists papers, by title and author, appearing in journals issued within the preceding ten days and in many cases, through courtesy of the publishers concerned, actually in advance of the appearance of the journals themselves.

The Institute states that: "The need for such a publication is clear to anyone who has seen a scientist approach his desk on an already heavily scheduled day to find a formidable stack of journals awaiting his perusal. Without time

/...

to read them all, he will often merely glance at the Table of Contents of each, occasionally finding an entry that will cause him to refer to a specific paper, but more often discarding the journal without examining it further.

"Current Contents sharply increases the efficiency of this practice".

The publication started with the Life Sciences edition, reproducing in original format the tables of contents of every issue of more than 600 primary journals published in the United States and abroad, devoted to medicine, pharmacology, chemistry, biology and other life sciences.

This experiment initiated in 1958 seems a successful one, as it was followed in 1961 by a Space and Physical Sciences edition. Published also weekly, it monitors over 600 journals devoted to physics, electronics, metallurgy, aircraft and missiles, geology, and other physical sciences. In addition, because chemistry is the link between the life and physical sciences, almost 100 chemical journals are included. Subscription rates are relatively high: \$100 for industries and £50 for non-profit organizations, for 52 issues, of about 120 pages, 13 x 21 cm. From January 1962 "Current Contents" is sent by air mail, without increase in the price, to all European subscribers.

Each issue of Current Contents includes a comprehensive directory of authors, listing their association or institution, and address. This allows the reader to correspond with the authors and obtain article reprints directly. Another new facility for obtaining the full text of any article desired is offered by the Institute under the Original Article Tear Sheet Service (OATS). As indicated by this title it is not a photocopy which is provided but the original article itself, torn from one or several copies of the journal in the OATS Library. The rates are one dollar per article plus 19 cents per page and the orders are shipped within 48 hours. For special delivery an air service exists for the additional cost of 50 cents per article.

It will be interesting to observe, after some time has elapsed, the final results of this bold initiative on the part of the Institute for Scientific Information.

More elaborate lists are also published with the titles classified by subject or translated, usually into the language of the country of publication or, less frequently, into several languages. The translation should always be accompanied

by the title in the original language, as a check on its accuracy. This is often omitted on account of the cost of the extra paper, composition and text required. All the more credit is therefore due to certain indexing periodicals launched in recent years at Mexico City - Boletín del Centro de Documentación Científica y Técnica - and Cairo - Documentation Bulletin of the National Research Centre - which scrupulously publish the original language title as well as the translation into the language of the bulletin concerned: Spanish, English or French.

The techniques used in publishing these title lists have recently undergone substantial modification as a result of the introduction of electronic computers. Alongside the lists published on conventional lines, others are now beginning to be put out with the speed attainable through the use of computers, though with the limitation that only alphabetical classification can be used.

The first such list, Chemical Titles, was brought out by the American Chemical Society in 1960; the second, Biochemical Title Index, under the sponsorship of Biological Abstracts in January 1962. Both are based on the permuted title index principle.

Chemical Titles, which will be referred to again later in the chapter on mechanization, gives three lists printed by a tabulator. The first list shows the titles of the periodicals covered. The second list shows all the articles, arranged in a special order: i.e., the alphabetical order of the first five letters of the author's name, followed by a binary number (representing the year) and three letters corresponding to the initials of three significant words in the title. This code symbol is followed by the name of the author(s), the title of the article and the reference. An average of sixty-eight articles are listed per page. The third list contains simplified titles in alphabetical order of the significant words they contain; the average is six words per article. In this list each title is followed by the identification code symbol of the article. The number of articles per page is 250. Each article is mentioned four or five times; in other words, the number of permuted words is slightly less than the number of simplified-title words. (Non-significant terms - articles, prepositions and conjunctions - are omitted.)

Biochemical Title Index follows a similar arrangement and principle but does not list the periodicals covered (approximately 500). Each issue of more than 100 pages must contain approximately 2,000 titles.

These modern versions of the title list have been found very satisfactory as regards speed of access to information. On the other hand they are criticized on several counts: incompleteness of information in the case of over-long titles; faulty classification, inasmuch as it is based on the alphabetical order of the words in the title or part of the title only; and the use of type so small, and a presentation so crowded, as to tire and discourage the reader. A little more time will be needed before final judgement can be passed on this experiment. In any event it has only just begun, and further developments and improvements may be expected. We can rely on the inventors to show ingenuity and persistence.

This return to the use of title lists lends increasing importance to the contents of the title, on which the value of the bibliographical lists will depend. The participants in the International Conference convened by UNESCO in 1949 recommended that "the title of each scientific article be descriptive but concise." It was even suggested that a carefully formulated title could take the place of the indicative abstract; if so, titles would have to be comprehensive and convey an accurate idea of the subject being treated by the addition, if need be, of a sub-title. This idea is taken up by Auger,⁽⁵⁾ who considers that "the use of a fuller title of one or two lines stating whether the work is theoretical, experimental or both and whether measurements have been taken and by what method, would obviously add much to the value of bibliographies".

A further problem is created by the introduction of electronic equipment for processing article titles; a trend to which attention was repeatedly drawn at the Gordon Research Conference on Scientific Information (1961). In the same connexion, when the Code of Good Practice for Scientific Publications (see chapter II) was discussed in the UNESCO International Advisory Committee on Bibliography, Documentation and Terminology in September 1961, a further recommendation to the editors of scientific journals was proposed: namely, that they^(*) should ensure that the titles of articles were sufficiently descriptive and informative concerning their contents for practical use in title lists and in coding. For example, the title "Hydrolysis of certain metallic alkyls" would be

better worded "Hydrolysis of sodium, lithium and potassium alkyls under high pressure". In this carefully selected example, the improvement of the text is as obvious as it is simple. Many others, however, cannot be improved without turning the title into a summary.

Half way between a summary and a title, but sometimes fuller even than an abstract, are the "graphical abstracts" published in Index Chemicus. This system appears to be based on the Chinese proverb: "A picture is worth a thousand words." The prelude to the publication of the Index Chemicus by the Institute for Scientific Information, Philadelphia, was a study which the Institute carried out for the United States Patent Office in order to locate, analyse and codify the literature and approximately 11,000 new steroid compounds, to enable the Office to process a large backlog of applications for patents in that field. Afterwards, the Institute reported, "The ease with which it was possible to identify steroid compounds by their structural diagrams for the Patent Office, without regard to the language employed in the accompanying verbal description, led to the development of a unique combination of manual and electronic techniques for the screening, coding and indexing of new compounds within sixty days of their first mention in world chemical literature. Index Chemicus is the resulting publication. Original journal articles are abstracted 'graphically' rather than verbally; published twice monthly, it speaks in the universal language of the chemical structural diagram. A chemist can, by scanning each issue, quickly recognize work pertaining to compounds related to those with which he is working, eliminating the use of involved nomenclature. In each issue, there is a journal index, and also a molecular formula index and an author index, which are prepared and printed on a high-speed electronic computer. These indexes are cumulated three times a year.

"Some 80,000 compounds are listed in Index Chemicus each year, as compared to two- to four-year time lag currently prevalent (and rapidly increasing) for conventional methods of indexing and abstracting. With each diagram are supplied molecular formulae, and such information as article title, dates of submission and publication, and author's name and address. The reader interested in a given compound thus has all the data he needs to obtain the full text of the original paper, or to communicate with the author. Each new compound listed is also indexed quarterly and annually."

This form of publication seems ideally suited to descriptive chemistry, and especially to organic chemistry. Consequently, it is in this field that the periodical is believed to be most successful.

Symbols and standardization. The idea of using symbols to indicate the category to which the article and abstract belong was endorsed by the UNESCO International Conference which, in its Final Act, recommended that "if the paper is not the publication of an original work, editorial symbols be provided to indicate whether it is a review, discussion or criticism of already published work, or whether it is a technological application of basic data". The "Code of Good Practice for Scientific Publications" also recommends that the editors of primary periodicals should indicate the category (original scientific papers, preliminary notes, or reviews of existing information) to which the published text belongs. Although this suggestion - which is, in fact, very sensible - has not met with any opposition, it does not appear to have been adopted systematically by any publication.

There is no call to labour the obvious: i.e., the advantages of and need for the standardization of abstracts. We shall therefore merely mention that the International Organization for Standardization (IOS) has laid down detailed standards for abstracts and synopses in recommendation IOS/R 214, which is reproduced in full in annex III.2 to this chapter, and that the recommendations made in the Guide for the Preparation and Publication of Synopses (annex III.1) conform to recommendation IOS/R 214.

Bibliography

- (1) Index Bibliographicus, 4th Edition, Volume I, Science and Technology, IFD, The Hague, 1959.
- (2) Herner, S., Proceedings of ICSI, Volume I, page 409, Washington, 1959.
- (3) Boutry, G.A., Principes d'une coopération internationale pour l'amélioration de l'information scientifique. Published by the Abstracting Board of ICSU, May 1960.
- (4) Herner, S., Subject Slanting in Scientific Abstracting Publications. ICSI, I, 407-427.
- (5) Auger, P. Current trends in scientific research, page 214, United Nations, UNESCO, Paris, 1961.

ANNEX III.1

GUIDE FOR THE PREPARATION AND PUBLICATION OF SYNOPSES

1. "Synopsis" is a term adopted by the Royal Society of London (in fulfilment of a recommendation of the Scientific Information Conference sponsored by the Society in 1948) and by the UNESCO International Conference on Science Abstracting, 1949, to describe an author's summary of a scientific paper which is published simultaneously with the paper itself after editorial scrutiny by the editor of the journal in which it is published.
2. The purpose of a synopsis is not only for the convenience of the readers of the journal in which it is published, but also to reduce the cost and to expedite the work of the abstracting journals, and thus to contribute to the general improvement of information services in the scientific field.
3. The synopsis should comprise a brief and factual summary of the contents and conclusions of the paper, refer to any new information which it may contain, and give an indication of its relevance. It should enable the busy reader to decide more surely than he can from the mere title of the paper whether it merits his reading it.
4. The author of every paper is therefore requested to provide also a synopsis of it, in accordance with the following suggestions.

STYLE OF WRITING

5. Use complete sentences rather than a mere list of headings. Any reference to the author of the article should be in the third person. Standard rather than proprietary terms should be used. Unnecessary contractions should be avoided. It should be presumed that the reader has some knowledge of the subject but has not read the paper. The synopsis should therefore be intelligible in itself without reference to the paper. (For example, it should not cite sections or illustrations by their numerical references in the text.)

CONTENT

6. As the title of the paper is usually read as part of the synopsis, the opening sentence should be framed accordingly so as to avoid repetition of the

title. If, however, the title is not sufficiently indicative, the opening sentence should indicate the subjects covered. Usually, the beginning of a synopsis should state the objects of the investigation.

7. It is sometimes valuable to indicate the treatment of the subject by words such as: brief, exhaustive, theoretical, etc.

8. The synopsis should indicate newly observed facts, conclusions of an experiment or argument, and if possible, the essential parts of any new theory, treatment, apparatus, technique, etc.

9. It should contain the names of any new compound, mineral species, etc., and any new numerical data, such as physical constants; if this is not possible, it should draw attention to them. It is important to refer to new items and observations, even though some may be incidental to the main purpose of the paper; such information may otherwise be hidden although in fact it might be very useful.

10. When giving experimental results the synopsis should indicate the methods used; for new methods the basic principle, range of operation and degree of accuracy should be given.

REFERENCES, CITATIONS

11. If it is necessary to refer in the synopsis to earlier work, the reference should always be given in the same form as in the paper; otherwise, references should be omitted.

12. Citations to scientific journals should be made in conformity with the standard practice of the journal for which the paper is written. (The International Conference on Science Abstracting has recommended the standard proposed by the International Organization for Standardization, Technical Committee 46, names of journals being abbreviated as in the World List of Scientific Periodicals.)

LENGTH

13. The synopsis should be as concise as possible. Only in exceptional cases should it exceed 200 words, so as - among other things - to permit it, when printed, to be cut out and mounted on a 3 x 5-inch card.

PUBLICATION - LANGUAGE AND FORMAT

14. The International Conference on Science Abstracting has recommended that synopses be published in one of the more widely used languages, no matter what the original language of the paper, in order to facilitate its international usefulness.

15. The International Conference on Science Abstracting also commended the practice of certain journals in which all the synopses appearing in a single issue are printed together either inside the cover or with advertisements on the back in such a way that they can be cut out and mounted on index cards for reference without mutilating the pages of the journal itself. For this purpose the synopses should be not more than about 4 inches wide so as to be mounted on 3 x 5-inch cards.

ANNEX III.2

RECOMMENDATION IOS/R 214-1961

ABSTRACTS AND SYNOPSES

ABSTRACTS

1. Definition

An abstract is a brief indication of the content of an article or other work, is issued independently of it, and includes the appropriate bibliographical reference (see 4). It is usually compiled by a person other than the author, though it may be based on the (author's) synopsis which accompanies the article or work.

2. Purpose, character and content

An abstract should set out the essential features of the original article or work, indicating new observations and any conclusions drawn from them, so that the reader can decide whether or not he need consult the original. It may be comprehensive enough to serve as a substitute for the original, especially when this is not readily available.

2.1 Normally an abstract should be objective and should respect the general form and balance of the original; the scope and treatment of the subject may be denoted by such terms as "brief", "exhaustive" or "theoretical".

2.2 If designed for a particular group of readers, an abstract may be selective and emphasize certain features of particular interest to them.

SYNOPSES

1. Definition

A synopsis is a summary of the whole content of an article or other work, which it always accompanies, preferably between the heading and the text, to distinguish it from any summary of conclusions in the text. It is compiled by the author or with his agreement.

2. Purpose, character and content

A synopsis should set out the essential features of the article or work it accompanies, indicating new observations and any conclusions drawn from them, so that the reader can decide whether or not the contents are of sufficient interest or importance to warrant his reading the full text.

ABSTRACTS (continued)

2.3 Appraisal or criticism is not the function of an abstract, except the so-called 'critical' abstract, which is, in effect, a critical review in the guise of an abstract. If any matter critical of the original article or work is included this should be clearly distinguished from the rest of the abstract.

3. Phrasing

An abstract should be intelligible in itself without necessitating reference to the original article or work. It is preferable to use complete sentences rather than a bare list of section headings. Drawings and diagrams may be reproduced.

3.1 Abbreviations and contractions other than those in accepted international usage should be avoided; special symbols, if necessary, should be limited to those used and explained in the abstracts journal.

3.2 The first sentence should not reproduce the title, but should indicate the subject treated if this is not clear from the title.

4. Bibliographical reference

The bibliographical reference should precede the text of the abstract, and should conform to the requirements of ISO/R 77 "Bibliographical references - Essential elements" and of ISO/R 4 "International code for the abbreviation of title of periodicals".

SYNOPSIS (continued)

3. Phrasing

A synopsis should be intelligible in itself without necessitating reference to the article or work it accompanies. It is preferable to use complete sentences rather than a bare list of section headings.

3.1 Abbreviations and contractions other than those in accepted international usage, should be avoided; special symbols, if necessary, should be limited to those used and explained in the original.

3.2 Any reference to the author should be in the third person.

4. Translation

If the language of the original is not one of those widely used internationally and the original itself is not provided with a translation (full or abridged) a translation of the synopsis in at least one such language should be given.

ABSTRACTS (continued)

5. Type area

To permit mounting on standard index cards, the width of the type area should not exceed 103 mm.

SYNOPSIS (continued)

5. Use of synopsis as base for abstracts

In certain cases, a synopsis which conforms to the foregoing requirements can, with the addition of a bibliographical reference, be used as an abstract.

Published with the authorization of ISO. (Some slight modifications will be introduced in the final text - in preparation.)

IV

PERSONAL CONTACTS, ABSTRACTS AND/OR TITLES

For years it was regarded as an article of faith that the literature in its various forms - primary periodicals, papers, abstracts, indexes, books, etc. - was by far the best source of scientific information. Figures obtained in the United States by several writers, and quoted in the annotated bibliography which E. Tornudd⁽¹⁾ gives at the beginning of her study, for the most part confirm this view. The author herself in an inquiry among a group of Danish and Finnish scientists, found an even higher proportionate preference for literature (75 per cent) over oral information (25 per cent). It should be added that this result was the exception to the rule at the Washington Conference, for the conclusion arrived at from several other studies was that personal contacts played the predominant role in the transmission of scientific and technical information.

This somewhat unexpected finding was the subject of much comment at the Conference, and reference was made to: the implication "that ... abstracting and indexing services are not fully utilized" (B. Glass); "either bad abstracts or bad scientists" (Sir Herbert Howard) and "a growing tendency to provincialism on the part of the scientists of the United States" (B. Glass). The cases considered were clearly too few for valid conclusions to be drawn, especially when it is remembered that the very people who say they do not use abstracts often express the wish to see the number of abstracts increased and abstracting services improved.

Thus the above-mentioned conclusion is debatable, to say the least. That has not prevented it from gaining accuracy, or from requiring added emphasis in the process. One often hears it said at scientific meetings that 80 per cent of scientific information is transmitted by word of mouth. This is the figure obtained in a sample survey by United States biologists; in 80 per cent of the cases investigated, a biological abstracting journal had been consulted because a colleague had drawn the respondent's attention to a paper of importance to his research.

It has never been stated, to our knowledge, how the eighty "mouthpieces" obtained their information; moreover there is a constant demand for fuller and quicker abstracting services. In practice, both the services and the periodicals

are being steadily improved, which would seem to indicate that they still play an essential part in the dissemination of scientific information.

As Boutry⁽²⁾ points out, many scientists and laboratory workers are inclined to take pleasure in this state of affairs on the ground that it demonstrates the effectiveness of international friendships. However, sentiment of this kind is not the only consideration: the fact that, in 1960, so many scientists still regarded this friendly but pre-historic means of obtaining information as the best one reveals the distressing ineffectiveness of the scientific and technical Press as a whole. The only way to replace an outworn rule-of-thumb by industrial efficiency is to organize the accretions of scientific and industrial history, co-ordinate what is now haphazard, and introduce discipline where anarchy now reigns. This task must be undertaken and carried out at the international level, for it is between countries that the most impassable rifts are liable to open. The question will have to be studied with reference to several geographical regions, various branches of science and as many research workers as possible before it can be asserted that word of mouth is the most widely used method of transmitting scientific information because it is the most effective method.

The steady proliferation of original scientific papers makes it increasingly difficult for abstracting periodicals to bring out their abstracts promptly. The improvements effected through mechanical and electronic applications have been more telling in relation to the tables of contents of these periodicals, which are more complete, up-to-date and numerous than before; abstracts, however, still appear with an average time-lag of six to ten months.

On the other hand, recent developments in the publication of indexing journals, and especially the striking advances made in expediting their publication through the use of modern techniques, have already been described in the previous chapter.

This raises the following question: is it necessary or feasible to go on using abstracting periodicals, or would it be better to replace them by periodicals containing lists of titles? The essential adjunct to such lists would be a service ready to supply at short notice abstracts of the articles, photostats of the original text, or the articles themselves, on the pattern of the Original Article Tear Sheet Service described in chapter III. Lastly, ought every abstracting service or periodical to be duplicated by a similar indexing periodical?

Let us look at the record and see what arguments pro and con may be added to the above considerations.

Title lists have their own strong supporters, who regard them as essential even where these are abstracting periodicals. Thus, at the first meeting of editors of English-language abstracting journals in the biological field (Monte Carlo, December 1959), the users' representatives expressed, through the delegates of the Scientific Unions, a desire for the introduction of an indexing periodical in the biological field, notwithstanding the fact, already made plain at the meeting and largely confirmed in a report prepared by the Secretariat of the ICSU Abstracting Board,^{1/} that there was already much duplication among the English-language abstracting journals in that field. Their desire seems about to be gratified by the publication - announced for July 1962 - of Index Biologicus (Biological and Medical Abstracts Ltd., 4 Fitzroy Square, London W.1).

In the field of chemistry, which is so well covered by abstracts, especially in English, two indexing periodicals - Biochemical Title Index and Current Contents - and another semi-indexing periodical - Index Chemicus - have just made their appearance in this same language. What is more, E. Carfield, the director of the agency publishing the latter two periodicals, considers that in the future an indexing periodical or index list will be the normal complement of every abstracting service and periodical.

The inquiries made in this field have been too limited to yield valid conclusions regarding users' preferences. According to an inquiry conducted by Johns Hopkins University among medical scientists and medical librarians in 1950, there was no clear preference of indexes over abstracts or vice versa.⁽¹⁾ On the other hand, in a similar survey made at the same time by Gray⁽³⁾ in the physical science field, 86 per cent of respondents expressed a preference for abstracts.

Resnick and his colleagues⁽⁴⁾ made three series of inquiries into the relative effectiveness of titles and abstracts: (a) to determine whether a specific article met a specific purpose - titles were found to be as useful as abstracts; (b) to obtain specific information on particular subjects - abstracts were found to be superior; (c) to indicate to scientists the existence of work

^{1/} See the figures given in chapter VI of this survey.

which might be useful in their research - no appreciable difference was found between abstracts and titles.

Series (c) brought to light an interesting fact: although 400 users - who had not been told of the experiment - received both abstracts and titles of articles regularly for more than six months, only seven complained when, after 2,092 dispatches, the abstracts were stopped and only the titles were supplied.

When one of the editors of this survey (APV) had occasion to produce, at the Mexico City and Cairo conferences, scientific documentation bulletins issued by the centres established in those cities, and containing only article titles, he was asked repeatedly why those bulletins did not publish abstracts, which would be more useful. It should be noted that the articles listed were all to be found in the libraries of the centres concerned. The explanation for this reaction would appear to be that these scientists, having had no previous access to major collections of scientific periodicals, had had to acquire the habit of relying on the abstracts in lieu of the original article. This occurs less frequently where there is a good scientific library within call. Thus, in the above-mentioned survey by Gray,⁽³⁾ only 6 per cent of the abstracts consulted were used as a substitute for the original article.

Having drawn attention in the previous chapter to the advantages, for retrospective research, of abstracting journals which publish indexes, we need not dwell on them here.

It may be concluded that, where original articles are readily accessible, the preference will go to lists of titles which can be brought out quickly; where this is not the case, abstracts, as a source of fuller information, will normally be preferred.

The "abstracts versus titles" controversy will be resolved, subject to the limitations of reasonable economy, by the general adoption of homotopic abstracts, preferably in several languages, and by the advantages which abstracting periodicals stand to gain - mainly as regards rapidity of production and the publication of indexes - from new mechanical, electronic and photographic reproduction processes.

Here again, it would be desirable to conduct a survey of the use made of abstracts and article titles, covering several countries, various branches of science and as many research workers as possible.

/...

Bibliography

- (1) TORNUEDD, E. Study on the Use of Scientific Literature and Reference Services by Scandinavian Scientists and Engineers Engaged in Research and Development. Proceedings of the ICSI, Vol. I, pp 19-75, 1958.
- (2) BOUTRY, G.A. Principes d'une coopération internationale pour l'amélioration de l'information scientifique. ICSU Abstracting Board, Paris, 1960.
- (3) GRAY, D.E. Physics Abstracting, Am. J. Phys. 18, 417.24. 1950.
- (4) RESNICK, A., and SAVAGE, T.R. A re-evaluation of machine-generated abstracts. Human Factors 2, 141. 1960.

RATH, G.J., RESNICK, A., and SAVAGE, T.R. Am. Doc. 12,126. 1961.

RESNICK, A. Relative effectiveness of document titles and abstracts for determining relevance of documents. Science, Washington 134, 1004-5, 1961.

V

DESCRIPTION AND TYPES OF ABSTRACTING SERVICES

Several thousands of abstracting services exist throughout the world in the field of natural sciences, pure and applied. Their characteristics, size and ways of action are defined by the needs of their potential customers and the resources of the services themselves. In spite of their variety these services may be classified by subjects in three broad categories:

- (a) Abstracting services and periodicals related to all fields of natural sciences, such as: the Documentation Centre of the "Centre national de la Recherche scientifique (CNRS), Paris, or the all-Union Institute for Scientific and Technical Information of the USSR Academy of Sciences, Moscow.
- (b) Abstracting services and periodicals devoted to a single scientific field such as: Biological Abstracts, Philadelphia, or Chemical Abstracts, Columbus.
- (c) Abstracting services and periodicals devoted to a single technical field, such as: the Institut international de la Soudure, Paris.

To these three groups a fourth may be added:

- (d) Abstracting services and periodicals in developing countries, such as: the Centro de Documentación Científica y Técnica de México or the Indian National Scientific and Technical Documentation Centre, New Delhi.

This last group has been growing up steadily during the last twelve years, following the joint action of interested Governments and international organizations, especially UNESCO.

The existence of services of a universal character such as those included in (a) above may seem surprising at first sight. But the heads of the two main services in this category have very good reasons for advocating the all-embracing organization of their Centres. For instance, the Director of the All-Union Institute for scientific and technical information in Moscow says:⁽¹⁾ "Only a centralized system for issuing abstracts journals is capable of ensuring a more or less total (rather than relative) coverage of information for only such a system affords the means for collecting, systematizing and generalizing all the facts dispersed throughout the multitude of sources. On the other hand such a set up offers the advantage of avoiding duplication thereby saving on effort and means."

/...

Similarly, in a recent report Professor J. Wyart, Director of the Documentation Centre of the CNRS, writes that: "Its universal character corresponds to the evolution of research work. For instance, a physicist could formerly set up a fair bibliography by consulting about a dozen periodicals. This is no more true. The scientist has become the expert of a definite technique, of a specific narrow field of science; but owing to this specialization he has turned more universal because he needs to know and to use various techniques which converge in his speciality. For instance, the crystallographer specialized in the determination of the atomic structures of crystals is often obliged to consult papers published in the various fields of physics, chemistry, biology, mineralogy and metallurgy as well as the Acta Crystallographica and periodicals dealing with the different techniques of X-rays and calculating machines.

Besides, the fact that applied research is carried on at the same time as fundamental research has also altered the ways of approach to the problems of documentation. Any research, whether academic or not, is bound to very quick applications in industry, so that every scientist, whether he works in a university or in industry, leads a very similar life, with the same instruments and same periodicals."

The basic tool and the main publication of the "Centre de Documentation du Centre national de la Recherche scientifique" de Paris is the Bulletin Signalétique. For every paper, after the title in the original language and in French, a short abstract is given, sufficient to show whether the whole article should be read. The abstracts are not critical and they are not signed. Out of the 9,000 titles of periodicals existing in the Library some 5,000 have been selected for abstracting and they are exhaustively analysed.

Until 1960, the Bulletin Signalétique was published in two parts covering respectively pure and applied natural sciences and a third part on philosophy and human sciences.

The number of Abstracts published in the Bulletin has been increasing steadily: 140,000 in 1956, 212,000 in 1959 and 227,500 in 1960, distributed as follows:

First part:	118,500
Second part:	87,000
Third part:	22,000

In 1961 20,000 subscriptions were entered to the different parts of the Bulletin.

The three parts were provided with author indexes but no subject index was published. This was a strong hindrance to the utilization of the Bulletin for retrospective searching.

To make possible the publication of a subject index of a reasonable size, since January 1961^{1/} the Bulletin is published with 22 separate sections each dealing with a specific subject, as follows:

	Price NF	
	France	Abroad
1. Mathematics (about 7,000 abstracts per year)	30	35
2. Astronomy. Astrophysics. Physics of the globe. (about 8,500 abstracts per year)	40	45
3. Physics I. General. Mathematical Physics. Mechanics. Acoustics. Optics. Heat. Thermodynamics. (about 12,000 per year)	50	55
4. Physics II. Electricity. (about 9,000 per year)	40	45
5. Nuclear Physics. Nucleus. Particles. Atomic Energy. (about 6,500 per year)	40	45
6. Structure of the matter. Crystallography. Solids. Fluids. Atoms. Ions. Molecules. (about 1,500 per year)	40	45
7. Chemistry I. General. Physical Chemistry. Mineral Chemistry. Analytical Chemistry. Organic Chemistry. (about 25,000 per year)	100	105
8. Chemistry II. Applied Chemistry. Metallurgy. (about 17,000 per year)	30	85
9. Engineering. (about 6,000 per year)	60	65
10. Sciences of the Earth I. Mineralogy. Geochemistry. Petrography. (about 3,000 per year)	25	30
11. Sciences of the Earth II. Physics of the Globe. Geology. Paleontology. (about 12,500 per year)	40	45

^{1/} This is certainly the main improvement out of the several improvements that have followed the installation of the Centre de Documentation du CNRS in the new building located: 15 Quai Anatole France, Paris VII.

	Price NF	
	France	Abroad
12. Biophysics. Biochemistry. Biological analytical chemistry. (about 12,000 per year)	40	45
13. Pharmacological Sciences. Toxicology. (about 10,000 per year)	40	45
14. Microbiology. Virus. Bacteriophagous. Immunology. Genetics. (about 12,000 per year)	40	45
15. General and Experimental Pathology (about 15,000 per year)	60	65
16. Animal Biology and Physiology. (about 36,000 per year)	100	105
17. Vegetable Biology and Physiology. (about 8,000 per year)	50	55
18. Agricultural sciences. Zootechniques. Phytiatry and Phytopharmacy. Food and Food Industries. (about 12,000 per year)	60	65
19. Philosophy. Human Sciences. Philosophy. Religious Sciences. Archaeology and History of Art. Psychology. Pedagogy. Sociology. Sciences of Language. History of Sciences and Techniques. (about 24,000 per year)	80	85
20. Psychology. Pedagogy. (about 8,000 per year)	30	35
21. Sociology and Sciences of Language. (about 6,000 per year)	30	35
22. History of Sciences and Techniques. (about 3,000 per year)	20	25

Each section includes monthly and annual index of authors, Section 6 provides also a monthly subject index. This is the final aim to be reached for all the other sections, but at present only annual subject indexes are available; they will be published sometime in 1962.

Abstracting is a very expensive enterprise and it may be interesting to provide the detailed figures of expenditure for some of the abstracting services. In the case of the CNRS which we are describing, the figures concerning 1948 are available, as published by UNESCO in 1949,⁽²⁾ and this will allow for an interesting comparison of the expenses alone and their evolution during the last 13 years:

/...

	<u>1948</u>		<u>1961</u>	
	Sum in NF	%	Sum in NF	%
Paper	30,000	7.4	85,000	2.40
Publication costs	150,000	37.5	1,531,900	42.70
Salaries (permanent staff)	140,000	35.0	1,200,000	34.25
Salaries (abstractors)	35,000	8.7	400,400	11.40
Subscriptions to periodicals	17,500	4.4	223,600	6.40
Office expenses	<u>28,000</u>	7.0	<u>100,000</u>	2.85
	400,500		3,540,900	
	\$154,000**		\$715,289	
Number of abstracts:	30,000		250,000	
	<u>1948</u>		<u>1962</u>	
Cost price of each abstract	NF 5.07 (\$ 1.92) ^{2/}		NF 14.02 (\$ 2.86)	
Subscription price	NF60.00 (\$22.75) ^{2/}		NF 58.00 ^{3/} (\$118.37)	
Selling price per abstract to subscriber	NF 0.00075 (\$ 0.000285)		NF 0.00232 (\$ 0.00047)	

Without discussing and comparing in detail the two series of figures given above, it should be remarked that the increase in the price per abstract to the subscriber is much lower than the general increase of the expenses. The increase in the subscription rate is partially balanced by the increase in the number of abstracts published annually. The small increase in the paper expenses and especially the drastic decrease in the percentage of office expenses should also be stressed.

Another publication of the Documentation Centre is the "Monthly Review of the Tables of contents of the main scientific and technical periodicals" issued in 35 mm microfilm and including some 300 periodicals issued during the month in the fields of Biology, Chemistry and Physics.

Other complementary sections of the Centre besides the Library - freely open for the consultation of its holdings of periodicals only - are:

- Photo-reproduction section: providing photo-reproduction on microfilm or on paper, of scientific articles quoted or not in the Bulletin Signalétique.

^{1/} \$1 = 4.9 NF.

^{2/} The rate of the \$ was not the same as that in 1962.

^{3/} For the 22 sections published. Partial subscription, per section, are also accepted.

Microfilm cameras have been installed by the Centre in the main scientific libraries in Paris; borrowing arrangements have been established with the other local libraries and exchange agreements with photo-reproduction services throughout the world.

- Translation section: Besides the actual preparation of translations (1,330, corresponding to 25,300 pages in 1959) the most important task of this section is the centralization of the catalogue of technical translations carried out in most of the documentation services in France. A monthly catalogue of such translations is published by the Centre. For these activities the Centre has been selected as representative of France in the newly created European Translation Centre in Delft, Netherlands.
- Bibliographical Research Section: For several years this section has been working on the use of machines to facilitate the preparation of scientific bibliographies, especially in the fields of Pharmacology, and Biological Chemistry. For the future the objective of the research section is to increase the mechanization of the different services of the Documentation Centre.

With the same intention of promoting new ideas in scientific documentation the Centre has created a "Grand Prix de la Documentation scientifique" (10,000 NF) to be awarded at the end of 1962 for the best project for a French Centre of scientific documentation.

The "Centre de Documentation du CNRS" in Paris, in spite of its universal character, coexists with many other scientific documentation and abstracting services. The case is not the same in the USSR. At least from abroad, the only service known is the All-Union Institute for Scientific and Technical Information of the USSR Academy of Sciences^{1/}(VINITI^{2/}), although some specialized institutes are active in technical information. The Institute centralizes and carries out all the activities of the country in all aspects of scientific and technical information, including theoretical studies and practical research on the organization and mechanization of documentation.

1/ Baltyjskaja No. 14, Moscow D-219. Director: Professor A.I. Mikhailov, Deputy Director, Professor S.M. Lisitchkine.

2/ VINITI - Vsesojuznyj Institut Naučnoj i Tehničeskoj Informacii - USSR Institute for Scientific and Technical Information.

It is the successor to the Institute for Scientific Information created in July 1952 by the Council of Ministers of the USSR within the framework of the Academy of Sciences. Much discussion is still going on concerning the advantages and disadvantages of such a huge, centralized organization. While some people regard the Institute as a good model for the creation of a world Centre, others consider this mechanism too heavy, too slow and lacking the necessary flexibility to fulfil in the most appropriate way the needs of scientists and technologists. Agreement is general in recognizing the large amount of work carried out by the Institute, especially the wide coverage of the Referativnyi Zhurnal which, through its 16 series, embraces practically all the field of pure and applied natural sciences. The full list of these series is given below including, for each title, the periodicity, the number of abstracts published in 1961, the price of subscription and, in brackets, the name of the editor. (See table on following page 65). It is expected that 1 million abstracts will be published in 1962. The articles abstracted are taken from the 13,500 periodicals received by the Institute. This figure includes 2,500 national periodicals in 24 languages of the USSR. The others are written in 60 languages from 92 foreign countries. The list of these periodicals has not been published since 1958. Twenty per cent of the reference concern Russian publications; 68 per cent publications in European languages; and 12 per cent of the references less usual languages (Japanese, Swedish, ...).

In general, informative abstracts are published, the length depending on the actual value of the article abstracted. Normally the abstracts do not exceed one double-spaced typed page, but in specific cases the abstracts can be as long as three pages. Author abstracts are used sometimes, namely for less common languages. Often, the author-abstracts are taken only as a basis for the abstract prepared after consulting the original article.

About 5 to 6 months elapse between the receipt of the periodical and the publication of the abstract. About 3 months are needed to analyse the article and to prepare and revise the abstracts and 3 months for the printing operations.

A staff of more than 20,000 participates, from the receipt of periodicals to the printing of abstracts, in the preparation of the abstracting series. This figure includes permanent staff of the Institute and part-time collaborators. In 1961 out of the staff of specialists, 24 were members of the Academy of Sciences; 44, corresponding members; 1,166, Doctors of Science; 5,823 had a B.Sc. or M.Sc. degree and 212 were foreign scientists.

	<u>Periodicity</u>	<u>Abstracts published in 1961</u>	<u>Subscription rates in NF 1/</u>
Automation and radio-electronics (Dr. A.S. Boutchinsky)	12	40,000	285
Astronomy and Geodesy (Prof. K.F. Ogorodnikov)	12	13,000	84
Biology (Dr. V.P. Dobrochvalov)	24	120,000	517
Geography (Dr. A.A. Nasimovitch)	12	40,000	252
Geology (Prof. E.E. Zacharov)	12	36,000	243
Mining (Prof. E.M. Faerman)	12	18,000	128
Geophysics (Prof. I.A. Khvostikrov)	12	21,000	150
Mathematics (Dr. R.V. Hamkrelidze)	12	21,000	150
Engineering (Dr. V.O. Freiberg)	24	145,000	644
Metallurgy (Acad. N.V. Agueev)	12	34,000	253
Mechanics (Acad. L.I. Sedov)	12	18,000	118
Transport (Dr. V.T. Ossipov)	12	17,000	110
Physics (Prof. E.V. Shpolsky)	12	37,000	295
Chemistry	24	140,000	858
Biological Chemistry (Dr. V.V. Serpinsky)	24	40,000	172
Electrotechnics (Prof. B.M. Tareev)	12	35,000	239

1/ \$1 = NF 4.90. The subscription includes author and subject indexes.

Other publications of the Institute are the "Express Information" series containing selected information in some vital scientific and technical fields: Automatic Control, Automobile Construction, Computers, Forging, Public Health. Forty-eight issues of each series are published per year.

Besides the library - 1,100,000 books and periodicals and more than 3,500,000 photocopies - the Institute operates the following services:

- Photo-reproduction services, providing microfilm or photocopies of the original articles analysed in the series of the "Referativnyi Zhurnal". In 1957 this service provided 400,000 photocopies.
- Bibliographical service, under which may be included the monographs published under the general heading of "Advances in Science", covering major problems in Basic Sciences and Technology.
- Terminology and lexicography, including the publication of multilingual dictionaries.
- Research laboratories. Two laboratories are operating in the Institute on problems concerning the mechanization of the information services and translation: namely, the laboratory for mechanization of information work and the electric modelling Laboratory. The former has been able to launch experimental search for information in the field of mechanics. The latter is working on the elaboration of the theory and principles for the designing of information machines.

The above description of two universal scientific documentation centres has well covered this kind of service. To obtain a similar coverage for abstracting services and periodicals devoted to a single scientific field, it would be necessary to describe many more than two; but the chapter would become too long and monotonous. Therefore, two of the main services have been selected, "Biological Abstracts" and "Chemical Abstracts" as examples to give an idea of the structure and functioning of the specialized abstracting services.

"Biological Abstracts": Its new central editorial office building occupied^{1/} since October 1960, at the same address^{2/} as the original one, has doubled its size, and shows through the material installation the continuous development of this periodical since its foundation in 1926 as a non-profit corporation by the National Academy of Sciences, The American Association for the Advancement of Science and the Union of American Biological Societies. By February 1961, "Biological Abstracts" had published⁽³⁾ 1 million abstracts, after publishing 21,650 in 1947; 30,058 in 1955 and 87,000 in 1961. This represents an increase of 189 per cent in six years' time. Measures have been taken to publish 100,000 abstracts in 1962.

The abstracts refer to all biologically-oriented articles appearing in some 5,500 periodicals; this number is growing constantly through world-wide permanent new literature search. Author abstracts are always used wherever they are available. Otherwise, non-critical informative abstracts are prepared by a professional staff. All abstracts are reviewed by specialists. The author's address is generally given in the abstract.

The abstracts are classified under more than 350 headings. They are published semi-monthly in a complete edition and in five separate parts: Section A, General Biology; B, Basic Medical Sciences; C, Microbiology, Immunology, Public Health and Parasitology; D, Plant Sciences; E, Animal Sciences. The subscription rates of the complete edition and the different sections are given on page 105 of the present report.

According to the information communicated by the Director of "Biological Abstracts" the "manufacturing" process involves about 2 1/2 to 3 months; thus the delay between the receipt of a journal and publications of abstracts from it can never be less than 2 1/2 months. Abstract delays vary from 2 1/2 months to 18 months, with the preponderance falling in the six or seven month range.

An author index is published in every issue and a cumulative author index in the last issue of each volume. Currently 4 volumes per year are being published.

1/ On the occasion of the opening ceremony of this new building, a symposium was organized to discuss ways to improve biological communications. The symposium papers have been published in a booklet by "Biological Abstracts".

2/ 3815 Walnut Street, Philadelphia 4, Pennsylvania.

Since October 1961 a subject index for each issue is a valuable feature which has been added to "Biological Abstracts". This new indexed system known as KWIC (Key Word in Context) devised by H.P. Luhn of the IBM Corporation, is a "permuted" word index which arranges alphabetically the significant words of every article title. It has been quoted already on page 43 of this report in describing "Chemical Titles", the new publication of the American Chemical Society which follows the same principle.

Under the title BASIC^{1/} Index, the system is applied by "Biological Abstracts" and commented by its editor⁽⁴⁾ as follows:

"Based as it is on the author's title, BASIC can only reflect those contents of an article that the author has deemed important enough to mention in his title.

These are the 'keywords' that he has chosen to characterize his work. If the author has chosen wisely and well, others will be directed to his work, but if his title is poorly drawn or ambiguous, his findings may become irrevocably lost in the tremendous mass of publication that is the product of today's research. We believe that the speed and 'informal efficiency' of BASIC is so great ... and that the adoption of this or similar methods of automatic machine handling are so necessarily inevitable to the control of all scientific literature ... that it behooves all biologists to give much thought to the construction of their article titles. If they do not, their work may be relegated to a limbo of the unknown and irretrievable."

The system is also utilized for the publication of "Biochemical Title Index" already described on page 44. Both this periodical and the BASIC Index are prepared on IBM equipment. Titles are punched on Hollerith cards; converted to magnetic tape on the IBM 1401; the permutation and alphabetization are accomplished on the IBM 7070 computer; the ordered tape is then printed out on the IBM 1401; finally, the "print-out" is photographed for lithographic printing.

^{1/} "Biological Abstracts, Subjects In Context.

Biological Abstracts maintains a full-time paid staff of eighty and a part-time volunteer staff of 150 Specialist Editors and 600 abstractors. Functionally, this staff breaks down as follows:

Management and Administration	5
Editorial	
Staff Editors	24
Volunteer Section Editors	150
Clerical	6
Literature Acquisition	
Staff	15
Volunteer abstractors	600
Composition for printing	15
Data processing (automation activities)	5
Business Office	10

Eight editors and two clerical employees devote full-time to the preparation of the subject index.

Concerning expenditure, in 1947⁽²⁾ for a total number of 21,560 abstracts published the total expenses were \$126,662; the cost of each abstract \$5.87. In 1962, for 100,000 abstracts, about one million dollars and the cost of each abstract \$10. The increase in cost is similar to the one observed for the Bulletin Signalétique.

In the field of Chemistry, abstracting in English is carried out by a single periodical, Chemical Abstracts (CA), created in 1907.^{1/} The number of periodicals abstracted has grown from 475 the first year to about 10,000 in 1961. Out of them some 750 were fully abstracted and 9,250 partially abstracted, in accordance with the main criteria for abstracting in CA which are: (i) Chemical; (ii) new; (iii) published; (iv) usually not anonymous and (v) not an incomplete interim report.⁽⁵⁾ The list of periodicals abstracted is published completely revised every five years, with annual supplement of changes, additions, etc. The 1961 revised list will appear in May 1962 and will contain for the first time,

^{1/} The Chemical Abstracts Service, The Ohio State University, Columbus 10, Ohio.
Director: Dr. D.B. Baker; Assistant Director: Dr. Fred A. Tate.

library holdings in many countries. At the same time the number of abstracts increased from 32,281 in 1953 to 120,000 in 1958 and 132,159 in 1960; out of these 104,484 concerned articles from 97 countries and published in about 52 languages, 27,675 were patents taken from 23 countries.

In 1961, 144,589 abstracts were published, and the expected figure for 1962 is 160,000.

In spite of these high figures, CA has not been divided into parts or series as the abstracting periodicals above. The editors are continually asked to do so. The reasons for not adopting these suggestions to date are presented as follows by the Director of Research, Chemical Abstracts Service:⁽⁶⁾ "People advance many reasons to support this suggestion, but we suspect in most cases the real reason is a hope that division will reduce the cost to the individual. The possibility of reduction may prove illusory and certainly will prove so in relation to the current member subscription.

Dividing Chemical Abstracts cannot be done effectively just by chopping it piecemeal into the numbered sections and selling these. Chemical Abstracts is conceived as a whole; its parts are elaborately cross-referenced, so the organic content of a paper on the reaction kinetics of new organic compounds is not lost to the reader of Section 10, despite the fact that the abstract is placed in Section 2 by virtue of its primarily physicochemical content. Arbitrary chopping into sections would deprive the reader of such cross-references.

Thus, a plan to subdivide Chemical Abstracts must be a plan to reconceive Chemical Abstracts - in halves, in quarters, or in some more subdivided form, with all the attendant difficulties of pagination of separate and conjoint indexing of printing and even reprinting, and of distribution. This project is engaging our thought and study, but readers should know the solution is not so simple as it appears at first sight".

The non-critical abstracts published are informative and relatively long. This is the reason given for using only sometimes: 25 per cent with minor revisions, author's abstracts, which usually are indicative abstracts. 3,200 abstractors subject specialists, collaborate in preparing the material in CA.

The average delay between the receipt of the periodicals and the publication of the abstracts is five months. It seems very difficult to go below this figure, considering that to obtain the abstract manuscript from the abstractor and then edit and print it, takes three months on the average.

/...

The indexes are one of the important features of CA. Annual indexes for authors, subjects, patents and chemical formula will be replaced by semi-annual indexes, following the publication of CA in two volumes with separate indexes starting in 1962. In addition decennial indexes were published until now, to be replaced from 1962 by five-year indexes. The fifth decennial index covers volumes 41-50 (1947-56); the sixth collective covers volumes 51-55 (1957-61) and the seventh collective volume will cover the five-year period 1962-1966.

Besides the 3,200 abstractors indicated above the permanent staff employed by CA is as follows:

	<u>Technical</u>	<u>Clerical</u>	<u>Total</u>
Abstracts (incl. Library)	46	55	101
Administration, Research, Nomenclature	18	21	39
Indexes (Author, Subject, Formula, Ring Patent)	<u>101</u> <u>165</u>	<u>121</u> <u>197</u>	<u>222</u> <u>362</u>

The technical staff includes: 56 Doctorates, 51 Masters of Science and 58 Bachelors of Science or Arts.

Thanks to the UNESCO publication already mentioned⁽²⁾ and the information kindly provided by the Director of CA for 1961 we are able to present below a summary of the expenses of this periodical both for 1945-46 and for 1961 as already done for the "Bulletin signalétique".

Chemical Abstracts and Indexes

	1946	% ^{1/}	1961	%
	\$		\$	
Printing and Distribution	151,000	42.0	1,310,000	42.1
Salaries (Staff)	127,000	35.0	1,355,000	43.5
Abstractors	32,000	8.8	299,000	6.4
Research			300,000	
Other expenses	55,000	14.2	250,000	8.0
	<u>365,000</u>		<u>3,415,000</u>	

in 1945 197,681

		1961
Number of Abstracts	32,281 (in 1945)	144,589
Cost price of each abstract \$6.12	All Costs of each Abstract plus Indexes printed in 18,000 edition	\$23.60
Subscription price \$12.00		\$925 to Base Rate Subscribers
		\$200 to Colleges and Universities
		\$ 40 to American Chemical Society Members for personal use.

Selling price per abstract to subscribers \$0.000.371

2/

Other services: Besides CA and its indexes, the Chemical Abstracts Service Provides the following publications and services:

The Ring Index and Supplements (bound volumes)

Chemical Titles described on page 43

Bibliography of Chemical Reviews (7,000 bibliography reviews a year in one volume)

List of Periodicals Abstracted (with library keys to holdings in major countries)

Naming and Indexing of Chemical Compounds (and related nomenclature pamphlets)

1/ Research expenses not included.

2/ The variety of rates does not allow for a calculation.

Specialized searching services by machines for all chemical compounds and related data.

Finally the research department is very active. Some of the research projects handled by this department are⁽⁷⁾: (i) the study of annual index production; (ii) the study of cumulative index production; (iii) the organization of chemical knowledge with special regard to storage and retrieval; (iv) the study of new journals and services; (v) a study of chemical semantics; (vi) the production of a register of chemical compounds; (vii) the production of a "Lexicon of non-systematic and trade names for organic compounds", project sponsored by the American Chemical Society and the Synthetic Chemical Manufacturers Association.^{1/}

The number of abstracting or indexing periodicals and series devoted to a single technical field is already very important and it is increasing steadily both at the national and international levels. As an example of such services we have chosen, the "Institut international de la Soudure, Paris" and we refer the reader to page 186 of this report where a full description of its activities is given.

Within the framework of the scientific and technical documentation centres created in developing countries, mostly with the assistance of UNESCO, indexing and abstracting services have been established which deserve at least a brief description.

In various countries, especially after the Second World War, it was found that there was an urgent need for such centres to aid in accelerating industrial, scientific and economic progress. The help of UNESCO was requested in the framework of the Technical Assistance Programme. Scientific and technical documentation centres were created, with the assistance of UNESCO, in Mexico - for Latin America,⁽⁸⁾ New Delhi, Cairo - for Middle East Arab States,⁽⁹⁾ Belgrade, Karachi, Philippines,⁽¹⁰⁾ while UNESCO missions or experts are still working at the Centres in Indonesia, Cuba and Thailand.

The general scheme of such assistance has been very similar in all the countries concerned. UNESCO has provided a team, two to four experts; Chief of

^{1/} See also page 214 of this report.

the Centre; documentalist in charge of the publications of the Centre; specialist in bibliography or translations; expert in documentary photo-reproduction. The team stays in the country from three to five years organizing and running the Centre and training the local staff who are to replace the international experts. The training of the local staff is supplemented by training abroad through fellowships provided by UNESCO. Funds are also allocated to purchase a part of the equipment, materials, books, subscriptions to periodicals.

Some of these centres are publishing regularly indexes of the titles of the articles received in the Library, so as to inform the "customers" of the region of the materials available at the Centre. Some 8,000 titles were published in 1961 by the "Boletín del Centro de Documentación Científica y Técnica de México"; more than 53,000 by the "Documentation Bulletin of the National Research Centre", Cairo, in 1960 and about 28,000 are quoted annually in the Insdoc List, New Delhi. Full description of these periodicals is given in chapter VI - Table I - of this report.

The "Jugoslovenski Centar za Tehnicku i Naucnu Dokumentaciju" in Belgrade concentrates its action in the Technical field by publishing monthly sixteen technical abstracting Bulletins covering almost all subjects in technology. In total these Bulletins have published 35,844 abstracts in 1960 and more than 37,000 in 1961. Two other Bulletins are devoted to medical and veterinary sciences and to pharmacology.

Some of the Centres collect and provide information on the scientific papers published within the region in the form of abstracts. This is the case of the "Philippine Abstracts" published quarterly, since 1960 by the Manila Centre or "Pakistan Scientific Literature" edited quarterly also since 1961 in Karachi. The Bulletin of the Cairo Centre publishes these abstracts in French or English (some 800 in 1960) in part 2, which is also distributed separately as a reprint. The Centre in Mexico has been publishing abstracts of Latin American papers (more than 5,000 in 1961) until the present year, but when in March 1962, the name of the Bulletin was changed to "Indice bibliográfico del Centro de Investigación y estudios avanzados del I.P.N.", this is one of the valuable services suspended. This was the only service producing and publishing abstracts of all scientific papers published in Latin America.

In addition to these indexing and abstracting activities the above documentation centres have organized and are running photo-reproduction, bibliographical and translation services. They have also been:

- (a) providing microfilm readers, as a contribution to developing the utilization of microfilm;
- (b) editing special publications for industry; such as the "Monthly Bulletin" for the Textile Industry (Cairo) or the series of Technical Papers (Manila): ceramics; plastics; coconut technology;
- (c) organizing the exchange of periodicals between their geographical area and the rest of the world;
- (d) collaborating with the scientific libraries and periodicals in the region;
- (e) preparing catalogues and lists of scientific periodicals received or published in the country, scientific equipment, etc.;
- (f) preparing lists of scientific terms;
- (g) organizing technical courses of languages, etc.

It may be interesting to evaluate the cost of these projects, by producing the only complete papers which have been published⁽¹⁴⁾ for one of them: The "Centro de Documentación Científica y Técnica de México", for the period of 33 months (1 April 1951 - December 1953) during which the Mexican Government and UNESCO provided the funds needed for the creation and the operation of the Centre, the total expenses amounted to \$220,930. The share of the Mexican Government: 47,790 or \$104,650 included all local expenses: salaries, printing of the Bulletin, furniture and office equipment, adaptation of the Building (but not the cost of the building itself) etc. While UNESCO's share - 52.6 per cent or \$116,280 covered salaries and travel expenses of the international experts, periodical subscriptions, equipment and fellowships.

For 1954, the first year in which the Centre operated with the financial support of the Mexican Government only, the total expenditure was some \$70,000, with the following breakdown: Bulletin 36 per cent; (printing: 30 per cent, paper 6 per cent); salaries - permanent and part-time staff, 47 per cent. Subscriptions, material, equipment; 17 per cent.

The flow of requests to UNESCO for assistance in the creation of scientific and technical documentation centres continues. This may be taken as proof of the recognition of the usefulness of the tool UNESCO is using to increase the network of national documentation centres, essential for efficacious universal action in this field.

Bibliography

- (1) Mikhailov, A.I.: "Proceedings of the ICSI". Vol. 1, p. 512, Washington 1959.
- (2) International Conference on Science Abstracting. Final Report. UNESCO, Paris 1949.
- (3) Conrad, G.M.: Biological Abstracts Tools up for the Future. "AIBS Bulletin" X. No. 5. 25.7.1960.
- (4) "Biological Abstracts". 36 (20), Oct. 15, 1961.
- (5) Baker, D.B.: "Growth of Chemical Literature. Past, Present and Future". Chemical and Engineering News. 39, 78, 1961.
- (6) Dyson, G.M.: "Closing the gap in Chemical documentation". Chemical and Engineering News, 38, 70, 1960.
- (7) Dyson, G.M.: "Current Research at Chemical Abstracts". Journal of Chemical Education, 1, 24, 1961.
- (8) Sandoval, A.M.: Centro de Documentación Científica y Técnica de México. Noticias bibliográficas de la División de Bibliotecas de la UNESCO. 4, 1, 14-16, 1955. Pietsch, E.: "Nationale Dokumentationseinrichtungen" Nachrichten für Dokumentation, 6, 1, 5-18, 1955.
- (9) Pérez-Vitoria, A.: "La division de documentation scientifique et technique du Caire". Rev. Doc. 20, 4, 97-100, 1959.
- (10) Lorch, W.T., and Eala, Q.A.: "Scientific documentation in economically under-developed countries." Science Rev., Manila, October, 8 issue, 8-12, 1960.
- (11) Pérez-Vitoria, A.: "Hubo una Misión de Asistencia técnica Mexico City, 1954, 74 pp., 3 fig.

VI

REVIEW OF ABSTRACTING AND INDEXING PERIODICALS IN DIFFERENT BRANCHES OF SCIENCE; SURVEY BY SUBJECT AND BY LANGUAGE; DUPLICATION AND GAPS

The number of primary scientific periodicals which at least occasionally publish original scientific information is variously estimated between 26,000 and 32,000,^{1/} depending on where the "frontiers" of science are drawn. About 1 million papers and articles, covering a total of more than 14 million pages of every size, are estimated to have been published in this way in 1958. In 1960, the year to which this chapter relates, the figure was considerably higher.

This means that in practice every abstracting journal has perforce to make a choice among these primary periodicals. It selects those which, broadly speaking, offer it the most profit, as judged by such scientific or commercial features as the following:

1. A high proportion of original and informative articles in the field covered;
2. Facilities for good abstracting (provision of author abstracts or translations of abstracts by the editor);
3. Easy, rapid and regular availability of the periodical (e.g. on an exchange basis).

If we simplify matters by confining our inquiry to pure science, to the exclusion of abstracting journals concerned solely with a single branch of applied science, we are left with a bare hundred titles of abstracting or indexing periodicals. Moreover, of the former, only the French Bulletin signalétique and the Russian Referativny Zhurnal cover more or less all branches of science.

1/ Or even 50,000, if the definition of science is that used by the World List of Scientific Periodicals.

The following classification of the branches of science will be used:

1. Mathematical and physical sciences
2. Chemical sciences
3. Biological sciences
4. Earth sciences.

Any attempt at a more detailed classification would be fraught with the major difficulties presented by gaps and overlapping. Does physical chemistry differ from physico-chemistry, for example, or biological physico-chemistry from biophysical biochemistry?

Let us therefore start by tabulating the titles of the most important abstracting and indexing periodicals (tables 1, 2, 3 and 4), and then give such particulars as we have been able to obtain on the periodicals listed in the four tables. These particulars consist mainly of the following:

- (a) The address of the scientific society or committee which publishes the periodical;
- (b) the number of issues published each year, the annual subscription, the annual number of pages and the number of articles abstracted or indexed each year;
- (c) particulars of treatment and presentation, such as the nature and frequency of author and subject indexes;
- (d) the classification used within the field covered;
- (e) the periodical's circulation (this information will be supplied later).

These particulars have been taken either direct from the cover page of a recent copy of the abstracting periodical or from references (1) and (8).

TABLE 1. MATHEMATICAL AND PHYSICAL SCIENCES

1. Bulletin signalétique du CNRS (sections 1 to 6)
2. Referativny Zhurnal (mathematics and physics sections)
3. Physics Abstracts
4. Physikalische Berichte
5. Mathematical Reviews
6. Applied Mechanics Reviews
7. Current Contents of Space and Physical Sciences^{1/}
8. Nuclear Science Abstracts^{2/}
9. Meteorological and Geostrophysical Abstracts
10. Semiconductor Abstracts
11. Rheology Abstracts^{1/}
12. Physics Express
13. Engineering Index^{1/}
14. Astronomischer Jahresbericht
15. Chemical Abstracts (Nuclear physics, structure of matter and physical chemistry sections)
16. Soviet Abstracts: Physics
17. Boletín del Centro de Documentación Científica y Técnica de México^{1/}
(sections 1 and 2) (physics)
18. International Aerospace Abstracts
19. Electrical Engineering Abstracts
20. Structure Reports
21. Mineralogical Abstracts
22. Index Aeronauticus^{1/}
23. NASA Announcements
24. Documentation Bulletin of the National Research Centre, Cairo^{1/}
25. Insdoc List^{1/}

^{1/} Indexing periodical.

^{2/} A report on the present state of abstracting services in the nuclear science field will be presented by the Director-General of IAEA to the Agency's Board of Governors in June 1962.

PARTICULARS OF ABSTRACTING PERIODICALS ON THE
MATHEMATICAL AND PHYSICAL SCIENCES

1. Bulletin Signalétique du CNRS (sections 1 to 6)

Mr. Wyart, Director, Mrs. Duval, Editor, 15 Quai Anatole France, Paris 7^e.

Section 1: Mathematics

This section is classified under 12 headings (Cross-references to sections 2, 3, 6, 9 and 18 for questions of applied mathematics)

Number of articles index per year: 7,000

Price in France: 30 new francs; abroad: 35 new francs

Circulation: 1,500

Section 2: Astronomy - Astrophysics - Geophysics

This section is classified under 12 headings (Cross-references to sections 3, 5, 9, 10 and 22 - for astronomers only)

Number of articles index per year: 8,500

Price in France: 40 new francs; abroad: 45 new francs

Circulation: 1,500

Section 3: Physics I

General. Physics. Mathematics. Mechanics. Acoustics. Optics. Heat. Thermodynamics.

This section is classified under 7 headings (Cross-references to sections 4, 6, 8, 9 and 22)

Number of articles indexed per year: 12,000

Price in France: 50 new francs; abroad: 55 new francs

Circulation: 1,600

Section 4: Physics II

Electricity.

6 headings

(Cross-references to sections 3, 6, 7 and 9)

Number of articles index per year: 9,000

Price in France: 40 new francs; abroad: 45 new francs

Circulation: 1,550

/...

Section 5: Nuclear physics

Nuclei. Particles. Atomic energy.

This section is classified under 6 headings

(Cross-references to sections 4, 6 and 7)

Number of articles indexed per year: 6,500.

Price in France: 40 new francs; abroad: 45 new francs

Circulation: 1,500

Section 6: Structure of Matter

Crystallography. Solids. Fluids. Atoms. Ions. Molecules.

This section is classified under 15 headings

(Cross-reference to section 10)

Number of articles indexed per year: 11,500

Subject index: monthly and annual since 1961

Price in France: 40 new francs; abroad: 45 new francs

Circulation: 1,650 plus a special printing of 1,250 with tables
of contents in English and French- for the American Crystallographic Association.

2. Referativny Zhurnal

Abstracting journal of the Institute of Scientific Information of the
Academy of Sciences of the USSR.

Moscow, D. 219

Baltysky poselok 42-6.

Here follow the titles of all the constituent journals of

Referativny Zhurnal:

	<u>Number of abstracts in</u> <u>1961</u>
1. Automation and radioelectronics	40,000
2. Astronomy and geodesy	13,000
3. Biology (cf. table 3)	120,000
4. Geography (cf. table 4)	40,000
5. Geology (cf. table 4)	36,000
6. Mining (cf. table 4)	18,000

/...

7.	Geophysics (cf. table 4)	21,000
8.	Mathematics	21,000
9.	Mechanical engineering	145,000
10.	Metallurgy	34,000
11.	Mechanics	18,000
12.	Transport	17,000
13.	Physics	37,000
14.	Chemistry (14 sections)	140,000
15.	Biological chemistry (11 sections) (cf. table 2)	40,000
16.	Electrical engineering and energy	35,000

Circulation: 161,050

There is also an additional section entitled "Industrial Economics".

3. Physics Abstracts

(Editor: Dr. Crowther)

Institution of Electrical Engineers, Savoy Place, London W.C.2.

(section A of the former periodical Science Abstracts).

Classification:

1. Mathematics
2. Astrophysics
3. Physics, general
4. Physics (nuclear and atomic)
5. Solid state physics
6. Physical chemistry
7. Geophysics (relates to table 4)
8. Biophysics (relates to table 3)
9. Technique.

Subscription: £6 (printed on one side only £7)

Circulation: 9,000

4. Physikalische Berichte

Brunswick, Bundesallee 100

(Verband Deutscher Physik - Gesellschaften)

Editors: Dr. Ebert and Dr. Schön

/...

14,800 abstracts published in 1961.

Length of abstracts: approx. 150 words. Author index. Some articles are indexed only.

Classification: 0. General

1. Mathematics
2. Astronomy and astrophysics
3. Physics (general)
4. Mathematical physics
5. Mechanics
6. Acoustics
7. Optics
8. Heat, thermodynamics
9. Electricity, magnetism
10. Structure of matter
11. Geophysics (relates to table 4)
12. Biophysics (relates to table 3)
13. Materials

Circulation: 1,400

5. Mathematical Reviews

American Mathematical Society, 190 Hope St., Providence 6, R.I., U.S.A.

11 times a year since 1940; 10,000 critical articles a year covering 800 periodicals and 200 books; annual author and subject indexes; \$50.

(*) Summary Classification:

Mathematics, history of mathematics, theoretical mechanics including fluid mechanics and elasticity, theoretical physics, theoretical astronomy, mathematical statistics.

Circulation: 5,600

6. Applied Mechanics Reviews

American Society of Mechanical Engineers, 29 West 39th Street, New York 18, N.Y., U.S.A.

/...

Editorial Offices: Southwest Research Institute, 8500 Culebra Road, San Antonio 6, Texas, U.S.A.

12 issues a year since 1948; 6,000 abstracts a year; author and subject indexes; \$25.

7. Current Contents of Space and Physical Sciences

Weekly indexing service covering 100,000 articles a year from 500 primary journals. Established to cover the field of missiles, rockets, electronics, mathematics, computers, nuclear energy and instrumentation, this periodical also indexes, as an "extra", all the basic chemical journals.

This journal provides quick and convenient access to the original documents.

Subscription: \$50 (non-profit-making institutions)

\$100 (others)

8. Nuclear Science Abstracts

U.S. Atomic Energy Commission, c/o Superintendent of Documents,

U.S. Government Printing Office, Washing 25, D.C.

Twice a month since 1947; 22,000 abstracts a year from 370 journals, 100 books, 9,000 technical reports, 500 patent specifications and 100 other sources; author index (by authors and groups of authors); index of report numbers and subjects; indexes cumulated after one quarter, after the third quarter (separately), annually and every five years.

Subscription: \$18 in the United States, \$22.5 abroad (\$15 and \$17.5 for the indexes alone).

Biology, chemistry, physics, metallurgy and other fields where they relate to nuclear science.

9. Meteorological and Geostrophysical Abstracts (previously Meteorological Abstracts and Bibliography)

American Meteorological Society, 3 Joy Street, Boston 8, Mass., U.S.A.

Monthly since 1950: 5,000 abstracts a year from 1,500 journals, 150 books, 600 technical reports and 2,000 other sources; annual author and subject indexes, geographical index and index by periodicals (a ten-year index of authors and

subjects, arranged geographically and by periodicals according to UDC rules, is planned); \$60.

Meteorology, climatology, geophysics, hydrology, oceanography, physics (of the auroras, the ionosphere and meteorites), radio-astronomy and the applications of meteorology to agriculture, astronautics, aviation, trade, forestry, industry, public health, etc.

Circulation: 3,000

10. Semi-conductor Abstracts

Battelle Memorial Institute, Solid State Devices Division, 505 King Ave., Columbus 1, Ohio, U.S.A.

Annual since 1951; 2,500 informative abstracts a year; author and subject indexes; distributed free of charge.

Semi-conductors and luminescent materials.

11. Rheology Abstracts

British Society of Rheology, c/o Pergamon Press Inc., 122 East 55th Street, New York 22, N.Y.

Four times a year since 1958; indicative review on rheology.

12. Physics Express

International Physical Index Inc., 1909 Park Ave., New York 35, N.Y.

10 issues a year since 1958; 500 abstracts a year from Russian journals; author index; \$57.50.

(*) Summary classification:

Atomic structure and spectra; cosmic rays and elementary particles, study of cold, electrical discharges, luminescence, magnetism; ferri- and ferro-magnetic phenomena, magnetic methods, molecular structure and spectra, nuclear structure, space physics and geophysics, quantum theory, radiation and rays, relativity and gravity, solid state and semi-conductors.

13. Engineering Index

Engineering Index Inc., 345 East 47th Street, New York 17, N.Y.

Since 1928, weekly card services arranged by subjects (in addition an annual volume has been issued since 1885); 3,000 abstracts a year from 1,578 journals, 100 books and 200 technical reports; annual subject index.

Subscription to card service: \$12 to \$45 according to series.

Price per volume: \$70.

All subjects in the field of engineering technology.

Circulation: 3,000.

14. Astronomischer Jahresbericht

Astronomisches Rechen-Institute, W. de Gruyter, 13 Genthiner Str., Berlin W 35, Germany.

Since 1899; 13,500 abstracts a year; author and subject indexes.

50 Deutsch Marks.

15. Chemical Abstracts (nuclear physics, structure of matter and physical chemistry sections)

(See table 2 below).

16. Soviet Abstracts: Physics

U.S. Joint Publications Research Service, c/o Office of Technical Services,
U.S. Department of Commerce, Washington 25, D.C.

Selected abstracts classified by subjects; published since 1959 at irregular intervals (from two to ten issues a year) and based on the Soviet abstracting journal Referativny Zhurnal.

(*) Classification:

Physics: general, theoretical, nuclear, atomic and molecular, solid state physics, magnetism, electricity, electronics, accoustics, optics and radiation-physics.

17. Bolétín del Centro de Documentación Científica y Técnica de México

Enrico Martinez 24, Mexico City 1, D.F., Mexico.

Established under an agreement of 9 November 1950 between the Mexican Government and UNESCO to stimulate, through documentation, the progress of science, technology and industry in the Latin American countries.

The bulletin, which appears monthly, contains, classified by subjects, the titles - translated into Spanish - and bibliographical references of all work published in the reviews received at the Centre. Entries concerning work published in Latin American reviews are followed by an abstract in English and are specially marked by a black dot in the margin. Except in the case of Latin American work, therefore, the bulletin is an indexing periodical, each issue of which is divided into the following five sections:

		<u>Published in 1961</u>	
		<u>Titles</u>	<u>Abstracts</u>
Section 1	Mathematics; Astronomy and astrophysics; Physics (13 sub-sections); Geology, geophysics and geodesy (cf. table 4)	14,341	329
Section 2	Mechanical and architectural engineering	10,243	863
Section 3	Chemistry (15 sub-sections) (cf. table 2)	21,080	417
Section 4	Medicine (28 sub-sections) (cf. table 3)	23,051	2,789
Section 5	Biology (12 sub-sections) (cf. table 3) Agriculture, stockbreeding and food industry (10 sub-sections) (cf. table 3)	11,203	731
		<hr/> 79,918	<hr/> 5,129
Price per twelve issues:		form A (all sections combined) \$US 8	
		form B (5 specialized sections) \$US 10	
		each section: \$US 2.50	

18. International Aerospace Abstracts (previously Aerospace Reviews)

Section Aerospace Reviews, including Periodicals and Reports, International Aeronautical Abstracts, and Books.

Institute of the Aeronautical Sciences Inc., 2 East 64th St., New York 21, N.Y.

Monthly since 1940; 7,000 abstracts; 2,200 index entries a year from 500 journals, 400 books, 3,000 technical reports and 400 communications to congresses; classification by subject.

Subscription: \$6 a year abroad.

Aerospace science and technology; missiles, rockets, satellites, fluid mechanics, propulsion systems, etc.

Circulation: 2,000.

19. Electrical Engineering Abstracts (section B of the former periodical Science Abstracts)

Institution of Electrical Engineers, Savoy Place, London W.C.2, England.

Since 1858; 6,500 abstracts a year; author and subject indexes

Price: £5

Circulation: 4,500

20. Structure Reports

Published by the International Union of Crystallography as a successor to the German Struktur Berichte. Editor: Dr. W.B. Pearson, National Research Council of Canada, Ottawa.

Issued as an annual volume of about 800 pages (the latest, issued in 1961, contains the bibliography published in 1954), giving some 1,400 detailed critical abstracts.

21. Mineralogical Abstracts

Published jointly by the Mineralogical Society of Great Britain, 41 Queen's Gate, London S.W.7., and the Mineralogical Society of America.

4 issues a year; \$US 9 or £3.3s.

300 pages a year; 3,000 articles a year abstracted.

Author index for each issue.

(Formerly published as part of the Mineralogical Magazine)

22. Index Aeronauticus

23. NASA Announcements

National Aeronautics and Space Administration, 1520 H St., N.W. Washington 25, D.C.
Since 1951; every two or three weeks; no index. Free of charge.
1,200 announcements a year.

24. Documentation Bulletin of the National Research Centre, Cairo

(Started under the title of Bulletin of the Scientific and Technical Documentation Centre).

Scientific and Technical Documentation Division, National Research Centre,
U.A.R., Dokki, Cairo

Published monthly since 1955.

Part 1: Number of articles indexed in 1960: 53,356 titles in English or French;
Part 2: 872 abstracts in English or French (scientific articles published in the
Middle East).

(*) Classification

Published in 1960

		<u>Titles</u>	<u>Abstracts</u>
Section A	General	166	-
B	Mathematics	1,301	3
C	Astronomy and geophysics	1,863	-
D	Pure and applied physics	8,371	9
E	Pure and applied chemistry	22,864	50
F	Geological sciences	1,857	13
G	Biological sciences	5,632	81
H	Medicine	10,662	496
I	Agricultural and veterinary sciences	3,358	213
J	Engineering	5,282	7
		<u>61,356</u>	<u>872</u>

Annual author and subject indexes for part 2.

Subscription: parts 1 and 2: UAR: 200 piastres

Other countries: \$US 12.

part 2 only:

75 piastres or \$US 2.50

Circulation: 1,500

25. Insdoc List

National Physical Laboratory, Hillside Road, New Delhi, India.

Published twice monthly since 1954. 28,000 titles and 1,344 pages a year.

No index. Classifications: UDC and Colon.

Annual subscription: in India: 10 rupees.

other countries: \$US 12 or £4.

Circulation: ?

TABLE 2. CHEMICAL AND BIOCHEMICAL SCIENCES

1. Bulletin signalétique du CNRS (sections 7, 8 and 12)
2. Referativny Zhurnal (chemistry and biological chemistry)
3. Chemical Abstracts
4. Chemische Zentralblatt
5. Soviet Abstracts: Chemistry
6. Verfahrenstechnische Berichte (Bayer Berichte)
7. Index Chemicus^{1/}
8. Current Contents of Chemical, Pharmacomedical and Life Sciences^{1/}
9. Current Chemical Papers^{1/}
10. Biological Abstracts (biochemical part)
11. International Abstracts of Biological Sciences (biochemical part)
12. Excerpta Medica (section 11)
13. Kagaku Soran (Chemical Abstracts of Japan)
14. Biochemical Title Index^{1/}
15. Chemical Titles^{1/}
16. Boletín del Centro de Documentación Científica y Técnica de México^{1/}
(section 3: Chemistry)
17. Documentation Bulletin of the National Research Centre, Cairo^{1/}
(section E: Pure and applied chemistry)
18. Insdoc List

^{1/} Indexing periodical.

PARTICULARS OF ABSTRACTING PERIODICALS ON THE
CHEMICAL AND BIOCHEMICAL SCIENCES

1. Bulletin signalétique du CNRS

Section 7: Chemistry I

General chemistry. Physical chemistry. Inorganic chemistry. Analytical chemistry.
Organic chemistry.

This section is classified under 16 headings.

(Cross references to sections 6, 8, 12, 13 and 22)

Number of articles indexed per year: 25,000

Price in France: 100 new francs; abroad: 105 new francs

Circulation: 2,000

Section 8: Chemistry II

Applied Chemistry. Metallurgy.

2 headings

(Cross references to sections 6, 7, 9, 10 and 18)

Number of articles indexed per year: 17,000

Price in France: 80 new francs; abroad: 85 new francs

Circulation: 1,750

Section 12: Biophysics - biochemistry and biological analytical chemistry

3 headings

(Cross references to sections 7, 13, 14, 17 and 18)

Number of articles indexed per year: 12,000

Price in France: 40 new francs; abroad: 45 new francs

Circulation: 1,550

2. Referativny Zhurnal (Chemistry and biological chemistry)

(See general description in table 1)

Section 14 (Editor: Dr. V.V. Serpinsky) of the Referativny Zhurnal deals with chemistry. The number of abstracts was 100,000 in 1960 and 140,000 in 1961, placing this section on a par with the biology section (120,000 in 1960 and 120,000 in 1961) and with section 9 (Mechanical engineering, 137,000 in 1960 and 145,000 in 1961).

/...

Biological chemistry is covered in a separate section 15, which carried 35,000 abstracts in 1960 and 40,000 in 1961.

These figures, in relation to the grand total (686,000 in 1960 and 784,000 in 1961), show that the chemical and biochemical part accounts for 23 per cent of the Referativny Zhurnal.

Circulation: 11,300

3. Chemical Abstracts

American Chemical Society, 1155 16th Street, N.W., Washington 6, D.C.

Twice monthly since 1907. 144,589 informative abstracts in 1961 from 10,000 journals, 1,200 books, 22,000 patent specifications, etc. Indexed by author, subject, formula, patent and ring. Cumulative indexes every 5 years (formerly every 10 years).

Subscription: \$200 for educational establishments
\$925 for others

Chemistry, including biochemistry, organic chemistry, physical chemistry, inorganic chemistry, etc.

The classification of Chemical Abstracts has just been revised for the first time in fifty-five years. The new classification, as from January 1962, is as follows:

1. History, Education, and Literature
2. Analytical Chemistry
3. General Physical Chemistry
4. Surface Chemistry and Colloids
5. Catalysis and Reaction Kinetics
6. Phase Equilibriums, Chemical Equilibriums, and Solutions
7. Thermodynamics, Thermochemistry, and Thermal Properties
8. Crystallization and Crystal Structure
9. Electric and Magnetic Phenomena
10. Spectra and Some Other Optical Properties
11. Radiation Chemistry and Photochemistry
12. Nuclear Phenomena
13. Nuclear Technology

14. Inorganic Chemicals and Reactions
15. Industrial Inorganic Chemicals
16. Cement and Concrete Products
17. Ceramics
18. Mineralogical and Geological Chemistry
19. Extractive Metallurgy
20. Ferrous Metals and Alloys
21. Nonferrous Metals and Alloys
22. Electrochemistry
23. Water
24. Sewage and Wastes
25. Apparatus, Plant Equipment, and Unit Operations and Processes
26. General Organic Chemistry
27. Aliphatic Compounds
28. Alicyclic Compounds
29. Noncondensed Aromatic Compounds
30. Condensed Aromatic Compounds
31. Heterocyclic Compounds - One Hetero Atom
32. Heterocyclic Compounds - More than One Hetero Atom
33. Organometallic and Organometalloidal Compounds
34. Terpenes
35. Alkaloids
36. Steroids
37. Carbohydrates
38. Amino Acids, Peptides, and Proteins
39. Pharmaceuticals
40. Essential Oils and Cosmetics
41. Fats and Waxes
42. Surface-Active Agents and Detergents
43. Organic Coatings, Inks, and Related Products
44. Dyes
45. Leather and Glue
46. Rubber and Other Elastomers

47. Plastics
48. Textiles
49. Cellulose, Lignin, Paper, and Other Wood Products
50. Industrial Carbohydrates
51. Propellants and Explosives
52. Petroleum Derivatives and Petroleum
53. Coal and Coal Derivatives
54. General Biochemistry
55. Biochemical Methods
56. Toxicology, Air Pollution, and Industrial Hygiene
57. Radiation Effects on Biological Materials
58. Biochemistry of Natural Products
59. Enzymes
60. Plant Biochemistry
61. Plant Nutrition and Fertilizers
62. Plant-Growth Regulators and Crop-Control Agents
63. Pesticides
64. Foods
65. Mammalian Nutrition
66. Microbial Chemistry
67. Fermentations
68. Nonmammalian Biochemistry
69. Mammalian Physiological Chemistry
70. Immunochemistry
71. Mammalian Pathological Chemistry
72. Hormones and Related Substances
73. Pharmacodynamics

4. Chemische Zentralblatt

Deutsche Akademie der Wissenschaften zu Berlin, der Chemischen Gesellschaft in der DDR, der Akademie der Wissenschaften zu Göttingen und der Gesellschaft Deutscher Chemiker in der BRD.

Akademie-Verlag, Mohrenstr. 39, Berlin W.8, and Verlag Chemie GmbH, Papellallee 3, Weinheim/Bergstr., German Democratic Republic.

Since 1830; 87,450 abstracts a year; with abstracts of patent specifications and index of authors.

Price: 960 Deutsche Marks

Classification:

- A. General, physical and inorganic chemistry
- B. General organic chemistry - theoretical
- C. Preparative organic chemistry. Natural products
- D. Macromolecular chemistry
- E. Biological chemistry. Physiology. Medicine
- F. Pharmaceutical chemistry. Disinfection
- G. Analysis
- H. Applied chemistry (24 sub-sections).

Circulation: 4,000

5. Soviet Abstracts: Chemistry

Address and remarks as in table 1, journal 16;

Chemistry classification:

Physical chemistry, inorganic chemistry, analytical chemistry, organic chemistry, industrial chemistry, macromolecular chemistry, geochemistry, equipment and instruments.

6. Verfahrenstechnische Berichte (Bayer Berichte)

Ingenieur-Wissenschaftliche Abteilung der Farbenfabriken Bayer A.G., Leverkusen.

Published by Verlag Chemie, 3 Pappelallee, Weinheim/Bergstr., Germany

Since 1954; 6,000 abstracts a year, each abstract bearing an index number, e.g. B. 1403/29.

Price: 363 Deutsche Marks

The abstracts are fairly long (in some cases, one 13 x 21 page), but they are expensive.

/...

7. Index Chemicus

Institute for Scientific Information, 33 South 17th Street, Philadelphia 3, Pa.

Twice monthly since 1959.

4,850 "graphical abstracts" a year.

Some 80,000 formulae in three years. Index of authors and of molecular formulae in each issue, cumulated three times a year.

Subscription: \$250 for non-profit-making institutions

\$500 for industrial users

Further details of this publication are given in chapter III.

8. Current Contents of Chemical, Pharmacomedical and Life Sciences

(See below, table 3, journal 9)

9. Current Chemical Papers

Chemical Society, Burlington House, London.

This Chemical Society publication is an indicative journal designed to supply chemists with information faster than would be possible with an abstracting journal. It is not intended to replace abstracting journals. Its purpose is to serve as a reading guide for chemists rather than as a basis for permanent bibliographies. For this reason, it is not indexed.

Taking August 1961 as a typical month: of 234 periodicals received, 118 were covered by at least one reference each. The remaining 116 were rejected on compilation because they contained no new information on pure chemistry.

The sections are as follows:

1. Sub-atomics (chemical aspects)
2. Atomic and molecular properties
3. Phase structure and phase relations
4. Surface properties
5. Colloids and macromolecules
6. Electrochemistry
7. Thermodynamics
8. Reaction kinetics and reaction mechanisms
9. Inorganic

/...

10. Organometallic and organometalloidal compounds

11. Organic:

- aliphatic
- amino-acids and proteins
- carbohydrates
- homocyclic
- terpenes and steroids
- heterocyclic
- miscellaneous

12. Analysis:

- general methods and reagents
- inorganic
- organic

13. Apparatus and techniques

20,000 references a year: price per year: ordinary edition, £5; edition printed on one side only, £6.10s.; airmail edition, £8.

Circulation: 4,180

10. Biological Abstracts

(See table 3, journal 3).

11. International Abstracts of Biological Sciences

(See below, table 3, journal 4).

12. Excerpta Medica

Excerpta Medica Foundation. Head office: 119-123, Herengracht, Amsterdam, The Netherlands. New York office: New York Academy of Medicine Building, 2 East 103rd Street, New York 29, U.S.A. London office: 67, New Bond Street, London W.1, England. Tokyo office: Echiso Building, 1 Hongo 3-chome, Bunkyo-ku, Tokyo, Japan.

Section 2: Physiology, biochemistry and pharmacology. Monthly since 1948; 6,000 abstracts a year from 2,500 journals, monthly indexes of authors, annual indexes of subjects and authors.

Price: \$45

Biochemistry, human body fluids, circulation, digestive system, excretion, gerontology, metabolism, nutrition, etc.

13. Kagaku Soran

(Chemistry and Chemical Industry)

Review edited by the Chemical Society of Japan; published by Maruzon and Co., Nihonbasi Tôri 2-6, Tyûô-ku, Tokyo, Japan.

Since 1948, twelve issues a year; 2,500 "bibliographies" based on primary periodicals.

14. Biochemical Title Index

3815 Walnut St., Philadelphia 4, Pa.

Monthly since January 1962; expected to cover some 29,000 titles a year from 500 biochemical periodicals and other conventional periodicals on biology or chemistry; 100-page sections.

Price: (1962): \$50; non-profit-making educational institutions: \$40
(Further information on this new periodical is given in chapter III).

15. Chemical Titles

American Chemical Society, 1155 16th St., N.W., Washington 6, D.C.

Twice monthly since 1960; 60,000 articles a year indexed from 550 journals, including 110 Russian journals; takes the form of an alphabetical index of authors and titles.

Price range between \$25 and \$65, depending on the number of subscriptions. This is a service relating to pure and applied chemistry (see also chapter III).

Circulation: 3,600

16. Boletín del Centro de Documentación Científica y Técnica de México

See table 1, journal 17.

Section 3 deals with chemistry in general.

17. Documentation Bulletin of the National Research Centre, Cairo

See table 1, journal 24.

Section E deals with chemistry in general.

18. Insdoc list

See table 1, journal 25.

TABLE 3. BIOLOGICAL SCIENCES^{1/}

1. Bulletin signalétique du CNRS (sections 13-22)
2. Referativny Zhurnal (biological section)
3. Biological Abstracts
4. International Abstracts of Biological Sciences
5. Excerpta Medica
6. Bulletin de l'Institute Pasteur
7. Bibliography of Agriculture^{2/}
8. Chemical Abstracts (biochemical part)
9. Current Contents of Chemical, Pharmacomedical and Life Sciences^{2/}
10. Boletín del Centro de Documentación Científica y Técnica de México^{2/}
(sections 4 and 5)
11. Agricultural Index^{2/}
12. Berichte über die wissenschaftliche Biologie
13. Berichte über die gesamte Physiologie
14. Index Medicus
15. Excerpta Botanica
16. Commonwealth Agricultural Bureaux Journals (17 specialized journals)
17. Index Veterinarius^{2/}

^{1/} Full information on this subject will be found in the list published by the World Health Organization (WHO) in Library News, volume 12, supplement 2, of 1959, under the title "Current Indexing and Abstracting Periodicals in the Medical and Biological Sciences". The second edition of this list gives information on 310 periodicals which are devoted entirely to abstracting or which have an abstract section or a bibliographical section. As stated in the introduction, "the number of journals containing abstracts as a new feature is steadily growing, exceeding in fact the number of new periodicals devoted entirely to indexing or abstracting purposes. Few of these periodicals, however, make any systematic attempt to survey the relevant literature comprehensively."

The third edition of "World Medical Periodicals", ⁽¹⁰⁾ which covers 5,800 medical, pharmaceutical, dental and veterinary journals, describes in appendix II the "Principal International Indexes" comprising seventeen periodicals.

^{2/} Indexing periodical.

18. Psychological Abstracts
19. Zoological Record
20. Documentation Bulletin of the National Research Centre, Cairo
(section G: Biological sciences)
21. Insdoc List
22. Zentralblatt für Bakteriologie

PARTICULARS OF ABSTRACTING PERIODICALS ON
THE BIOLOGICAL SCIENCES

1. Bulletin signalétique du CNRS

Section 13: Pharmacological Sciences. Toxicology

Classification under 2 headings.

(Cross-references to sections 12, 16 and 18)

Number of articles indexed per year: 10,000

Price in France: 40 new francs; abroad: 45 new francs

Circulation: 1,500

Section 14: Microbiology. Viruses and Bacteriophages. Immunology.
Genetics

Classification under 7 headings.

(Cross-references to sections 13, 15, 16, 17 and 18)

Number of articles indexed per year: 12,000

Price in France: 40 new francs; abroad: 45 new francs

Circulation: 1,500

Section 15: General and Experimental Pathology

Classification under 16 headings.

(Cross-references to sections 12, 14 and 16)

Number of articles indexed per year: 15,000

Price in France: 60 new francs

Circulation: 1,400

Section 16: Animal Biology and Physiology

Classification under 11 headings

(Cross-references to sections 11, 12, 14 and 18)

Number of articles indexed per year: 36,000

Price in France: 100 new francs; abroad: 105 new francs

Circulation: 1,500

Section 17: Plant Biology and Physiology

Classification under 7 headings.

(Cross-references to sections 11, 12, 15 and 18)

Number of articles indexed per year: 8,000

Price in France: 50 new francs; abroad: 55 new francs

Circulation: 1,400

Section 18: Agricultural Sciences. Stockbreeding. Plant Protection and
Phytopharmacology. Food, Food Industries and Industries of
Fermentation

Classification under 3 headings.

(Cross-references to sections 11, 12, 13 and 14)

Number of articles indexed per year: 12,000

Price in France: 60 new francs; abroad: 65 new francs

Circulation: 1,450

Section 22:^{1/} History of Science and Technology

Classification under 3 headings.

Number of articles indexed per year: 3,000

Price in France: 20 new francs; abroad: 25 new francs

Circulation: 400

2. Referativny Zhurnal

See table 1 (journal 2) and table 2 (journal 2).

The section expressly concerned with biology is section 3, which carried 120,000 abstracts in 1960 and the same number in 1961.

3. Biological Abstracts

3815 Walnut St., Philadelphia 4, Pa.

Twice-monthly since 1926; approximately 100,000 abstracts a year (in 1962) from 5,500 journals and 400 books; the abstracts are classified; author index is published monthly and cumulated annually; subject, geographical, geological and taxonomical indexes are provided for each volume.

^{1/} The following sections are mentioned pro memoria: 19, Philosophy and Human Sciences; 20, Psychology and Pedagogy; 21, Sociology and Speech Sciences.

	<u>Price</u>	<u>Non-profit organizations</u>	<u>Individuals</u>
Complete edition	\$225	\$180	\$180
General Biology - section A	26	20	13
Basic Medical Sciences - section B	78	62	39
Microbiology, Immunology, Public Health and Parasitology - section C	30	24	15
Plant Sciences - section D	38	30	19
Animal Sciences - section E	28	22	14
Subject Index	36	28	18

Classification:

Theoretical and applied biology, anthropology, animal physiology, anatomy, allergy, agronomy.

Circulation: 8,150

4. International Abstracts of Biological Sciences

Published by Pergamon Press, 4-5 Fitzroy Square, London, W.1. for Biological and Medical Abstracts Limited - a non-profit company limited by guarantee, sponsored by 10 British scientific societies.

A direct successor of Physiological Abstracts which began in 1916. Published monthly - 4 volumes per annum.

In 1961 volumes 20, 21, 22 and 23 were published, totalling 24,117 abstracts divided into 13 sections:

<u>Volume</u>	<u>20</u>	<u>21</u>	<u>22</u>	<u>23</u>
<u>Section</u>	<u>No. of Abstracts</u>			
Anatomy	225	147	211	198
Animal Behaviour	131	117	76	101
Biochemistry	1,689	1,776	2,052	1,718
Biophysics	154	220	183	156
Cytology	151	132	167	130
Expt. Botany	267	288	270	304
Expt. Zoology	268	273	319	248
Genetics	110	211	180	162
Immunology and Expt. Pathology	504	495	416	540
Microbiology	500	477	436	587
Odontology	125	106	141	87
Pharmacology	536	476	625	680
Physiology	1,233	1,034	1,082	1,099
Reviews, Symposia	20	40	18	12
	5,908	5,833	6,265	6,111
Total cost £35 (\$98.00) per annum.				

/...

In 1962 a 10 per cent expansion, to include Proceedings of Society Meetings by title only for the review section, is budgeted for.

1962 Subscription £45 (\$120.00)

Teaching Institutes £40 (\$102.00)

Abstracts are obtained:

- (1) from authors after editing by the journal of origin;
- (2) from specialist abstractors,

and originate from

List A journals - totalling 87, from which ALL papers are abstracted except proceedings of scientific meetings;

and List B journals - totalling 443, from which only papers pertinent to the basic experimental sciences are abstracted.

5. Excerpta Medica

Address: See table 2, journal 12.

(a) List of the 27 sections and subscription price per section in new francs (NF):

Section

1	Anatomy, embryology, anthropology, histology	NF 110
2	Physiology, biochemistry and pharmacology	NF 215
3	Endocrinology	NF 75
4	General microbiology and serology	NF 80
5	General pathology, pathological anatomy	NF 175
6	Internal medicine	NF 180
7	Pediatrics	NF 76
8	Neurology and psychiatry	NF 120
9a	Surgery	NF 132
9b	Orthopaedics and traumatology	NF 48
10	Obstetrics and gynaecology	NF 75
11	Otorhinolaryngology	NF 75
12	Ophthalmology	NF 75
13	Dermatology and venereology	NF 100
14	Radiology	NF 75

Section

15	Chest diseases	NF	95
16	Cancer	NF	100
17	Public health, social medicine and hygiene	NF	100
18	Cardiovascular diseases	NF	100
19	Rehabilitation	NF	92
20	Gerontology	NF	92
21	Ontogenetic human biology	NF	92
	Japanese medicine	NF	160
	Soviet Medicine ^{1/}		
	Poliomyelitis	NF	16
	Disseminated Sclerosis	NF	85

a. Muscular Dystrophy Abstracts (this journal is distributed only to a mailing list of the Muscular Dystrophy Association of America).

b. Human Genetics. This abstracting journal will start in July 1962.

Approx. price NF 120.

(b) Six sections have been selected as examples and are described in detail below:

Section 1: Anatomy, embryology

Monthly since 1947; 4,000 abstracts a year from 2,500 journals; monthly index of authors, annual indexes by subject and author. \$22.50

Section 3: Endocrinology

Monthly since 1947; 2,500 abstracts a year from 2,500 journals; monthly index of authors, annual indexes by subject and author. \$15.00

(Classification under 5 headings)

Section 13: Dermatology and venereology

Monthly since 1947; 2,800 abstracts a year from 2,500 journals; monthly index of authors, annual indexes by subject and author. \$25.00

(Classification under 15 headings)

^{1/} This section was published separately from 1957 to 1961. As from January 1962, it has been included among the regular sections of Excepta Medica.

Section 15: Chest diseases

Monthly since 1948; 2,800 abstracts a year from 2,500 journals; monthly index of authors, annual indexes by subject and author. \$20.00. Diseases of the collagen, non-tubercular respiratory conditions.

(Classification under 8 headings)

Section 16: Cancer

Monthly since 1953; 4,700 abstracts a year from 2,500 journals; monthly index of authors, annual indexes by subject and author. \$15.00

History, general theory, statistics, cancer control, experimental research, general pathology, metastasis, tumours in animals and plants, etc.

(Classification under 24 headings)

Section 18: Cardiovascular diseases

Monthly since 1957; 3,400 abstracts a year from 2,500 journals; monthly index of authors, annual indexes by subject and author. \$15.00. Anatomy, embryology, histology, etc.

(Classification under 20 headings)

The remaining sections are comparable to those described.

6. Bulletin de l'Institut Pasteur

Abstracting periodical published for the Institut Pasteur by Ed. Masson et Cie., 120 Bd. St. Germain, Paris 6e.

Since 1903; 12 issues a year; \$11; 13,000 abstracts a year, 12 author indexes; 1 annual cumulative author index; 1 subject index. Abstracts and references. Some of the abstracts go into great detail. It is specified that "edited author abstracts" are used.

Classification:

1. Antibiotics
2. Chemicotherapy and bacteriostasis
3. Disinfection. Antiseptics
4. Phytopathology

Circulation: 1,750

7. Bibliography of Agriculture

U.S. Department of Agriculture, c/o Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C.

Monthly since 1942; 100,000 article titles a year indexed from 14,000-15,000 periodicals; monthly index of authors; annual indexes by author and subject. \$10 in the United States; \$13 abroad.

Main headings: Agricultural economics and rural sociology; agricultural engineering; agricultural products (processing, distribution and statistics); animal industry; entomology; food and human nutrition; forestry; plant science; soils and fertilizers.

8. Chemical Abstracts (biochemical part of interest to biologists)

See table 2, journal 3.

Section 11 deals with biological chemistry. Following a recent decision by Chemical Abstracts, this section may be subscribed to separately.

9. Current Contents of Chemical, Pharmacomedical and Life Sciences

Eugene Garfield Associates, 1122 Spring Garden St., Philadelphia 23, Pa.

Weekly since 1958; 120,000 titles a year indexed from some 600 journals, 500 books and 500 technical reports. Journals grouped by branch of science: chemistry and biochemistry journals at the beginning of each issue, followed by pharmacology and physiology, then medical and clinical, journals. \$50 to non-profit-making institutions, \$100 to other users.

The branches of science covered are: Biochemistry, organic chemistry, pharmacology, basic medicine, pharmaceutical research and pre-clinical sciences. This organization is connected with the Original Article Tear Sheet Service. The cover pages of various primary journals, showing article titles, are photographically reproduced within forty-eight hours after receipt of the primary journal. (see also chapter III).

10. Boletín del Centro de Documentación Científica y técnica de México

(Biological part). See table 1, journal 17 (sections 4 and 5).

11. Agricultural Index

The H.W. Wilson Co., 950 University Ave., New York 25, N.Y.

Monthly, except September, since 1916; 28,000 articles a year indexed from 115 journals, 1,000 books and 3,000 pamphlets; cumulative subject indexes quarterly, annually and biennially. The subscription depends largely on the terms on which it is taken out.

Headings: Agricultural chemistry, bacteriology, botany, ecology, entomology, farm economics, forestry, horticulture, mycology, rural sociology, soil science, veterinary medicine, zoology.

12. Berichte über die wissenschaftliche Biologie

The relevant part is part A of Berichte über die wissenschaftliche Biologie. This is the abstracting journal of the German Botanical Society and of the German Zoological Society.

Springer Verlag, Heidelberger Platz 3, Berlin-Wilmersdorf, Germany.

From 1926 to 1944 and since 1948-1949.

In 1958, 68 Deutsche Marks per volume; 8,000 abstracts; author and subject indexes.

13. Berichte über die gesamte Physiologie

The relevant part is part B of Berichte über die gesamte Physiologie und experimentelle Pharmakologie. Edited in collaboration with the German Physiological Society, the Society for Physiological Chemistry and the German Pharmacological Society.

Springer Verlag, Heidelberger Platz, Berlin-Wilmersdorf, Germany.

From 1920 to 1944 and since 1948-1949.

Subscription in 1959: 68 Deutsche Marks per volume; 10,000 abstracts indexed by author and subject.

14. Index Medicus

Index Medicus replaced the Current List of Medical Literature in 1959.

National Library of Medicine, c/o Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C.

Monthly since 1960; 150,000 articles listed per year, from 2,000 journals; subject and author sections. Price: \$20 U.S.; \$25 foreign. The Cumulated Index Medicus is an annual consolidated publication of the same material, in three volumes. The Cumulated Index Medicus is available from the American Medical Association, 535 North Dearborn Street, Chicago 11, Illinois, at \$35 U.S. and Canada; \$40 foreign.

15. Excerpta Botanica (Section A: Taxonomica et Chlorologica)

Published by Gustav Fischer Verlag, Stuttgart, Germany, since 1959.

1 volume a year (approx. 640 pages) from 1959 to 1961; 2 volumes in 1962.

Price: 55 Deutsche Marks per volume;

Circulation: 600.

16. Commonwealth Agricultural Bureaux

This organization, established in collaboration with the Commonwealth Governments, publishes 17 specialized abstracting journals. Its address is: Commonwealth Agricultural Bureaux, Farnham House, Farnham Royal, near Slough, Bucks. (United Kingdom).

The titles of the 17 journals are:

Bulletin of Entomological Research. Quarterly since 1910

Review of Medical and Veterinary Mycology. Quarterly since 1943

Weed Abstracts. Twice monthly since 1957

Review of Applied Entomology. Series A. Monthly since 1913

Review of Applied Entomology. Series B. Monthly since 1913

Review of Applied Mycology. Monthly since 1922

Helminthological Abstracts. Quarterly since 1932

Animal Breeding Abstracts. Quarterly since 1933

Veterinary Bulletin. Monthly since 1931

Nutrition Abstracts and Reviews. Quarterly since 1931

Dairy Science Abstracts. Monthly since 1939

Horticultural Abstracts. Quarterly since 1931

Herbage Abstracts. Quarterly since 1931

Field Crops Abstracts. Quarterly since 1948

Plant Breeding Abstracts. Quarterly since 1930

Soils and Fertilizers. Twice monthly since 1938

Forestry Abstracts. Quarterly since 1939

(See also the appendix to table 3.)

17. Index Veterinarius

Editor: Commonwealth Bureau of Animal Health, Weybridge, Surrey, England.

Adm.: Commonwealth Agricultural Bureaux, Farnham Royal, Bucks, England.

Index Veterinarius has been published four times a year since 1933; 200s., 10,000 articles indexed. Alphabetical indexes by author and subject.

18. Psychological Abstracts

American Psychological Association, 1333 Sixteenth Street, N.W., Washington 6, D.C.

Since 1927, six issues a year, \$16.50; 6,000 classified abstracts a year. Alphabetical indexes by author and subject; alphabetical annual indexes by author and subject.

19. Zoological Record

Zoological Society of London, Regent's Park, London N.W.1, England.

Since 1864, one issue a year; 13,000 bibliographies. £8. Subject index and systematic index of each section.

List of sections:

<u>protozoa</u>	<u>bryozoa</u>	<u>insecta</u> ^{1/}
<u>porifera</u>	<u>mollusca</u>	<u>protochordata</u>
<u>coelenterata</u>	<u>crustacea</u>	<u>pisces</u>
<u>echinodermata</u>	<u>tribolita</u>	<u>amphibia</u>
<u>vermes</u>	<u>arachnida</u>	<u>aves</u>
<u>brachiopoda</u>		<u>mammalia</u>

^{1/} Published by the Commonwealth Institute of Entomology, 56 Queen's Gate, London S.W.7.

20. Documentation Bulletin of the National Research Centre, Cairo

(See table 1, journal 24).

Section G deals with biological sciences in general.

21. Insdoc List

(See table 1, journal 25).

22. Zentralblatt für Bakteriologie (Section 1. Referate)

Published since 1887 by Gustav Fischer Verlag. Published originally at Jena and since 1954 at Stuttgart.

Four volumes of approx. 640 pages a year; five volumes in 1962. Price per volume: 55 Deutsche Marks.

Circulation: 1,200

In chapter I we have already stressed the importance attached by the participants in the International Conference on Science Abstracting to indexing and abstracting in agriculture and related fields. The part played by the agricultural sciences in the development of new independent countries increases still more the importance of abstracting and indexing services in this field. This is the reason for the publication, as an appendix to table 3, of the list given below of abstracting and indexing journals in the agricultural sciences.

The list includes periodicals in the fields of plant breeding, pasturage, horticulture, stock-breeding, forestry, dairy science and technology, as well as fisheries, oceanography and animal nutrition. Only those journals have been included which contain exclusively abstracts or indexes in the above fields. Therefore periodicals like Biological Abstracts or Chemical Abstracts have not been mentioned, although part of their contents is certainly of interest for agriculture.

Appendix to table 3

Abstracting and indexing journals in the field of agriculture.

1. Alfalfa Abstracts (1949)

Editor and adm.: 1015 Dwight Building, Kansas City 5, Missouri, USA.

Issued once a year. Subscription: ?

Number of journals abstracted: ? Number of abstracts: 175

Classification: not UDC

Index: author index per annual issue.

2. Agricultural and Horticultural Engineering Abstracts (1950)

Editor and adm.: National Institute of Agr. Engineering, Wrest Park,
Silsoe, England

Issued 4 times a year. Subscription: £1.5s.

Number of journals abstracted: 500. Number of abstracts: 2,400

Nature of the abstracts: informative

Classification: not UDC

Index: author/subject, per issue.

3. Abstracts from Current Scientific and Technical Literature (1947)

Editor and adm.: British Food Manufacturers Ind. Res. Ass., Randalls Rd.,
Leatherhead, Surrey, England

Issued 12 times a year. Subscription: ?

Number of journals abstracted: ? Number of abstracts: 2,120

Nature of the abstracts: indicative

Classification: not UDC

Index: subject, annually, issued within 1 year.

4. Abstracts of recent published material on soil and water conservation

U.S.D.A. Soil Conservation Science.

Editor and adm.: C.B. Crook, Soil and Water Conservation Res. Div. Agr.
Res. Service U.S.D.A., Plant Ind. Station, Beltsville,
Maryland, USA

Issued once a year. Subscription: ?

Number of journals abstracted: abt. 25. Number of abstracts: 300

Nature of the abstracts: informative

Classification: not UDC

5. Agricological Abstracts

Editor and adm.: Anti-Locust Research Centre, Princess Gate, London S.W.7

Issued 4 times a year. Subscription: ?

Number of journals abstracted: ? Number of abstracts: 400

Nature of the abstracts: indicative

Classification: not UDC

Index: author, covering the first 3,000 abstracts (abt. 6 yrs.)

6. Agronomy Abstracts

Editor and adm.: American Society of Agronomy, 2702 Monroe St.,
Madison 5, Wis., USA

Issued once a year. Subscription: ?

Abstracts of lectures. Number of abstracts: abt. 500

Nature of the abstracts: indicative/informative

Classification: not UDC

Index: author, per issue and per year

7. Animal Breeding Abstracts (1933)

Editor: Commonwealth Bureau of Animal Breeding and Genetics,
West Mains Rd., Edinburgh

Adm.: C.A.B., Farnham Royal, England

Issued 4 times a year. Subscription: £4.10s.

Number of journals abstracted: 580. Number of abstracts: 2,500

Nature of the abstracts: informative

Classification: not UDC

Index: author, per issue; author/subject/geographical, per year,
issued within 1 to 2 months of the close of the volume.

Circulation: 1,600

8. Bibliographia Oceanographica (1928-1956)

(Discontinued; subject field assimilated by Current
Bibliography for Aquatic Sciences and Fisheries)

Editor and Adm.: Commissione Internazionale per l'Esplorazione
Scientifica del Mare Mediterraneo - Comitato
Italiano

c/o Consiglio Nazionale delle Ricerche, Piazzale
della Scienza, Rome, Italy

Issued once a year (last volume for 1956 published 1960)

Subscription: \$US6.00 Number of journals abstracted: 900

Number of abstracts: 5,400

Type of abstract: indicative

Classification: not UDC

Index: author, per annual issue

9. Bibliographie des forst - und holzwirtschaftlichen Schrifttums (1958)

Editor: Dokumentations Zentrale Bundesforschungsanstalt für Forst- und
Holzwirtschaft, Reinbek bei Hamburg

Adm.: Kommissionsverlag: Buchlandlung Max Wiedeburch, Valentina Kamp 16,
Hamburg 36

Issued 4 times a year. Subscription: ?

Number of journals abstracted: ? Number of abstracts: 6,600

Nature of abstracts: titles only

Classification: UDC - Oxford

Index: author, per issue; author/subject, annually.

10. Bibliography of Soil Science, fertilizers and general agronomy

Editor and adm.: see Soils and Fertilizers, No. 42

Classification: UDC

Index: author/subject/geographical, per issue; author/subject, per year,
issued after 3 years; systematic with keyword index, every 4 years
from 1931/1934 until 1956/1959.

10 bis. Review of Medical and Veterinary Mycology (1943)

Editor and Adm.: Commonwealth Mycological Institute, Kew, Surrey, England.

Issued 4 times a year. Subscription: £2.0.0

Number of journals abstracted: 450 regularly. Number of abstracts: 750

Nature of the abstracts: factual

Classification: not UDC

Index: author/subject, per issue; author/subject triannually, issued
within 1 year.

Circulation: 800

11. Boletín Bibliográfico Agrícola (1948)

Editor and adm.: Ministerio de Agricultura, Sección de Capacitación.
Plaza de San Nicolas 1, Madrid 1º

Issued 4 times a year. Subscription: exchange

Number of journals abstracted: ? Number of abstracts: 1,600

Classification: not UDC

Index: none.

12. Bulletin Signalétique - Sciences Agricoles (1961)

Editor and adm.: Centre de Documentation du CNRS, 15, quai Anatole France,
Paris 7^e

Issued 12 times a year. Subscription: 65 new francs

Number of journals abstracted: ? Number of abstracts: 6,800 in the
first 8 issues

Nature of the abstracts: indicative

Classification: not UDC

Index: author, per issue; per year, since 1961

12 bis. Bulletin signalétique du Centre National de recherches agronomiques

Number of journals abstracted: 1,500; number of abstracts: 10-15,000

Monthly. Issued free of charge.

Classification: UDC

13. Current Bibliography for Aquatic Sciences and Fisheries (1957)

Editor: Biology Branch, Fisheries Division FAO, Rome, Italy

Publisher: Taylor and Francis Ltd., Red Lion Court, Fleet Street,
London, E.C.4., England

Issued 2 volumes a year, each up to 12 parts

Subscription: £9.0.0d. per volume

Number of journals abstracted: 1,500; Number of abstracts: 15,000 per year

Nature of abstract: indicative

Classification: UDC for some parts of subject field, others not UDC

Index: Author, taxonomic, subject, geographic, citation, in each part
and also cumulative yearly and by five-year period. Also more
detailed indexes maintained on punchcards by Aquatic Sciences
Information Retrieval Centre, University of Rhode Island, USA

14. Dairy Science Abstracts (1939)

Editor: Commonwealth Bureau of Dairy Science and Technology, Shinfield,
Reading, England

Adm.: C.A.B., Farnham Royal, England

Issued 12 times a year. Subscription: £5.0.0

Number of journals abstracted: 600; Number of abstracts: 3,600

Nature of the abstracts: indicative

Classification: not UDC

Index: author, per issue; author/subject, per year, issued within
1-2 months of the close of the volume

Circulation: 2,350

/...

15. Documentatie Oosteuropese Landbouwkundige Literatuur (1960)

Editor and adm.: PUDCC, Gen. Foulkesweg 1a, Wageningen, Netherlands

Issued 5 times a year. Subscription: free

Number of journals abstracted: ? Number of titles: 2,000

Nature of the abstracts: only titles

Classification: not UDC

Index: none

16. Economic Abstracts (1953)

Editor: Library of the Economic Information Service, 95 Bezuidenhoutseweg,
The Hague, Netherlands

Adm.: Martinus Nijhoff, 9 Lange Voorhout, The Hague, Netherlands

Issued 24 times a year. Subscription: 25 guilders

Number of journals abstracted: 450; Number of abstracts: 4,000

Nature of the abstracts: indicative

Classification: UDC

Index: subject/geographical, annually, issued after 1 year.

17. Field Crop Abstracts (1948)

Editor: Commonwealth Bureau of Pastures and Field Crops, Hurley,
Berkshire, England

Adm.: C.A.B., Farnham Royal, England

Issued 4 times a year. Subscription: £3.10.0

Number of journals abstracted: 800; Number of abstracts: 2,070

Nature of the abstracts: indicative

Classification: not UDC

Index: author, per issue; author/subject, annually, included in
every fourth issue.

Circulation: 1,350

/...

18. Food Science Abstracts (From 1929 until 1945 entitled: Index to the literature of food investigations; suspended in 1957 and merged with the Journal of the Science of Food and Agriculture-Abstracts Section)

Editor and adm.: 14 Belgrave Square, London, S.W.1

Issued x times per year. Subscription: £15.

Number of journals abstracted: 250; Number of abstracts: 2,500

Nature of the abstracts: indicative

Classification: not UDC

Index: author, per issue; author/subject, annually, issued within 1 year

19. Forestry Abstracts (1939)

Editor: Commonwealth Forestry Bureau, Oxford

Adm.: Commonwealth Agricultural Bureaux, Farnham Royal, England

Issued 4 times a year. Subscription: £5.10.0

Number of journals abstracted: 550; Number of abstracts: 5,450

Nature of the abstracts: indicative

Classification: UDC - Oxford

Index: author, per issue; author/subject/geographical, annually, issued after 1 year

Circulation: 1,700

20. Helminthological Abstracts (1932)

Editor: Commonwealth Bureau of Helminthology, The White House, 103 St. Peter's Str., St. Albans, England

Adm.: C.A.B., Farnham Royal, England

Issued 4 times a year. Subscription: £4.0.0

Number of journals abstracted: 800; Number of abstracts: 3,000

Nature of the abstracts: indicative

Classification: not UDC

Index: author, per issue; author/subject/geographical, annually, now included in every fourth issue

Circulation: 1,200

21. Herbage Abstracts (1931)

Editor: Commonwealth Bureau of Pastures and Field Crops, Hurley,
Berkshire, England

Adm.: C.A.B., Farnham Royal, England

Issued 4 times a year. Subscription: £3.10.0

Number of journals abstracted: 800; Number of abstracts: 2,000

Nature of the abstracts: informative

Classification: not UDC

Index: author, per issue; author/subject/geographical, annually,
included in every fourth issue

Circulation: 1,450

22. Horticultural Abstracts (1931)

Editor: Commonwealth Bureau of Horticulture and Plantation Crops,
East Malling, Kent, England

Adm.: C.A.B., Farnham Royal, England

Issued 4 times a year. Subscription: £5.10.0

Number of journals abstracted: 600; Number of abstracts: 8,000

Nature of the abstracts: -informative

Classification: not UDC

Index: author, per issue; author/subject, annually; cumulative;
decennial (1931-1940); afterwards every five years

Circulation: 1,950

23. Hungarian Agricultural Review (1950)

Editor and adm.: Orszagos Mozogazdasagi Konyotor és Dokumentacios,
Kospont, Budapest, Hungary

Issued 4 times a year. Subscription: -

Number of journals abstracted: - Number of abstracts: 600

Nature of the abstracts: informative

Classification: not UDC

Index: author, per issue; author/subject, annually, included in
every fourth issue

23 bis. Index of Fungi (1940)

Editor and adm.: Commonwealth Mycological Institute, Kew, Surrey, England

Issued twice a year. Subscription: £1.0.0

Lists names of new species and varieties of fungi

24. Landbouwdocumentatie (1944)

Editor: PUOC, Gen. Foulkesweg 1a, Wageningen

Adm.: N.V. Systemen Keesing, Ruysdaelstraat 71-75, Amsterdam-Zuid I,
Netherlands

Issued 52 times a year. Subscription: 30 guilders

Number of journals abstracted: 800; Number of abstracts: 6,000

Nature of the abstracts: informative and indicative

Classification: UDC

Index: subject, 4 times a year, to informative abstracts: author/subject,
annually, issued within 1 year.

25. Landwirtschaftliche Literatur der Tschechoslowakei (1959)

Editor and adm.: Tschechoslowakische Akademie der Landwirtschaftswissen-
schaften, Sleszka 7, Prague 7

Issued 4 times a year. Subscription: ?

Number of journals abstracted: ? Number of abstracts: 640

Nature of the abstracts: informative

Classification: not UDC

No indexes

26. Landwirtschaftliches Zentralblatt - Abt. I. Landtechnik (1955/1956)

Editor: Institut für Dokumentation der Deutschen Akademie der
Wissenschaften, Schiffbauerdamm 19, Berlin N4

Adm.: Akademie-Verlag, Leipzigerstrasse 3-4, Berlin W 1

Issued 6 times a year. Subscription: 96 Deutsche Marks

Number of journals abstracted: 800; Number of abstracts: 3,500

Nature of the abstracts: indicative and informative

Classification: not UDC

Index: author/subject, annually, issued after 1 year (additional price)

Note: From 1961, a "Schnell-Dokumentation" is additionally published,
containing only titles on pages printed on one side with
perforated edges.

27. Landwirtschaftliches Zentralblatt - Abt. II. Pflanzliche Produktion
(1955/1956)

Editor: Institut für Dokumentation der Deutschen Akademie der
Wissenschaftern, Schiffbauerdamm 19, Berlin N4

Adm.: Akademie-Verlag, Leipzigerstrasse 3-4, Berlin W 1

Issued 12 times a year. Subscription: 192 Deutsche Marks

Number of journals abstracted: 570; Number of abstracts: 12,000

Nature of the abstracts: indicative and informative

Classification: not UDC

Index: author/subject, annually, issued after 1 year (additional price)

Note: same as under Abt. I. Landtechnik

28. Landwirtschaftliches Zentralblatt - Abt. III. Tiersucht, Tierernährung
(1955/1956)

Editor and adm.: see No. 27

Issued 9 times a year. Subscription: 144 Deutsche Marks

Number of journals abstracted: 520; Number of abstracts: 5,000

Nature of the abstracts: indicative and informative

Classification: not UDC

Index: author/subject, annually, issued after 1 year (additional price)

Note: same as under Abt. I. Landtechnik

29. Meccanizzazione Agricola (1959)

Editor and adm.: Centro Nazionale Meccanico Agricolo, Consiglio
Nazionale delle Ricerche, Via Onorato Vigliani 104,
Torino

Issued 4 times a year. Subscription: Lire 2,500

Number of journals abstracted: 125; Number of abstracts: 2,400

Nature of the abstracts: informative

Classification: not UDC

Index: author/subject, per issue; author/subject, annually, within
1 year

/...

30. Die Milchwissenschaft - Abt. B (1945)

Editor: Chemisches Institut der Bundes-Versuchs- und Forschungsanstalt
für Milchwirtschaft, Kiel

Adm.: Verlag Hans Carl, Nürnberg

Issued 12 times a year. Subscription: 6.50 Deutsche Marks

Number of journals abstracted: ? Number of abstracts: 5,000

Nature of the abstracts: informative

Classification: not UDC

Index: author/subject, per issue; author/subject, annually, within
1 year

31. Monthly Analytical Bulletin (1950)

Editor and adm.: Documentation Section, Inter-African Bureau for
Soils and Rural Economy, 57 rue Cuvier, Paris 5^e

Issued 12 times a year. Subscription: ?

Number of journals abstracted: ? Number of abstracts: 250 + 12

abstracts of books

Nature of the abstracts: informative

Classification: not UDC

Index: None

32. Nutrition Abstracts and Reviews (1931)

Editor and adm.: Commonwealth Bureau of Animal Nutrition, Rowett
Institute, Bucksburn, Aberdeen, Scotland

Issued 4 times a year. Subscription: £10.0.0

Number of journals abstracted: 730; Number of abstracts: 6,000

Nature of the abstracts: informative

Classification: not UDC

Index: author, per issue; author/subject, annually; cumulative,
vol. 1-5 and 6-10

Circulation: 2,500

33. Pesticides Abstracts and News Summary, Section A: Insecticides (1955)

Editor and adm.: Colonial Pesticides Inf. Service, Tropical Products Inst.

56/62 Gray's Inn Rd., London W.C.1

Issued 4 times a year. Subscription: ?

Number of journals abstracted: ? Number of abstracts: ?

Nature of the abstracts: indicative and informative and titles

Classification: not UDC

Index: author/subject, annually, included in every fourth issue

34. Pesticides Abstracts and News Summary - Section C: Herbicides, Arboricides (1955)

Editor and adm.: Unit of Exp. Agronomy, Dept. of Agriculture, Park Rd.,

Oxford, England

Issued ? x per year. Subscription: ?

Number of journals abstracted: ? Number of abstracts: ?

Nature of the abstracts: indicative and informative and titles

Classification: not UDC

Index: author/subject, annually, included in every last issue

35. Plant Breeding Abstracts (1930)

Editor: Commonwealth Bureau of Plant Breeding and Genetics, School of
Agriculture, Cambridge, England

Adm.: C.A.B., Farnham Royal, England

Issued 4 times a year. Subscription: £5.10.0

Number of journals abstracted: 2,000; Number of abstracts: 6,000

Nature of the abstracts: indicative

Classification: UDC

Index: author, per issue; author/subject, annually, issued within 1 year

Circulation: 1,750

36. PUDOC Bulletin (List of recent publications of Dutch Agricultural Institutions) (1960)

Editor and adm.: PUDOC, Gen. Foulkesweg 1a, Wageningen

Issued 4 times a year. Subscription: 4 guilders

Number of titles: 1,200

Classification: not UDC

No indexes

37. Review of Applied Entomology, Series A: Agriculture (1931)

Editor and adm.: Commonwealth Institute of Entomology, 56 Queen's Gate,
London S.W.7

Issued 12 times a year. Subscription: £4.0.0

Number of journals abstracted: 1,000 Number of abstracts: 2,000

Nature of the abstracts: informative

Classification: not UDC

Index: author, per issue; author/subject/geographical, annually,
issued within 1 year

Circulation: 1,950

38. Review of Applied Entomology, Series B Medical and Veterinary (1931)

Editor and adm.: Commonwealth Institute of Entomology, 56 Queen's Gate,
London S.W.7

Issued 12 times a year. Subscription: £2.0.0

Number of journals abstracted: 1,000 Number of abstracts: 800

Nature of the abstracts: informative and titles only

Classification: not UDC

Index: author, per issue; author/subject/geographical, annually,
issued within 1 year

Circulation: 1,700

39. Review of Applied Mycology (1922)

Editor and adm.: Commonwealth Mycological Institute, Kew, Surrey, England

Issued 12 times a year. Subscription: £5.0.0

Number of journals abstracted: 780 Number of abstracts: 3,500

Nature of the abstracts: factual

Classification: not UDC

Index: author/subject, per issue; author/subject, annually, issued
within 6 months

Circulation: 2,250

39 bis. Review of Medical and Veterinary Mycology (1943)

Editor and adm.: Commonwealth Mycological Institute, Kew, Surrey, England

Issued 4 times a year. Subscription: £2.0.0

Number of journals abstracted: 450 regularly; Number of abstracts: 750

Nature of the abstracts: Factual

Classification: not UDC

Index: author/subject, per issue; author/subject, triannually,
issued within 1 year

Circulation: 800

/...

40. Review of Extension Research

Editor and adm.: U.S. Dept of Agriculture, Washington, D.C., USA

Issued once a year. Subscription: ?

Number of journals abstracted: ? Number of abstracts: 100

Classification: not UDC

Index: none

41. Revue Internationale des Industries Agricoles

Editor and adm.: Commission Internationale des Industries agricoles

18, avenue de Villars, Paris 7e

Issued 4 times a year. Subscription: 40 new francs

Contains only abstracts of books. Number of abstracts: 900

Nature of the abstracts: indicative

Classification: not UDC

Index: none

42. Soils and Fertilizers (1938)

Editor: Commonwealth Bureau of Soils, Rothamsted Exp. St., Harpendon,
England

Adm.: C.A.B., Farnham Royal, England

Issued 6 times a year. Subscription: £5.0.0

Number of journals abstracted: 1,250; Number of abstracts: 3,500

Nature of the abstracts: indicative

Classification: UDC

Index: author, per issue; author/subject, annually, issued within 1 year;
systematic with keyword index, every year from 1931/1934
until 1956/1959

Circulation: 1,850

43. Summaries of studies in agricultural education (1935)

Editor: U.S. Dept of Health, Education and Welfare, Office of Education
Washington, D.C., USA

Adm.: U.S. Gov. Printing Office, Washington, D.C., USA

Issued once a year. Subscription: ?

Number of journals abstracted: ? Number of abstracts: 100

Nature of the abstracts: informative

Classification: not UDC

Index: subject, per issue

44. Supplement to the International Review of Agricultural Industries

Editor and adm.: International Commission for Agricultural Industries
10, avenue de Villars, Paris 7e

Issued 12 times a year. Subscription: ?

Number of journals abstracted: ? Number of abstracts: 2,350

Nature of the abstracts: indicative

Classification: not UDC

Index: none

45. Suplemento Bibliográfico de Turrialba (1950)

(data of 1959)

Editor and adm.: Instituto Interamericano de Ciencias Agrícolas,
Turrialba, Costa Rica

Issued 4 times a year. Subscription: \$3

Number of journals abstracted: ? Number of abstracts: 400, and titles only

Nature of the abstracts: indicative and informative

Classification: not UDC

Index: author/subject, per issue; author/subject, annually.

46. Tobacco Abstracts (1957)

Editor and adm.: Tobacco Literature Service, I.H. Hill Library, North
Carolina Exp. Station, Raleigh, N.C., USA

Issued 12 times a year. Subscription: ?

Number of journals abstracted: ? Number of abstracts: 1,963

Nature of the abstracts: indicative

Classification: not UDC

Index: author, per issue; author/subject, annually, included in
every 12th issue

47. Tropical Abstracts (1944)

Editor and adm.: Tropical Products Department, Royal Tropical Institute,
Mauritskade, Amsterdam

Issued 12 times a year. Subscription: 25 guilders

Number of journals abstracted: 300 Number of abstracts: 3,250

Classification: UDC

Index: subject, annually, issued within 1 year.

48. Uit de Pluimveepers

Editor and adm.: Instituut voor de Pluimveeteelt, Spelderholt,
Beekbergen

Issued 12 times a year. Subscription: ?

Number of journals abstracted: ? Number of abstracts: 3,550

Nature of the abstracts: indicative

Classification: not UDC

No index.

49. Veterinary Bulletin (1931)

Editor: Commonwealth Bureau of Animal Health, Weybridge, Surrey, England

Adm.: Commonwealth Agricultural Bureaux, Farnham Royal, England

Issued 12 times a year. Subscription: £6.0.0

Number of journals abstracted: 680 Number of abstracts: 4,120

Nature of the abstracts: indicative

Classification: not UDC

Index: author, per issue; author/subject, annually, within 1-2 months
of the close of the volume

Circulation: 2,000

50. Water Pollution Abstracts (1928)

Editor: Dept of Scientific and Ind. Research

Adm.: H.M.S.O., York House, Kingsway, London, W.C. 2

Issued 12 times a year. Subscription: £2.10.0

Number of journals abstracted: ? Number of abstracts: 2,340

Nature of the abstracts: indicative and informative

Classification: not UDC

Index: author/subject, annually, issued within 1 year.

51. Wood Abstracts (part 6 in 1957)

Editor: Information Section A.R.C., Wood Research Org., Dept of
Agriculture, Parks Road, Oxford

Adm.: Commonwealth Agricultural Bureaux, Farnham Royal, Bucks, England

Issued 6 times a year. Subscription: £4.0.0.

Number of journals abstracted: 370 Number of abstracts: 2,100

Nature of the abstracts: indicative

Classification: not UDC

Index: author/subject/species, annually, included in every 6th issue

Circulation: 1,000

52. Wildlife Abstracts, a bibliography and index at the abstracts in Wildlife Review (1954)

Editor: Branch of Wildlife Research, Bureau of Sport, Fisheries and
Wildlife, U.S. Dept Interior, Washington D.C., USA

Adm.: U.S. Gov. Printing Office, Washington D.C., USA

Issued 2 volumes up to now. Number of titles: 16,000 in total

No abstracts

Classification: not UDC

Index: author/subject, per volume.

53. World Agricultural Economics and Rural Sociology Abstracts (1959)

Editor: Dr. S. v. Frauenderfer, Agrarwirtschaftliches Institut des
Bundesministeriums für Land- und Forstwirtschaft, Schweizertalstr.
36, Wien

Adm.: North Holland Publishing Co., Amsterdam

Issued 4 times a year. Subscription: \$8.50

Number of journals abstracted: ? Number of abstracts: 2,300

Nature of the abstracts: indicative

Classification: not UDC

Index: author, per issue; author/subject, annually, issued within 1 year.

54. World Fisheries Abstracts

Editor and adm.: F.A.O. Fisheries Division, Viale delle Terme di
Caracalla, Rome

Issued 4 times a year. Subscription: £1

Number of journals abstracted: 700 ; Number of abstracts: 350 per year

Nature of the abstracts: informative

Classification: UDC and FWS (U.S. Fish and Wildlife Service)

Index: none

The abstracts can be cut out. Editions in English, French and Spanish

55. Zentralblatt der Bulgarischen wissenschaftlichen Literatur
(Land- und Forstwirtschaft. Veterinärmedizin) (1955)

Editor and adm.: Komitee für technischen Fortschritt, Bulgarische
Akademie der Wissenschaften, Sofia

Issued 4 times a year. Subscription: ?

Number of journals abstracted: ? Number of abstracts: 1,000

Nature of the abstracts: informative

Classification: not UDC

Index: author, per issue.

TABLE 4: GEOLOGICAL, GEOGRAPHICAL AND GEOPHYSICAL SCIENCES

1. Bulletin signalétique du CNRS (sections 10 and 11)
2. Referativny Zhurnal (sections 4, 5, 6 and 7)
3. Boletín del Centro de Documentación Científica y Técnica de México^{1/}
(section 1: Geology, Geophysics and Geodesy sub-sections)
4. Geophysical Abstracts
5. Documentation Bulletin of the National Research Centre, Cairo^{1/}
(section C - Astronomy and Geophysics - and section F - Geological Sciences)
6. Insdoc List
7. Meteorological and Geostrophysical Abstracts

^{1/} Indexing periodical.

PARTICULARS OF ABSTRACTING PERIODICALS ON THE GEOLOGICAL,
GEOGRAPHICAL AND GEOPHYSICAL SCIENCES

1. Bulletin signalétique du CNRS

Section 10: Earth sciences I

Mineralogy. Geochemistry. Petrography.

Classification under three headings.

(Cross-references to sections 2, 6, 7, 8, 18 and 22)

Number of articles indexed per year: 3,000

Price in France: 25 new francs; abroad: 30 new francs

Circulation: 1,600

Section 11: Earth sciences II

Physics of the Globe. Geology. Paleontology.

Classification under three headings.

(Cross-references to sections 10, 16, 17 and 22)

Number of articles indexed per year: 12,500

Price in France: 40 new francs; abroad: 45 new francs

Circulation: 1,600

2. Referativny Zhurnal (sections 4, 5, 6 and 7)

(See table 1, journal 2)

The four sections 4, 5, 6 and 7 take the following form:

Section 4: Geography	40,000 abstracts
Section 5: Geology	36,000 abstracts
Section 6: Mining	21,000 abstracts
Section 7: Geophysics	18,000 abstracts

3. Boletín del Centro de Documentación Científica y Técnica de México

(Section 1: Geology, geophysics and geodesy sub-sections)

(See table 1, journal 17)

Geodesy, geology and geophysics are under section 1, mathematics and physics.

4. Geophysical Abstracts

U.S. Geological Survey, c/o Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C.

Quarterly since 1929. 1,600 informative abstracts a year, from 370 periodicals and ten books. Quarterly and annual author index, annual subject index.

Price: \$1.25 in the United States

\$1.60 elsewhere

Geophysics, including determination of geological age; exploration, gravity, volcanology, internal structure of the earth, magnetism and electricity, radioactivity, seismology, tectonophysics.

5. Documentation Bulletin of the National Research Centre, Cairo

(See table 1, journal 24. Section C - Astronomy and geophysics; section F - Geological sciences)

6. Insdoc List

(See table 1, journal 25)

7. Meteorological and Geostrophysical Abstracts

(See table 1, journal 9)

Some conclusions

1. It is not possible to make a close comparison between these various journals. Some are indicative, the rest contain abstracts. Even apart from that difference, the overlapping - and the gaps - between the various classifications make any comparison difficult.

2. The primary periodicals from which the abstracts or titles are taken may be very numerous, or they may be very few.

Here are some examples:

(a) Very numerous:

1. Bulletin signalétique du CNRS
(about 5,000 primary periodicals)
2. Biological Abstracts
(5,500 primary periodicals)
3. Referativny Zhurnal
(12,000 primary periodicals)
4. Chemical Abstracts
(15,000 primary periodicals)

(b) Very few:

1. Nuclear Science Abstracts
(370 periodicals)
2. Current Contents of Space and Physical Sciences
(500 periodicals)
3. Geophysical Abstracts
(370 periodicals)

3. Some journals have to translate from a great many languages (Referativny Zhurnal translates from eighty-four, of which twenty-four are languages of the USSR). Others, however, work only in English, French, German, Russian and Spanish.

4. The Spanish-language Mexican journal, the English-language Egyptian journal and the Japanese journal Kagaku Soran are unique of their kind. They act, in a sense, as intermediaries between the primary periodicals in the languages of their countries (Spanish, Arabic and Japanese respectively) and the other major abstracting services. For example, the Mexican Boletín places a marginal note against articles from Latin American countries, which are accompanied by a brief abstract in English. The Bulletin of the Cairo Centre gives in part II, which is also distributed separately, abstracts in French or English of scientific works published in the primary periodicals of the Middle East.

5. From the quantitative point of view, we have tried to give an idea of the number of abstracta and references provided in 1960 by all the periodicals mentioned above. This is an estimate, and cannot be regarded as completely accurate because some of the data we were able to collect relate to 1960 and some to 1961,

/...

and because we were unable to work out a figure for some periodicals. It may accordingly be assumed that the total arrived at is too small for 1961; the number shown for each section should in all probability be scaled up by 1.2 to 1.5 for the journals mentioned.

Our totals are:

- (1) Mathematical and physical sciences: 586,100 (so that we may predict approximately 750,000 for 1961);
- (2) Chemical sciences: 557,500 (here again, about 750,000 may be expected in 1961);
- (3) Biological and geological sciences: 834,500 (some 1.1 million abstracts and references may therefore be expected in this field. This brings the estimated total for 1961 to 2.6 million).

Periodicals for which scientific abstracting is not the sole
activity or is of secondary importance

Many examples of such periodicals could be given, particularly for the English, French and German languages and for all the less widely used languages.

We shall not, therefore, list all these journals, especially since many of them are on the borderline - inevitably ill-defined - between pure and applied science. Here, however, are a few examples:

1. In French:

- (in table I) Science et industrie photographique
(in table II) Industries alimentaires et agricoles
Parfumerie, cosmétique et savons
Chimie industrielle
Revue française de corps gras

2. In English:

- (in table II) Industrial Chemistry
(in table III) Geoscience Abstracts

Annual Reviews:

Annual compilations of this kind are issued by learned societies or publishers in various countries, for example:

(a) The collection published in the United States by Annual Reviews Inc. on the following subjects, each of which has a volume to itself:

biochemistry	pharmacology
entomology	chemistry and physics
medicine	physiology
microbiology	plant physiology
nuclear sciences	psychology

On each of these subjects, of course, the material is divided up and reviewed by several authors, about a dozen to a volume; hence each volume contains, in a given year, a dozen or so reviews, each with some 250 to 300 bibliographical references. In addition, there is an index of authors and subjects at the end of each volume.

The average price per volume is \$7.00 in the United States and \$7.50 abroad.

(b) In the field of physics, we may mention the many "Progress Reports". Some of these are covered by Progress Report Abstracts (Microbiology Branch, Office of Naval Research, Washington 25, D.C.), an annual publication available free of charge, which has given seventy-five abstracts a year since 1953.

(c) Under the title "Advances in ...", the Academic Press publishes a series of volumes of this type of which Advances in Electronics is an example.

We may say that these annual reviews are greatly appreciated, particularly by scientists working in highly specialized fields, who find in them the references they need, classified and already scrutinized by other very able scientists.

In work of this kind the authors are, of course, entitled to some exercise of the critical faculty, if only in selecting the most important references.

Abstracting periodicals from the standpoint of language

Geographical or linguistic classifications

Geographical classification has frequently been proposed - for example, the following:

/...

1. Europe and the Near East
2. North America
3. Asia and Australia
4. Central and South America
5. Africa

Using this classification, the distribution of primary biological periodicals is estimated to be:

1. Europe and the Near East	47 per cent
2. North America	29 per cent
3. Asia and Australia	13 per cent
4. Central and South America	8.5 per cent
5. Africa	2.5 per cent

But all geographical classifications are unsatisfactory in themselves; it will be more profitable here to classify abstracting journals by language. We shall consider first the four working languages of UNESCO - English, French, Russian and Spanish - and then the other languages of major importance, including German, Japanese, Chinese, Italian, the Scandinavian languages, etc.

(1) English

The following periodicals are listed in the tables given in the first part of this chapter:

(A) Mathematical and physical sciences:

Physics Abstracts

Mathematical Reviews

Applied Mechanics Reviews

Current Contents of Space and Physical Sciences

Nuclear Science Abstracts

Meteorological Abstracts

Semiconductor Abstracts

Rheology Abstracts

Physics Express

Engineering Index

Chemical Abstracts (Crystallography Section)

Soviet Abstracts: Physics
International Aerospace Abstracts
Electrical Engineering Abstracts
Structure Reports
NASA Announcements

(B) Chemical sciences (including biochemistry):

Chemical Abstracts (73 sections)
Soviet Abstracts: Chemistry
Index Chemicus
Current Contents of Chemical, Pharmacomedical and Life Sciences
Current Chemical Papers
Biological Abstracts
International Abstracts of Biological Sciences
Excerpta Medica (section 11)
Nutrition Abstracts and Reviews
Biochemical Title Index
Chemical Titles
Reviews of Metal Literature

(C) Biological sciences (including social sciences):

Biological Abstracts
International Abstracts of Biological Sciences
Excerpta Medica
Bibliography of Agriculture
Chemical Abstracts (biochemical section)
Current Contents of Chemical, Pharmacomedical and Life Sciences
Agricultural Abstracts
Abstracts of World Medicine
Current List of Medical Literature
Excerpta Botanica
Commonwealth Agricultural Bureaux (17 specialized periodicals)
Index Veterinarius
Psychological Abstracts
Abstracts of Soviet Medicine

(D) Geological sciences:

Geophysical Abstracts

It will be noted that there is a great abundance of abstracting and indicative periodicals in English (forty-six titles out of sixty-four, or 71 per cent); this is undoubtedly where the greatest amount of duplication occurs. However, recent attempts in the biological science field^{(2) (5)} to reduce duplication, and at the same time to fill the gaps, have shown how difficult it is for an abstracting service to make even the slightest change in its classification or abstracting procedure in order to produce results which are easier for research workers and scientists to use. It would be particularly valuable to have the opinion of the Scientific Unions on the English-language periodicals (cf. page 152).

Moreover, the fact that the choice is widest in English means that a relatively complete bibliography of everything which has appeared in English-language primary publications would be the easiest to prepare.

(2) French

The Bulletin signalétique du CNRS, with its twenty-two sections, covers all three of the fields we are considering and all branches of pure science. The Bulletin used not to be indexed by subject, but the fascicules of section 6 have included a monthly subject index since 1961. An annual index for 1961 is already in preparation for each of the twenty-two sections of the Bulletin.

The only other periodical worth mentioning is the Bulletin de l'Institut Pasteur, which first appeared in 1903. Here again, the arrangement of the material makes it difficult to compile any retrospective bibliography. Thus the French-language periodicals cannot begin to compete with those in English.

(3) Russian

The Referativny Zhurnal, with its many sections, covers the whole range of science. The abstracts are of such quality, and are published with such care and, relatively, so short a time-lag (particularly for primary publications in oriental languages) that the various sections of this abstracting journal increase in international importance from year to year. The fact remains that

/...

Western scientists have great difficulty in learning Russian; the periodical Soviet Abstracts has been brought out in an endeavour to overcome that difficulty.

(4) Spanish

There is only one indexing journal (which also provides abstracts of Latin American papers): the Boletín del Centro de Documentación Científica y Técnica de México, which again covers the whole field of science. This publication, started eleven years ago, also met with increasing success from year to year, but it has just been "reorganized" and in future will merely reproduce tables of contents.

Briefly, then, in each of three UNESCO working languages, the abstracts for every main branch of science are prepared and distributed by a single organization. In English the situation is more complicated: there are several periodicals in each scientific field.

(5) German

The following publications appear:

(A) Mathematical and physical sciences:

Physikalische Berichte

Astronomisches Jahresbericht

(B) Chemical sciences:

Chemische Zentralblatt

Verfahrenstechnische Berichte (Bayer Berichte)

(C) Biological and geological sciences:

Berichte über die gesamte Physiologie

Berichte über die wissenschaftliche Biologie

Excerpta Botanica appears in three languages, one of which is German. Except for biology, a complete bibliography can be prepared in German. In addition, Chemische zentralblatt and Physikalische Berichte are members of the ICSU Abstracting Board. Abstracts appear in these journals relatively quickly. The classification of Physikalische Berichte is the same as that of Physics Abstracts, the corresponding English-language member of the ICSU Abstracting Board. Generally speaking, these periodicals are relatively expensive, and they account for only 6 per cent of the total number of articles considered in this survey, although German is the fourth language in world importance.

(6) Japanese

The Japanese Periodical Index, Natural Sciences Section, has been published monthly in English by the National Diet Library (1-14 Negata-cho, Chiyoda-ku, Tokyo) since September 1960 as a means of quick access to the contents of Japanese scientific periodicals. It is divided into two parts: I - Science and Technology; II - Medicine. The titles published are drawn from some 650 scientific and technological publications and 240 medical publications. A list of the publications quoted is given at the end of each issue. The annual subscription is \$30.00.

The following abstracting journals are also published in Japan:

Biology

Japan Science Review, Biological Sciences
Ed. by the Association of Agricultural Societies,
Tokyo, Kasai Publishing Co. (in English) (annual)

Chemistry

Nihon Kagaku Sôran (Complete Chemical Abstracts of Japan)
Sendai, Nihon Kagaku Kenkyûkai (Japanese Chemical Abstracting Society)
(monthly)

Medicine

Igaku Chûô Zasshi (Japana Centra Revuo Medicina)
Tokyo, Igaku Chûô Zasshisha (every six days)

Nihon Naika Shônika Chûô Zasshi (Abstracts of Internal Medicine and Pediatrics from Japanese Journals)
Tokyo, Igaku-shoin Publishing Co. (twice a month)

Kekkaku Bunken no Shôroku Sokuhô (Abstracts of Current Literature on Tuberculosis)
Tokyo, Kekkaku Yobôkai (Japan Anti-Tuberculosis Association) (monthly)

Nihon Naibumpi Bunken Tembô (The Japan Yearbook of Endocrinology)
Tokyo, Igaku no Sekai-sha Publishing Co. (annual)

Japan Science Review, Medical Sciences
Ed. by the Ministry of Education in co-operation with the Science Council of Japan
Tokyo, Gihôdô Publishing Co. (quarterly) (in English)

Reference has already been made, on page 107, to the abstracts on Japanese medicine published by Excerpta Medica.

Technology

Doboku Kôgaku Rombun Shôroku (Civil Engineering Index)
Tokyo, Nihon Doboku Gakkai (Civil Engineering Society of Japan)
(every five years)

Seitetsu Gijutsu Soran (Metallurgical Abstracts, Tokyo)
Tokyo, Nihon Tekkô Renmei (Iron and Steel Federation of Japan) (monthly)

Japan Science Review, Mechanical and Electrical Engineering
Ed. by the Joint Publication Committee of Engineering Societies.
Tokyo, Nippon Gakujutsu Shinkôkai (Japan Society for the Promotion of Science) (quarterly) (in English)

Tetsu to Hagané Abstracts (Iron and Steel Abstracts)
Tokyo, Nihon Tekkô Kyôkai (Iron and Steel Society of Japan) (quarterly)

Kagaku Gijutsu Bunken Sokuhô (Current Bibliography on Science and Technology)
Tokyo, Nihon Kagaku Gijutsu Jôhō Sentâ (Japan Information Centre of Science and Technology, C.P.O. Box 1478, Tokyo)

This is an abstracting journal designed to make world literature available in the Japanese language, and covers 2,500 scientific periodicals from forty-two countries. It started publication in April 1958 and comprises seven series:

General Engineering and Mechanical Engineering	Twice a month
Electrical Engineering	"
Chemistry and Chemical Industry	"
Geology, Mining and Metallurgy	"
Civil Engineering and Architecture	"
Pure and Applied Physics	"
Atomic Energy (Isotopes and Radiation Chemistry Section)	Monthly
Annual subscription: \$36 each series	

Tetsudô Gijutsu Bunken Shôroku (Railway Engineering Abstracts)
Comp. by Kotutetsu Gijutsu Kenkyûjo (Japanese National Railways Technical Research Institute)
Tokyo, Kenkyûsha Publishing Co. (monthly)

Hôshasei Dôigensho Eunkan Tekiroku-shû (Radioisotopes Abstracts)
Tokyo, Nihon Hôshasei Dôigensho Kyôkai (Radioisotopes Society of Japan)
(Appendix to Radioisotopes, quarterly)

(7) Scandinavian languages

The following yearbooks appear in these three languages: Dansk Bogfortegnelse, Årskatalog, Svensk Bokförteckning and Norsk Bokfortegnelse. These yearbooks, prepared by the national libraries of Denmark, Sweden and Norway, list the scientific articles, and also other articles and books, published in the country concerned during the year.

These yearbooks are indexed by subjects, systematically and otherwise. References to work published in 1960 thus appear during 1961. The ICSU Abstracting Board, with the aid of Professor VEIBEL, its correspondent in Scandinavia, selects from these books the titles of original scientific articles, of which photostats are then sent to the member journals.

(8) Eastern European countries

A remarkable amount of abstracting has been done in these countries. For example Documentare Technica, issued by the Institutul de Documentare Technica, Bucharest, published in 1961 some 25,000 abstracts from 1,900 applied science journals. It is estimated that 90 per cent of Romanian scientific journals publish abstracts in languages other than Romanian.

In Hungary, the thirteen technical abstractions bulletins (Műszaki Lapszemlek) published about 56,000 abstracts, and Agrarierodalmi Szemle, a review of world agricultural literature, some 30,000 abstracts from 1,200 periodicals, of which 180 were Hungarian, in 1961. Abstracts of Hungarian agricultural literature are published in four different editions, in Hungarian, Russian, German and English respectively. For the applied sciences, too, there are editions in Russian (Obzor Vengerskoy Tekhnicheskoy Literatury), English (Hungarian Technical Abstracts) and German (Zentralblatt des Hungarischen Technik).

Twenty-five per cent of Hungarian primary publications publish abstracts in two or three languages - Russian, English, German or French - and about 80 per cent publish titles in other languages besides Hungarian.

In Poland, the Centralny Instytut Informacji Naukowo-Technicznej i Ekonomicznej (CIINTE) has published the quarterly review Polish Technical Abstracts since 1951. This review, which appears in English and Russian, contains abstracts of articles from fifty Polish technical journals.

(9) Chinese

We have little information on this subject. However, the recent symposium published by AAAS (American Association for the Advancement of Science) under the title Science in Communist China contains some valuable information, to which the reader is referred.

(10) Esperanto and Interlingua

Although scientific papers are sometimes followed by an abstract in one or other of these international languages, they are not used in any of the main abstracting journals mentioned. At the present time these languages seem to be in rather limited use so far as abstracts are concerned.

(11) Abstracting journals translated

Some journals are published in several languages, and thus translated before distribution. This applies to Excerpta Botanica and World Fisheries Abstracts, which are published in English, French and Spanish, and to the English, German and Russian editions of the Hungarian abstracting journals mentioned above. Others are regularly translated; Referativny Zhurnal is translated in the United States and becomes Soviet Abstracts (Physics, Chemistry and Medicine), as stated in the first part of this chapter. This system has, however, one drawback which is difficult to overcome: the long time-lag between the publication of the original article and the appearance of the abstract.

(12) Translations from Chinese into English

Since 1961, the Office of Technical Services, U.S. Department of Commerce, Washington, has published English Abstracts of Selected Articles from Soviet Bloc and Mainland China Technical Journals. These are in six series, covering

respectively physics, chemistry, metallurgy, engineering, communications and general science. There do not seem to be very many abstracts of Chinese articles.

Number of abstracts and references in each language

We shall conclude this section in the same way as the preceding one, by giving a breakdown by language of the "likely" total of 2.6 million abstracts.

Approximate figures:

<u>Language</u>	<u>Calculated total</u>	<u>"Likely" total^{1/}</u>
1. English	900,000	1,100,000
2. French	233,000	250,000
3. Russian	784,000	800,000
4. Spanish	120,000	130,000
5. German	140,000	160,000
	2,177,000	2,440,000

These figures, of course, relate solely to the periodicals covered by this survey. Nevertheless, they leave little room for languages other than the above five.

They show English and Russian to be well in the lead in terms of quantity. Furthermore, the four working languages of UNESCO account for at least 85 per cent (2,280,000 abstracts or references) of the total number of abstracts.

Duplication

Referring back to the estimate given on page 77 for the number of original papers - 1 million in 1958, and perhaps 1.3 million in 1960 - we obtain the striking result that "on the average", each article is abstracted twice. It is true that such duplication is understandable, considering the differences between languages (between Russian and English, for example), which create an insuperable obstacle for specialists. However, it obviously results in:

- (a) incomplete access to information (even on the absurd assumption that there was no duplication between English-language abstracting and indexing journals, barely 70 per cent of original articles would be abstracted or indexed in that language);

^{1/} See page 135.

(b) a waste of money and energy by bodies specializing in documentation (preparation or use) and by scientists.

In many cases this duplication seems to create insoluble problems, as for example in the preparation of biological abstracts in English^(2,5). An inquiry carried out by the ICSU Abstracting Board, using punch-card machines, in 1959-1960 revealed 34 per cent duplication in the case of International Abstracts of Biological Sciences, 22 per cent in that of Excerpta Medica and 16 per cent in that of Biological Abstracts. These proportions are positively alarming when we consider how many articles in the same field are never abstracted or even indexed.

Methods of preparing abstracting periodicals

After studying the abstracting periodicals from the standpoint of the scientific fields they cover and from that of the languages they use, it will be appropriate to make a brief study of the staff-work involved in producing each of these periodicals: that is to say:

the method of indexing articles (in the case of indexing periodicals) or of preparing abstracts (in the case of abstracting periodicals).

the way in which the abstracts can be traced through the index;

and finally, the rate at which each of these periodicals is growing and the use, if any, made of automatic, mechanical or electronic processes.

Since all these aspects are dealt with in detail in other chapters of this report, they will be examined only briefly here.

(A) Different types of abstracts

1. Indexing periodicals

For the list of such periodicals, see all those marked^{1/} in tables 1-4.

These periodicals may be planned on either of two principles:

(a) The titles of the articles are grouped and classified by sections (e.g. Current Chemical Papers);

(b) The titles listed in the table of contents of the primary journal are reproduced en bloc in the indexing periodical (e.g. the two periodicals entitled Current Contents).

/...

The latter method is the quicker. Current Contents lists in the course of a year 125,000 articles from 600 journals; often with less than a month's delay (it is a weekly periodical).

2. Abstracting periodicals

Abstracts as well as indexes, may be prepared in a fair variety of ways. For the list of such periodicals, see all those not marked^{1/} in tables 1-4.

The following comments may be made on these:

(1) Table 1: Mathematical and physical sciences

The work of the different literature reviews in this field is exceptionally well co-ordinated at the present time:

(a) Physics Abstracts and Physikalische Berichte use almost the same classification.

(b) The abstracts are of comparable length in the different journals. Referativny Zhurnal often gives very full abstracts accompanied by sketches, diagrams of apparatus, graphs, etc.

(c) The author abstracts appearing in the best-known primary journals are now prepared in accordance with the rules laid down by UNESCO and the Royal Society.

The abstracting periodicals differ from one another mainly as regards:

1. The method of abstracting and retrieving patent specifications;
2. The number of specialist journals used by a particular abstracting periodical;
3. The amount of space devoted to papers on applied mathematics or applied physics;
4. The cost of producing the abstracting periodical. This depends, in particular, on the cost of printing in the country concerned, the number of subscribers, and the regulations governing the scientific body which edits the periodical (it may be published by the State, by a learned society or by private enterprise).

A detailed study is now available in document⁽¹²⁾. Although it is difficult to deduce any general laws from this study, it nevertheless shows how the factors mentioned above influence the cost of publication.

/...

(2) Table 2: Chemical sciences

The fields of applied chemistry, biological chemistry and pharmaceutical chemistry, in particular, show a certain lack of uniformity. On the other hand, Referativny Zhurnal, Chemical Abstracts, and Chemisches Zentralblatt cover most of the general chemistry, inorganic chemistry and organic chemistry fields with abstracts prepared in accordance with the same set of very strict rules. Chemical Abstracts, in particular, extracts from every paper, and includes in the abstracts, the chemical formulae of the compounds defined, full particulars of the structures and formulae developed and physical constants.

An additional feature is the index of chemical substances by name (in accordance with the official nomenclature), from which chemists will henceforth be able to draw up a bibliography classified by names of substances. This is of great value in chemistry, especially in organic chemistry. The need for such a bibliography is less marked in other branches of science (morphological and systematic biology deal with far fewer individual items than modern organic chemistry).

Thus the abstracts given in chemistry journals 2, 3 and 4 of table 2 are planned differently from author abstracts. On the other hand, author abstracts are often reproduced verbatim in chemistry periodicals "which also give abstracts" and in biological abstracting periodicals which devote some space to applied chemistry or biological chemistry.

Most of the systematically compiled chemical abstracts are longer than author abstracts for the reason indicated above. Despite great efforts by international nomenclature commissions, the Scientific Unions and specialized round-tables, there seems to be no immediate prospect of achieving a higher degree of uniformity in the preparation of chemical abstracts. In the circumstances each major service accordingly chooses its own indexing procedure and its own methods of mechanization in order to increase accuracy and to save time.

3. Tables 3 and 4: Biological and geological sciences

The great diversity of papers and primary periodicals on these subjects is inevitably reflected in a lack of uniformity among the abstracts published in different periodicals. The recent survey by the ICSU Abstracting Board on

/...

the primary journals, which are very numerous in this field, showed that only 38 per cent of the most important among them knew of the existence of the rules laid down by UNESCO and the Royal Society for the preparation of author abstracts (synopses). This survey covered 166 journals; if it had taken in all the primary journals - about 26,000 on last count - the proportion aware of the rules would undoubtedly be smaller.

Furthermore the biological sciences cover a wide variety of specialized subjects:

Biochemistry: the biochemist's field of study is related to that of the chemist;

Physiology: the physiologist's field of study comes close to that of the physicist in places, but the observable phenomena are defined according to less precise criteria;

Morphology)
Taxonomy) field of study similar to that of nomenclature committees;

Applied biology, nutrition, agronomy, agriculture, soil science:

these are rapidly developing disciplines, in which the volume of scientific work is increasing at a great rate;

Mineralogy: field of study close to those of inorganic and structural chemistry;

Medicine: many branches, with relatively distinct subject matter and methods of investigation, as witness the large number of sections of Excerpta Medica.

Some work in this field, although carried out scientifically, cannot be verified rapidly because it involves, for example, a rare pathological deviation, which may take years to recur (a recent example was an accident caused by a batch of vaccine in a particular village).

The only way to obtain a complete picture of the abstract situation in this field is to take the various abstracting journals for several months. A preliminary report submitted to the Executive Board of ICSU by the Abstracting Board of Madrid⁽¹⁴⁾ drew attention to the fundamental differences in classification which in practice prevent any comparison between Biological

/...

Abstracts, Excerpta Medica, the fourteen journals of the Commonwealth Agricultural Bureaux, Bibliography of Agriculture, etc.

To sum up briefly:

- (a) All the classifications in use are fundamentally different from one another;
- (b) Indexes are often non-existent, sometimes unusable (author indexes), and often modified from year to year;
- (c) Cross-references are scanty;
- (d) The choice of primary journals is still in a state of flux.

In the field of biology, bibliographies can be easily made from the Annual Reviews, but here a critical choice has necessarily been made already by the author of the articles.

(B) Index

In view of the amount of work involved in classifying, indexing and abstracting the primary journals, it would seem a natural corollary to follow it up by preparing indexes for future use. A collection of Bulletins Signalétiques for 1940-1950 with no subject index is virtually useless by comparison with the corresponding collection of Physikalische Berichte or Chemisches Zentralblatt, which is indexed.

In this connexion, we refer in particular to the situation in applied physics, chemistry and biology, where the need for indexes is particularly urgent on account of the great mass of information involved.

In 1961, the problem of preparing indexes is linked for all the major services, with that of choosing a system for the automatic coding of the information given in an abstract (key words, structures, morphological characteristics, etc.). On this subject, see the next chapter.

The most interesting examples, in our view, are Chemical Abstracts, Referativny Zhurnal and Excerpta Medica. In these three cases, indexes of the abstracts are prepared automatically by systems which satisfy the abstracting services and guarantee the users a high degree of reliability.

It is probable that in the very near future only journals equipped with a thoroughly workmanlike index will be able to continue the rapid expansion in coverage and circulation. Those users of abstracting periodicals who produce

/...

scientific work themselves spend more and more of their time studying the productions of other scientific workers (scientists proper or, more often, specialists in the broad sense of the term). Consequently, each of them needs to be able to draw up a relatively complete bibliography quickly. This can only be done with very full indexes which can be used directly (if possible without a machine).

The proportion of his time which each research worker is obliged to devote to bibliographical work now depends on the number of primary journals abstracted by each of these periodicals and on the ease with which their indexes can be used.

(C) Rate of growth of abstracting periodicals

The point made at the end of section (B) explains why the field covered by each abstracting periodical is increasing from year to year. We may give the following examples:

Biological Abstracts: 21,650 abstracts in 1947; 62,500 in 1958; 87,000 in 1961;
100,000 expected in 1962;

Bulletin signalétique du CNRS: 80,000 abstracts in 1948; 100,000 in 1958;
270,000 in 1961;

Chemical Abstracts: 32,281 abstracts in 1953; 120,000 in 1958; 144,589 in 1961;

Referativny Zhurnal: 107,890 abstracts in 1953; 455,000 in 1957; 775,000 in 1961.

Similar figures could be given for Physics Abstracts, Physikalische Berichte, etc.

Views of the International Scientific Unions

In order to obtain, in the form of replies to questions at least a rough guide to the views of the users of abstracting and indexing periodicals, a very simple and relatively short questionnaire was sent to the General Secretaries of the thirteen unions listed below.^{1/} It cannot be overemphasized that these replies are purely a rough guide, for the Secretaries had no time to do more than consult a few colleagues or, in some cases give their own personal views.

The quick information supplied by representatives of the Scientific Unions ought to be confirmed by an inquiry directed by the Services themselves, covering a much larger number of respondents and allowing much more time for replies.

(1) Mathematical and physical sciences

International Astronomical Union

International Scientific Radio Union

International Union of Pure and Applied Physics

International Union of Crystallography

International Union of Theoretical and Applied Mechanics

International Mathematical Union

(2) Chemical sciences

International Union of Pure and Applied Chemistry

International Union of Biochemistry

(3) Biological sciences

International Union of Biological Sciences

International Union of Physiological Sciences

(4) Earth sciences

International Union of Geodesy and Geophysics

International Geographical Union

International Union of the History and Philosophy of Science

^{1/} The inquiry was carried out through the ICSU Abstracting Board.

The questionnaire, together with the replies received, is reproduced below. In most cases, the lists of periodicals mentioned under (A) and (B) were suggested to the Secretaries of the Unions for approval and amplification.

(*) 1. In the field of science with which the International Astronomical Union

(General Secretary: D.H. SADLER
Royal Greenwich Observatory
Herstmonceux Castle
Hailsham, Sussex
United Kingdom)

is concerned, there are the following periodicals:

(A) Abstracting periodicals:

1. Bulletin signalétique du CNRS^{1/}
2. Referativny Zhurnal
3. Physikalische Berichte
4. Physics Abstracts
5. Mathematical Reviews
6. Astronomisches Jahresbericht

(b) Indexing periodicals:

I. Annual Reviews

(*) 2. The Union classes them as follows:

- | | | |
|---|-------------|---------|
| (a) Widely read and in current use | Periodicals | 1,2,4,6 |
| (b) Easy and convenient to use | " | 1,2,4,6 |
| (c) Time-lag after appearance of original literature acceptable | " | 1,2,4,6 |
| (e) Abstracts good | " | 2,4,6 |
| (f) Indexes accurate | " | 2,4,6 |

"In our opinion there is no need to publish another 'abstracting journal'."

* * *

^{1/} Although this is an indexing journal, it gives short abstracts and the Unions classify it under (A).

- (*)1. In the field of science with which the International Scientific Radio Union
(Secretary-General: E. HERBAYS,
7 Pl. E. Dance,
Brussels, Belgium)

is concerned, there are the following periodicals:

(A) Abstracting periodicals:

1. Bulletin signalétique du CNRS
2. Referativny Zhurnal
3. Physikalische Berichte
4. Physics Abstracts

(B) Indexing periodicals:

I. Annual Reviews

- (*)2. The Union classes them as follows:

- | | |
|---|-----------------|
| (a) Widely read and in current use | Periodicals 1,4 |
| (b) Easy and convenient to use | " 1,4 |
| (c) Time-lag after appearance of original literature acceptable | |
| (e) Abstracts good | |
| (f) Indexes accurate | |

"Since radioelectricity and electronics are concerned with many fields of science, there seems no point in establishing a new abstracting journal, which would be merely a compilation of the existing periodicals."

* * *

- (*)1. In the field of science with which the International Union of Pure and Applied Physics (Secretary-General: Prof. P. FLEURY,
3 Bd Pasteur, Paris 15^e)

is concerned, there are the following periodicals:

(A) Abstracting periodicals:

1. Bulletin signalétique du CNRS
2. Referativny Zhurnal
3. Physikalische Berichte
4. Physics Abstracts

/...

5. Nuclear Science Abstracts
6. Meteorological Abstracts
7. Physics Express
8. Rheology Abstracts
9. Semi-conductor Abstracts
10. Soviet Abstracts: Physics

(B) Indexing periodicals:

- I. Engineering Index
- II. Current Contents of Space and Physical Sciences
- III. Annual Reviews

(*) 2. The Union classes them as follows:

- | | |
|---|------------------------|
| (a) Widely read and in current use | Periodicals 1, 2, 3, 4 |
| Little read and little used | " 7, 8 |
| (b) Easy and convenient to use | " 4 |
| (c) Time-lag after appearance of original literature too long | All |
| (d) Choice of original literature too critical | All |
| (e) Abstracts good | Most |
| (f) Indexes accurate | Periodical 4 |
| Indexes inadequate | Often |

* * *

(*) 1. In the field of science with which the International Union of Crystallography

(General Secretary: Dr. D.W. SMITS,
Mathematisch Instituut
Rijks Universiteit
Groningen, Netherlands)

is concerned, there are the following periodicals:

(A) Abstracting periodicals:

1. Bulletin signalétique du CNRS
2. Referativny Zhurnal
3. Physikalische Berichte
4. Physics Abstracts

/...

5. Chemical Abstracts
6. Structure Reports
7. Mineralogical Abstracts

(B) Indexing periodicals:

(*) 2. The Union classes them as follows:

- | | |
|--|---------------------------|
| (a) Widely read and in current use | Periodicals 1, 2, 5, 6, 7 |
| Little read and little used | " 3, 4 |
| (b) Easy and convenient to use | " 6, 7 |
| Difficult and inconvenient to use | " 5 |
| (c) Time-lag after appearance of original literature too long | " 6 |
| Time-lag after appearance of original literature acceptable | " 1, 2, 5, 7 |
| (d) Choice of original literature sound | " 1, 2, 5, 6 |
| Choice of original literature too critical | " 3, 4, 7 |
| (3, 4, 7 only set out to cover part of the field) | |
| (e) Abstracts good | Periodicals 5, 6, 7 |
| Abstracts too short and do not give enough information | " 1, 4 |
| (f) Indexes accurate | " 5, 6, 7 |
| Indexes inadequate | " 1, 3, 4 |
| (g) "The Union would like to speed up the production of its own <u>Structure Reports</u> and has some ideas under discussion." | |

* * *

(*) 1. In the field of science with which the International Union of Theoretical and Applied Mechanics

(Secretary: Mr. ROY, 29, Av. de la Division Leclerc, Chatillon/Bagneux)

is concerned, there are the following periodicals:

(A) Abstracting periodicals:

1. Referativny Zhurnal
2. Mathematical Reviews
3. Physics Abstracts

/...

4. Applied Mechanics Reviews
5. IAS Journal
6. ASTIA

(B) Indexing periodicals:

- I. Bulletin signalétique du CNRS
- II. Index Aeronauticus
- III. NASA Announcements

(*) 2. The Union classes them as follows:

- | | |
|--|---------------------------|
| (a) Widely read and in current use | Periodicals 2, 3, 4, 5, I |
| Little read and little used | " 1, 6, II, III |
| (b) Easy and convenient to use | " 2, 3, 4, 5, I |
| Difficult and inconvenient to use | " 1, 6 |
| (c) Time-lag after appearance of original literature too long | " 2 |
| Time-lag after appearance of original literature acceptable | The remainder |
| (d) Choice of original literature too wide)
sound)
too critical) | No opinion |
| (e) Abstracts good | All |
| (f) Indexes accurate)
inadequate)
unusable) | No opinion |
| (g) <u>Desideranda</u> : rapid abstracting, in a "Western" language, of <u>Referativny Zhurnal</u> , or a bibliographical review of Russian scientific journals. | |

* * *

- (*) 1. In the field of science with which the International Union of Pure and Applied Chemistry (Secretary-General: Dr. R. MORF, c/o Hoffmann-La Roche Co., Ltd., Grenzacherstrasse 124, Bâle 2, Switzerland)

is concerned, there are the following periodicals:

/...

(A) Abstracting periodicals:

1. Bulletin signalétique du CNRS
2. Referativny Zhurnal
3. Chemical Abstracts
4. Chemische Zentralblatt
5. Soviet Abstracts: Chemistry
6. Bayer Berichte (Verfahrens technische Berichte)
7. Beilsteins Handbuch der Chemie (added by the Union, but not a periodical)

(B) Indexing periodicals:

- I. Index Chemicus
- II. Current Contents
- III. Current Chemical Papers

(*) 2. The Union classes them as follows:

(a) widely read and in current use	Periodicals 6, 7
Little read and little used	" 1
(b) Easy and convenient to use	" 4, 6
Difficult and inconvenient to use	
(c) Time-lag after appearance of original literature acceptable	" 2, 3, 4, 6
(d) Choice of original literature sound	" 6
(e) Abstracts good	" 6, 4
(f) Indexes accurate	" 3, 4

* * *

(*) 1. In the field of science with which the International Union of Biochemistry

(Secretary-General: Prof. R.H.S. THOMPSON
Dept. of Chemical Pathology, Guy's
Hospital Medical School, London, S.E.1,
United Kingdom)

is concerned, there are the following periodicals:

1. Bulletin signalétique du CNRS
2. Referativny Zhurnal
3. Biological abstracts
4. International Abstracts of Biological Sciences

/...

5. Excerpta Medica (section II)
6. Chemical Abstracts
7. Nutrition Abstracts and Reviews

(B) Indexing periodicals:

- I. Current Contents
- II. Current Chemical Papers
- III. Index Chemicus

(*) 2. The Union classes them as follows:

- | | |
|---|-----------------------------|
| (a) Widely read and in current use | Periodicals 4, 5, 6, (7), I |
| Little read and little used | " 3, (7) |
| (b) Easy and convenient to use | " 3, 4, 5, 6, 7 |
| (c) Time-lag after appearance of original literature acceptable | " 3, 4, 5, 6, 7 |
| (d) Choice of original literature sound | " 3, 4, 5, 6, 7 |
| (e) Abstracts good | " 3, 4, 5, 6, 7 |
| (f) Indexes accurate | " 4, 5, 6, 7 |

* * *

(*) 1. In the field of science with which the International Union of Biological Sciences

(Secretary-General: Prof. R. ULRICH
Vegetable Physiology Laboratory
1, rue Victor Cousin, Paris 5)

is concerned, there are the following periodicals:

(A) Abstracting periodicals:

1. Bulletin signalétique du CNRS
2. Referativny Zhurnal
3. Biological Abstracts
4. International Abstracts of Biological Sciences
5. Excerpta Medica
6. Journals of the Commonwealth Agricultural Bureaux
7. Psychological Abstracts
8. Soviet Abstracts: Biology
9. Berichte über die gesamte biologie

(A. Berichte über die wissenschaftliche Biologie;

B. Berichte über die gesamte Physiologie)

/...

10. Bulletin de l'Institut Pasteur

11. Excerpta Botanica

(B) Indexing periodicals:

1. Current Contents

2. Annual Reviews

3. Bibliography of Agriculture

(Page 2 of the questionnaire will be examined at the next meeting of the Executive Committee of the International Union of Biological Sciences. Only page 1 of the questionnaire was sent in by Professor ULRICH.)

* * *

(*) 1. In the field of science with which the International Union of Physiological Sciences (Secretary-General: Professor W.O. FENN, The University of Rochester Medical Center, Rochester 20, N.Y., U.S.A.)

is concerned, there are the following periodicals:

(A) Abstracting periodicals:

1. Bulletin signalétique du CNRS

2. Referativny Zhurnal

3. Biological Abstracts

4. International Abstracts of Biological Sciences

5. Excerpta Medica

7. Chemical Abstracts

(B) Indexing periodicals:

I. Current Contents

II. Annual Reviews

III. Bibliography of Agriculture

2. The Union classes them as follows:

(a) Widely read and in current use

Little read and little used

(b) Easy and convenient to use

(d) Choice of original literature sound

Choice of original literature too critical

Periodicals 3, 7

" 4, 5

" 3, 4, 5, 7

" 3

" 4, 5, 7

/...

- (e) Abstracts good Periodicals 3, 4, 5, 7
(f) Indexes accurate Probably 3, 4, 5, 7
(g) "Complete coverage of all the biological literature of the world by index of titles (and key words if possible) in two or three non-overlapping publications, such as: (1) N.S. America (2) Europe (3) Asia et al. or botany, zoology, biochemistry, entomology.

"Periodicals 1 and 2 are excellent and widely used except in countries where English is preferred.

"My answer reflects only my own personal habits and does not attempt to represent the opinion of IUPS. - W.O. FENN."

* * *

- (*) 1. In the field of science with which the International Geographical Union

(Secretary: H. BOESCH
30 Freiestrasse
Zurich 32, Switzerland)

is concerned, there are the following periodicals:

(A) Abstracting periodicals:

1. Bulletin signalétique du CNRS
2. Referativny Zhurnal
3. Acta Geographica, Bibliographical Supplement, published by the Société de géographie, 184 Boulevard St. Germain, Paris
4. Bulletin bibliographique of the (French) Ministry of Finance and Economic Affairs
5. Bibliographie of the Library of the Paris Chamber of Commerce
6. Météorologie nationale, abstracts and translations of abstracts
7. Almost all periodicals, both French and foreign, include a literature review section: for example, Petermann Geographische Mitteil., Gotha, Germany

/...

(B) Indexing periodicals:

- I. Those listed above
- II. New Geographical Literature and Maps, London
- III. Current Geographical Publications, New York (Geographical Society)
- IV. Météorologie nationale, bibliographical indexing weekly

(*) 2. The Union classes them as follows:

- (c) Time-lag after appearance of original literature acceptable
- (d) Choice of original literature too wide Periodicals 1, 5
Choice of original literature sound The remainder
- (e) Abstracts good Periodicals 3, 4, 6
- (g) "The IGU issues the annual Bibliographie géographique internationale, which meets its needs. It is published by CNRS, 13, Quai Anatole France, Paris 7^e."

* * *

(*) 1. In the field of science with which the International Union of the History and Philosophy of Science (General Secretary: R. TATON, 64 rue Gay-Lussac, Paris 5) is concerned, there are the following periodicals:

(A) Abstracting periodicals:

- 1. Bulletin signalétique du CNRS
- 2. Referativny Zhurnal
- 3. Isis (international review on history of science; official quarterly of the History of Science Society, University of Washington, Seattle 5, Washington, USA)

* * *

Analysis of replies to the questionnaire sent to the Scientific Unions

It is not our intention to make a critical review, however short, of the replies which the General Secretaries of the Scientific Unions were good enough to send to the ICSU Abstracting Board (representing, in some cases, their personal views. We shall merely make a few comments which apply to most of the replies, leaving to the reader the detailed analysis of the views expressed.

/...

- (1) Generally speaking, the total number of abstracting or indexing periodicals known to each Union is greater than 5 and less than 15; the average is 10. This seems to us a reasonable figure and will henceforth be used as a yardstick in this report.
- (2) Generally speaking, the Scientific Unions see no need for the establishment of any new abstracting journal in their respective fields or for science as a whole. Such a review, in their opinion, would merely be a compilation of existing journals. The exceptions are the Union of Crystallography (in the special case of Structure Reports) and the Union of Physiological Sciences. The latter exception deserves attention, for Professor FENN makes a constructive suggestion: that a new journal should provide complete coverage of all the biological literature of the world by index of titles (or key words if possible) in two or three non-overlapping publications, which might cover:

(A) Different geographical regions:

1. North and South America
2. Europe
3. Asia

or

(B) Different branches of science:

1. Botany
2. Zoology
3. Biochemistry and physiology.

- (3) The information provided by the existing abstracting journals is considered acceptable in many cases (but see the reply from the Union of Physics).

In short, the advice of the Unions seems to be that the existing journals in each field should be improved.

Conclusions

Having examined the abstracting and indexing journals, their organization - thrust back, by the greater rate of progress today, into what seems a distant past - and their current efforts in the direction of greater coverage and mechanization; and having also examined the possibility of establishing new

abstracting journals of limited or general scope, we shall conclude with a discussion of:

- (1) The disadvantages of the present situation;
- (2) The users' wishes;
- (3) The various ways in which the present situation might be rapidly improved.

(1) Disadvantages of the present situation

A. There is considerable duplication and omission, especially in biology, and even more so in physiology and biochemistry. Professor FENN, Secretary-General of the International Union of Physiological Sciences, stated at Monte Carlo in 1959 that, with all due respect to the existing abstracting journals:

"The scientific public at large is anxious for the widest possible coverage; what is wanted is an analysis as complete and as swift as possible of the bulk of the current biological literature, and if possible included in a single journal with a single index."

Moreover the recently published survey of biological abstracting⁽⁵⁾ revealed the gravity of this situation: in 1958, for example, 34 per cent of the information given in the International Abstracts of Biological Sciences could be found elsewhere.

In the medical field there is perhaps less duplication because so far only the journal Excerpta Medica has tackled the problem as a whole. However, certain gaps still exist.

In the fields of physics and pure chemistry, as a result of strenuous effort, almost exclusively on the part of the member-journals of the Abstracting Board of the International Council of Scientific Unions (ICSUAB) (Bulletin signalétique, Referativny Zhurnal, Physics Abstracts, Physikalische Berichte, Chemical Abstracts, Chemisches Zentralblatt), users may take it that the data supplied by these journals are excellent in quality and quantity, though there is still room for improvement. For the most widely-used languages, we may assume that 90-95 per cent of the useful scientific data in this field are abstracted - with, unfortunately, varying degrees of delay - by these journals.

In other fields, the information to be gleaned from the abstracting periodicals must be considered very incomplete. This is especially true of the material circulated by the many indexing services which publish a "monthly critical

or bibliographical review" at the end of the primary journals. Such a review is doubtless better than nothing but, while it is useful at the end of the month in question, it soon becomes completely valueless (through its incompleteness, through duplication with the more comprehensive journals, and through having no index). The services which produce these bibliographies are apparently willing to let them remain a merely temporary and provisional tool.

B. Problem of classification. Once each major abstracting service has chosen a classification, it tends to keep to it for years, since any change would involve considerable difficulty and expense. This is accordingly one of the problems requiring closest attention, for it affects the future. Improvements have been achieved in the field of pure science but not, apparently, in the applied sciences, particularly agriculture and medicine, so far. To respect each individual system, a new classification would have to split all the existing classifications into a hundred scientific "specialities". This would still be a manageable figure and would be increased by a few units in the future if need arose (for example, neutron chemistry could be added when a large number of laboratories had taken to using neutrons in chemistry).

The use of key words, without any classification at all, has been considered but does not seem very satisfactory. With documentation as abundant as it is, there are too many key words and too many possible ways of indexing each work. Hence, although the information officer's work would be simplified at the abstracting stage, it would be complicated considerably when the machine had to extract one item of information out of several thousand million. In our opinion it should be possible to secure an agreement in principle on an "approximate" classification of existing sciences by appealing to the competence and constructive spirit of the qualified international agencies (ICSU, IFD and UNESCO).

C. Inaccessibility of the primary journals. Geographical and linguistic difficulties are involved here.

For example, if a Japanese primary journal is sent to Europe by surface mail, we must allow one month for dispatch, one to two months for shipment and receipt, and another month for the translation of author abstracts or the compilation of abstracts by European staff able to read articles in Japanese. These difficulties are of very frequent occurrence, but all the major abstracting agencies have tackled them bravely and, generally speaking, solved them to some extent. We may

/...

mention as examples the translations made by the Referativny Zhurnal from minority languages of the Soviet Socialist Republics, and the efforts made in the United States, France and Germany to provide translations from Far Eastern languages. Much has also been done by ICSUAB, which spends \$1,000 a year on air-mailing primary journals to its member abstracting journals, and which solves some of the language problems through its correspondents (ICSUAB has one correspondent for English-speaking countries, one for German-speaking countries, one for Russian-speaking countries, one for the Scandinavian countries and one for Japan).

D. Any important decision regarding abstracts involves a large capital outlay. For example, any change in the present method of transliterating Cyrillic characters which obliged an agency to alter one or two characters throughout its past bibliographies would put that agency to considerable expense.

(2) Users' wishes

There is very little on record on the subject of users' wishes. The main sources of such information are:

- (a) the views of the International Unions on abstracting periodicals (fourth section of this chapter);
- (b) reports of ICSU and ICSUAB, reports of the international nomenclature committees (in the statements of purposes and the preambles; statement by Professor ULRICH to the Executive Board at El Escorial, 1960, and London, 1961).

The following is an attempt to define the characteristics sought by users, whatever the scientific field in which they are working:

- (1) They must be able to draw up their bibliography quickly and conveniently. To this end it is necessary to ensure that as large a proportion as possible of the material they must sift is useful to them. A convenient classification must accordingly be provided within each abstracting journal. This is the only way to avoid having to read a great many unclassified titles of articles or being dependent on a hard-pressed documentation service which takes several hours to reply to queries.

Every research worker wants direct access to certain essential bibliographical data. He is prepared to devote up to a quarter of his

/...

working time to bibliography. On the other hand, he wishes to be served by the best possible organization in order to eliminate useless documentation and unduly bulky or inconvenient card-indexes.

The UNESCO International Conference distinguished between the publication of an original paper, a review, a criticism of work already published, and so on. ICSUAB⁽⁴⁾ confirmed and clarified these principles by proposing ^(*) that a distinction should be drawn between the following types of primary scientific data:

- (a) news;
- (b) original papers;
- (c) reviews of existing information.

This scheme could be applied to abstracting journals as follows: News would be indicated by title, scientific papers would be abstracted (usually by the author), and reviews would be indicated by title (they constitute in themselves up-to-date documentation, but cannot be summarized). (2) The research worker wishes to receive prompt notice of all papers of interest to him. Consequently abstracting journals are bound to make an increasing use of the latest advances in means of communication. The main primary scientific journals are already sent by air, at ICSUAB's expense, to its member abstracting journals.

The Insdoc List receives the microfilmed tables of contents of primary journals by air from several countries.

A telex system has been considered as a means of speeding up these exchanges of information still further, but little use is apparently being made of it so far as abstracts are concerned.

J. Garrido is understood to have proposed to the Documentation Centre of CNRS, Paris, that brief accounts of the meetings of scientific societies, including a list of the papers presented, should be published at regular intervals in order to make the titles of articles known more quickly. This would, in a sense, reduce the delay in publication to a minus quantity, but duplication would arise when the article itself appeared. Furthermore some of the papers submitted to learned societies are never published.

Automatic translation, which was mentioned earlier, may also provide a means of speeding up the production of abstracting journals. Finally, automatic page-setting - already in use for Chemical Abstracts, including the indexes - is an efficient method of improving the accuracy and speed of operation.

All the major abstracting journals are convinced that their work is worthwhile. It is now becoming virtually essential for all large-scale research services to compile their bibliographies from abstracting periodicals, however numerous the primary journals to which they subscribe. It will be quicker for the abstracting periodicals than for the primary journals to achieve a degree of standardization in operation and to reduce delays in publication. They are thus destined to become:

- the means of conveying information rapidly to research workers;
- as a complete series, the fullest reservoir of information at the research service's disposal.

These comments might seem arbitrary if they were not confirmed by the major public and private research services which, after experimenting with cumbersome and complicated card indexes, consider that the most convenient way to store information is to keep the complete series of a good abstracting journal in their particular field.

(3) Policy for improving the situation with regard to abstracts

There are already many scientific documentation agencies in existence, both national and international, both public and private. Any improvement in the present situation in the near future must be sought through co-ordination between them; ICUSAB has been working on these lines for the past ten years, as described in chapter I.

Other efforts in this direction may be summarized as follows:

- (a) The International Federation for Documentation, following its recent reorganization, has included in its work programme, among other projects, the preparation of a world directory of abstracting services in the natural sciences, pure and applied sciences and social sciences;
- (b) The National Science Foundation, Washington, has already published a series of well-documented and constructive studies on scientific documentation, mainly in the United States but also elsewhere;

- (c) The USSR Academy of Sciences has begun a systematic and extensive study of the whole problem of scientific documentation throughout the world;
- (d) The Documentation Study Group of the General Delegation on Scientific Research (Délégation générale à la recherche scientifique) has prepared several reports on scientific documentation in France;
- (e) Since the International Conference on Science Abstracting in 1949, UNESCO has remained active in this field, both by participating in the establishment of scientific and technical documentation centres in various parts of the world and by fostering international co-ordination. This work of co-ordination, which is UNESCO's special function, will be intensified.

It would thus appear that, both at the international level and in individual countries, competent bodies with similar aims are working on much the same lines.

TECHNOLOGY

Abstracting or indexing periodicals dealing exclusively with specific branches of technology made their appearance much later than similar journals devoted to the basic scientific disciplines. Concerted international action to organize technical documentation and the publication of abstracts or indexes in a given branch of industry is an even more recent development.

To make such efforts a success is even more difficult in the technological field than in that of pure science. Industrial competition, financial interests and trade secrecy are all adverse factors. Some success has nevertheless been achieved, for example in welding and railways; other projects are still hindered by practical difficulties. However, these temporary setbacks have not prevented the announcement of new plans of international co-operation in several branches of industry; the ceramics industry, in which the initiative has been taken by the (*) Documentation Working Group of the European Association for Ceramics, and the automobile industry, with its (*) International Documentation Committee, are examples. Other developments may appear following the United Nations Conference on the Application of Science and Technology for the Benefit of the Less Developed Areas (Geneva, February 1963), where some aspects of scientific documentation at the international level will be discussed.

Other projects are more general in scope since they affect most branches of industry. The latest of these is the quarterly review of the titles of articles and books on automatic control, which is being published from 1962 onwards by the International Federation of Automatic Control (IFAC) with the help of UNESCO. It is hoped that the titles of some 4,000 articles and books brought to the notice of the Federation by its national committees can be published in French and English.

By way of illustration, the periodicals and services available in certain technological fields will be described below, more detail being given in the case of those industries, such as welding and railways, where the results already obtained deserve special mention. Prominence is also given to the Technological Digests, periodicals which are both unique in character and of general interest.

Technological Digests

The spread of technical innovations among small and medium-scale undertakings is one of the basic problems of industrial development. Small undertakings have a number of difficulties to overcome in picking out feasible innovations from the considerable mass of documentation available in scientific and technical publications appearing in various languages throughout the world. As a result, new ideas are created and applied much faster than industry can absorb them. In an attempt to remedy this state of affairs it was decided, at the conference on technical information held in London in September 1954, that OEEC should publish a series of abstracts on selected topics from the international technical press. The original title, European Technical Digests, was later changed to Technological Digests.

The publication of this journal began in March 1956; originally offset, it appeared later in printed form, and its present layout was adopted in June 1958.

Purpose and coverage of Technological Digests

The purpose of the Technological Digests is simply to disseminate ideas concerning technical developments and discoveries capable of immediate application. They differ widely from the specialized reviews in being extremely broad in scope, covering such topics as corrosion, liquid fuels, storage, metal-working, safety, packaging, etc. These abstracts are selected mainly for the use of engineers, technicians and the managers of small and medium-scale undertakings. They are intended to facilitate the exchange of new ideas between sectors of industry and thus to reduce the unavoidable time-lag between the description of a technical innovation in a given country and its practical application throughout the world.

Scanning of publications and dissemination

Every month, experts scan and abstract more than 1,500 technical journals published in fifteen countries in thirteen different languages. The abstracts are prepared at the national level in Austria, Canada, France, Germany, Italy, Netherlands, the Scandinavian countries, Spain, Switzerland, the United Kingdom

and the United States, as well as in countries outside OECD,^{1/} such as India and Israel.

It is the function of the national editors to condense articles, make a selection and draw attention to topics of particular interest.

The English edition of this review is translated in its entirety into Chinese, French, German, Greek, Italian, Japanese, Portuguese, Spanish and Turkish.

Besides these complete editions, several journals in various countries regularly reproduce extracts from Technological Digests (for example The New Scientist in the United Kingdom, Usine nouvelle in France, Ajour in Norway, Izbor in Yugoslavia, etc.).

Between 1,500 and 2,000 copies of the basic edition are printed monthly. The global circulation of the different editions totals 250,000.

To facilitate reproduction, the Organization provides original photographs, mats or blocks at cost.

The Technological Digests appear between the first and tenth of each month. Each number comprises about seventy-five abstracts and has a total of 112 pages. It also contains brief notes on technical subjects of general interest (Russian technical literature, industrial fairs, etc.).

Information service to readers

A technical information service is available free of charge to all readers of the different versions of Technological Digests and of the journals which reproduce them.

This service not only deals with inquiries concerning particular abstracts but also tries to solve as many as possible of the readers' technical problems. As a result, a striking number of inquiries are received.

The Information Division of the Organization for Economic Co-operation and Development (OECD) can supply photostats of original articles and will transmit all available information collected by the documentation services and specialized information centres of member countries which co-operate in this activity.

^{1/} Organization for Economic Co-operation and Development.

In this manner the Technological Digests, which started merely as an attempt to disseminate new technical ideas in industrial circles, have gradually become an instrument of technical liaison and information. They are quoted on an ever-increasing scale in many technical publications throughout the world, thus providing many countries with original technical notions whose application does not involve large-scale investment. They illustrate the type of contribution that can be made to the development of the under-developed regions.

AERONAUTICS

In France an important body in this field is the Documentation and Technical Information Service on Aeronautics (Service de Documentation et d'Information technique de l'Aéronautique - SDIT), Ministère de l'Air et Ecole Nationale Supérieure de l'Aéronautique, 2 and 4 avenue de la Porte d'Issy, Paris 15 e.

Since 1945 the SDIT has published an "indicative bulletin" (Bulletin signalétique) which appears twice a month. The abstracts of articles considered particularly significant are specially marked. The bulletin also shows what translations have been undertaken. The abstracts are also published in card form. They are indexed and arranged according to a scientific and technical classification established by the SDIT. The approximate number of abstracts per year is 10,000.

The Bulletin signalétique, in restricted circulation, has been supplemented since 1950 by Docaéro, a documentary review of world aeronautical engineering, which appears every two months.

In the United Kingdom, the Ministry of Supply (Leysdown Road, Mossingham, London S.E.9) publishes the Index aeronauticus.

This monthly publication, founded in 1944, contains about 300 abstracts per month, classified according to the UDC. It has an annual index with a systematic alphabetical classification, and an annual index of authors.

In the United States, the Pacific Aeronautical Library, Institute of the Aeronautical Sciences (7660 Beverley Blvd., Los Angeles 36, California) has published since 1955 a Uniterm Index to Periodicals, which appears once a year and which contains about 9,000 abstracts classified by a systematic index and by author. A cumulative index is published every four years.

The Aeronautical Engineering Review, published monthly since 1932 by the Institute of the Aeronautical Sciences (2 East 64th Street, New York 21, N.Y.), contains International Aeronautical Abstracts. These abstracts, which appear at the rate of some 1,500 a year, are assembled in an annual Aeronautical Engineering Index, classified systematically and by author.

AUTOMOBILE INDUSTRY

At the international level, mention should be made of the activities of the International Committee for Automobile Documentation (ICAD), a joint committee of the International Federation of Automobile Engineers' and Technicians' Associations (IFAETS) and of the International Federation for Documentation (IFD), established in 1956 with an office at the Verein Deutscher Ingenieure (VDI) Prinz Georg Strasse 77/79, Düsseldorf.

Besides revising the parts of the UDC concerned with motor vehicles, ICAD recommended the preparation of index cards (or strips which may be glued on to cards) of automobile bibliography, to be drawn up by authors or publishers in two languages (the original language and the reference language, English), according to standard procedures. The "autobibliography" has already been adopted by the journals of IFAETS and by other journals which do not belong specifically to the automobile industry.

The member countries of ICAD are considering the establishment of an abstracting pool to simplify the work of documentation by means of exchanges and collaboration, in which authors and publishers would be expected to take part.

In addition, two countries, the United Kingdom and France, each publish an important bibliographical bulletin.

In the United Kingdom, the Motor Industry Research Association (MIRA) at Lindley, near Nuneaton (Warwickshire) has published since 1955 a Monthly Summary of Automobile Engineering Literature, size 14.5 x 22 cm, of which each number contains about fifty abstracts. This review is divided into two parts, containing respectively abstracts of:

1. articles in English and untranslated foreign-language articles;
2. foreign-language articles which have been translated into English.

Each number includes an index of abstracts by subject and author.

In France the Union Technique de l'Automobile, du Motocycle et du Cycle (UTAC) (2 rue de Presburg, Paris 8ème), an association of car-assembly firms and manufacturers of automobile equipment and body work has published since 1945 the Bulletin mensuel de documentation de l'UTAC, which appears eleven times a year. Each number contains between 400 and 500 abstracts, indexed according to the UDC, from about 340 reviews and non-periodical documents (records of congresses and conferences, notices, regulations, etc.). Each bulletin also includes abstracts of foreign patent specifications and an index of French patents (forty to fifty a month) and a list of translations made by UTAC.

Circulation: 1,500 copies. The annual subscription is 50 new francs in France and 55 new francs abroad.

The service also has a documentary card index comprising nearly 100,000 abstracts cut out of the Bulletin and glued on to cards.

BUILDING AND PUBLIC WORKS

At the international level, a project involving co-operation between the member States of the International Council for Building Research, Studies and Documentation (CIB) (Bouwcentrum, 700 Weena, Rotterdam, Netherlands) proved a failure in practice. Each National Committee for Building Documentation was to print on cards abstracts of works published in this field in its own country. These cards, whose standardization, classification, language, etc., had been discussed in detail, were to have been exchanged among the National Committees and to have a large outside circulation. The failure of this plan, and the reasons why it failed, have been studied by Evans ⁽⁹⁾, who also indicates what must be done to ensure its success in the future.

France

Annales de l'Institut technique du bâtiment et des travaux publics.

Documentation technique

Founded in 1944. Monthly. Size 21 x 27 cm. Private subscription: 12 new francs; Corporate subscription: 24 new francs.

Publisher: Documentation technique du bâtiment et des travaux publics,
9 rue de la Pérouse, Paris 16^e.

Documentation technique publishes between 2,000 and 2,500 abstracts a year, classified systematically and specially indexed according to the Cordonnier system used in keeping the card-files of the Building Documentation Centre. Each abstract also bears a UDC number. Annual lists are prepared by author and by series and are revised every five years; the cumulative list for 1955-1960 appeared at the end of December 1960.

The Technological Institute for Building and Public Works (Institut technique du bâtiment et des travaux publics) has a Documentation Centre, which has been in operation for some fifteen years and which consists of a well-stocked library of 90,000 documents, from which index cards are prepared (220,000 cards in 1958); various departments engaged in abstracting, editing the bibliography and compiling technical bibliographies on request; a photographic department; and a translation department.

Also of great importance is the Centre for Building Science and Technology (Centre scientifique et technique du bâtiment) (CSTB), (4, avenue du Recteur Poincaré, Paris 16^e), for which the Minister for Construction is responsible. The function of this Centre, which is one of the French members of CIB, is to carry out scientific and technical studies and research.

CSTB publishes every two months, in the Cahiers du Centre scientifique et technique du bâtiment (1948), a "bibliographical" series which includes about 500 abstracts a year. These abstracts are printed on one side only, ready for cutting up into index cards. The Cahier size is 21 x 30 cm. Subscription (non-divisible) to all Cahiers: 89 new francs in France, 95 new francs abroad.

CIB has published since 1954 an information bulletin designed to foster the exchange of information among all countries. The bibliographical information is confined to a few very brief abstracts which cover only work done by CIB members.

A considerable number of journals are published on the subject of building and public works. Many of these scan periodicals and compile reviews. A few examples are given below.

Travaux. French technical journal dealing with public works and reinforced concrete.

Founded in 1915. Monthly. Size 23.5 x 30 cm. Subscription: 60 new francs in France, 65 new francs abroad.

Publisher: Editions Science et Industrie, 6, avenue Pierre de Serbie, Paris 16^e.

The documentary section includes 2,500 abstracts per year and a large, separately paginated indexing supplement. The systematic classification used is maintained in drawing up the table of contents which, with the author index, appears annually.

United Kingdom

Building Science Abstracts

Founded in 1928. Monthly. Size 15 x 24 cm. Subscription: £1.18.

Editor: Department of Scientific and Industrial Research (DSIR)

Publisher: Her Majesty's Stationery Office, London.

Road Abstracts

Founded in 1934. Particulars as for Building Science Abstracts, but does not use the UDC. Subscription: £1.13.0.

This bulletin is prepared by the Road Research Laboratory (section of the DSIR) and publishes 1,200 abstracts a year.

Library Bulletin

Founded in 1945. Appears twice a month. Size 22 x 32 cm. Published by the Ministry of Works, Lambeth Bridge House, London.

Each number includes a dozen roneoed pages, and 3,000 abstracts are published each year. Universal Decimal Classification (UDC). Indexes are issued twice a year.

The UDC system has also been used in another official publication, the RIBA Library Bulletin published by the Royal Institute of British Architects, which also includes many abstracts.

Belgium

Cahier Cedoc-biblio

Founded in 1950. Appears every two months. Size 21 x 30 cm.

Publisher: Centre belge de documentation et d'information de la construction, 11, rue de l'Esplanade, Brussels 5.

This roneoed series, which is purely for indexing purposes, lists a great many notices classified according to the UDC system, as well as pages of bibliographical index slips from the Technical Documentation Service of the Ministry of Public Works and Reconstruction. It covers 2,000 publications a year in this way.

Germany

Schrifttumkartei Bauwesen - Herausgeber Dokumentationsstelle für Bautechnik in der Fraunhofer-Gesellschaft

Founded in 1954. Monthly. Size 21 x 30 cm. Subscription: Series A: 5 Deutsche Marks; Series B: 2.30 Deutsche Marks; Series C: 3.60 Deutsche Marks. Publisher: Verlag von Wilhelm Ernst u. Sohn, Berlin, Wilmersdorf - Hohenzollerdamm 169.

The publication is divided into three parts for which separate subscriptions are accepted. They are made up in sheets of paper strong enough for cutting up into index cards, eight cards to a sheet. Each notice bears a UDC number, one or more subject references, the author's name, the title, the reference in traditional form, and a ten-line summary. The three series together include some 450 of these cards a month. The documentation centre can obtain photostats.

The Norwegian Building Institute publishes about 500 abstracts a year on cards.

Canada

Canadian Building Abstracts

Founded in 1960. Monthly. Size 15 x 23 cm. Published by the National Research Council, Division of Building Research, Ottawa 2.

This bulletin, published in French and in English and printed in very small, clear type, gives thirty abstracts in each number, so arranged that they can be easily cut out and glued to cards for filing. Each abstract is given a UDC number from the abridged classification for architects, builders and civil engineers.

The National Research Council has a photo-copying service which can also obtain microfilms.

Certain periodicals are indirectly concerned with the building and construction industries:

Technical Bulletin of the International Institute of Refrigeration

Founded in 1920. Appears every two months. Size 15.5 x 24 cm. Subscription: 35 new francs.

Publisher: International Institute of Refrigeration, 177 bd Malesherbes, Paris 17^e.

This bulletin, published in French and English, gives about 1,300 abstracts a year, of which about a third may deal with topics relating to the building industry, such as air conditioning, hygiene, the effect of cold on materials, and other matters.

Applied Mechanics Reviews

See table 1, periodical 6.

RAILWAYS

The International Union of Railways (UIC), 10 rue de Prony, Paris 17^e, has thirty-nine member countries throughout the world and a few private members. There is also an international railway union of the USSR, Eastern European countries and China, known as the OSZD, which stands for "Organization for Railway Co-operation".

The UIC has as a subsidiary organ the international Office of Railway Documentation (BDC), which now has its headquarters at the Société nationale des Chemins de fer français (SNCF), 27, rue de Londres, Paris 9^e. BDC abstracts 900 reviews in collaboration with railway organizations in some member countries of BDC which themselves operate well-developed documentation services: Belgium, Switzerland and Italy. The results of the abstracting operation are printed on 10 x 15 cm. index cards, which are exchanged among the countries mentioned and sent to other BDC members.

The most important abstracts are reproduced in the Bulletin de documentation de l'Union internationale des Chemins de fer, which appears in two editions, format 21 x 27 cm. The French edition is published by the BDC in Paris. The Spanish edition is published by the Gabinete de Estudios Generales y Económicos de la RENFE, Santa Isabel 44, Madrid.

This monthly bulletin, the French edition of which has a circulation of about 1,000 copies, is a co-operative effort between several countries: chapter I - Staff and social questions - is prepared by the Belgian National Railway Company (Société nationale des chemins de fer belges); chapter II - Law and finance, organization - by the Swiss Federal Railways; chapter III - Transport economy - by the Italian State Railways; and chapter IV - Transport technology - by the French National Railway Company (Société nationale des chemins de fer français).

The abstracts given in the bulletin are classified both according to the UDC and according to a systematic classification peculiar to BDC.

The bulletin includes a detachable supplement containing a study on a technical subject of current interest and a summary review of railway patent specifications. Almost 4,000 abstracts, about 120 book reviews and 300 patent abstracts were published in the bulletin in 1960.

Documentation in various countries

Belgium: The Belgian National Railway Company publishes a Bulletin mensuel de documentation, size 21 x 30 cm, in which the articles are indexed according to UDC principles (Brussels system). Part I is devoted to articles from reviews; it is merely indicative, with chapter headings in French and Flemish. Part II deals with technical works newly acquired by the library; and consists of abstracts. Each number of this bulletin covers 1,000 to 1,100 articles.

Italy: The General Directorate of the State Railways publishes in collaboration with BDC a Bolletino di Documentazione (size 21 x 30 cm) on land transport. This bulletin contains some abstracts, but in other cases merely indexes the articles concerned.

Germany: The Documentation Service of the German Federal Railways, Frankfurt on Main, has published since 1953 Kurzauszüge aus dem Schrifttum für das Eisenbahnwesen. This important monthly publication is printed on the side only, so that the abstracts, which are indexed and classified according to the UDC, may be cut out and glued on cards. It deals both with railways and with the technology of other forms of land transport. The size 21 x 30 cm. Between 3,000 and 3,500 summaries, usually in the form of abstracts are published each year.

United Kingdom: The Institution of Civil Engineers, London, in association with British Railways and the London Transport Executive, has published Railway Engineer Abstracts since 1946. This is a monthly bulletin, size 13.5 x 21 cm. The abstracts are indicative and are indexed and classified according to the UDC. Each bulletin contains about seventy abstracts.

The Monthly Review of Technical Literature has been published by the Research Department of British Railways since 1930. Each number contains an average of 100 to 120 abstracts.

Switzerland: The General Directorate of the Swiss Federal Railways at Berne publishes Referate von Veröffentlichungen über das Verkehrswesen. Recent publication, size 21 x 30 cm; each bulletin contains about a dozen abstracts.

India: The Railway Testing and Research Centre of the Ministry of Railways, Alambagh, Lucknow, has published Documentation Notes since 1956. This is a monthly publication, size 14 x 21 cm, containing 50-60 fairly detailed abstracts per bulletin, indexed and classified according to the UDC.

The Railway Union of the Eastern countries (OSZD) publishes at Warsaw a bulletin in Russian which contains a bibliographical section.

CHEMICAL INDUSTRY

Several of the periodicals mentioned in table 2 are not confined to the publication of abstracts or pure chemistry but also devote considerable space to applied chemistry, which occupies whole sections of their systematic classification. This applies in particular to Chemical Abstracts, Referativny Zhurnal (Khimia), Chemisches Zentralblatt and the Bulletin signalétique du CNRS (section VI). Other periodicals are more specialized. Thus in Spain the Patronato Juan de la Cierva (Serrano 150, Madrid) begun publishing in January 1962 abstracts of articles on the chemical industry from English, French, German and Russian-language periodicals. The intention is to publish 800 abstracts a month.

France: Chimie et Industrie. A review of applied chemistry published by the Presses documentaires with the technical collaboration of the Société de chimie industrielle, 28 rue St. Dominique, Paris 7^e.

Founded in 1918. Monthly. Size 21 x 27 cm. Subscription: 140 new francs in France, 160 new francs abroad (including the monthly supplement Génie chimique and the issues of Energie nucléaire published every two months).

This review includes full-length papers and articles as well as abstracts (200-250 per number, in thirty systematic divisions). The abstracts are prepared by industrial laboratory chemists working as outside contributors. The review also includes a list of applications for German patents. The indexes appear every six months and comprise: (1) alphabetical list of authors; (2) alphabetical list of subjects; (3) French patents, by number; (4) and (5) alphabetical lists of authors of new and recently published books. The documentation section of the monthly supplement Génie chimique is arranged on the same lines and includes about 1,000 abstracts a year. The Centre uses a special ideological decimal classification and has an active photographic service.

Italy: Chimica e l'industria. Giornale di chimica industriale ed applicata, L'Industria chimica.

Founded in 1935 through the merger of the two periodicals whose names form the sub-title. Organ of the Italian Chemical Society.

Monthly. Size 21 x 29.5 cm. Subscription: Italy 10,000 lire; Europe 12,000 lire; free to members of the Society.

Published at Via San Tomaso 3, Milan.

This review is similar in layout to Chimie et Industrie; part II, technical and scientific documentation, is systematic and gives, in fifteen sections, very detailed abstracts sometimes accompanied by formulae and tables; some of these abstracts take up a whole page. About 100 of them appear in each monthly issue. The section entitled "Analytical bibliography" includes about ten detailed book reviews. Subject index in each number.

United Kingdom: Journal of Applied Chemistry (14 Belgrave Square, London S.W.1), published by the Society of Chemical Industry.

Founded in 1951. Monthly. Size 21 x 28 cm. Subscription: £15 post free.

Part II of this periodical is almost completely independent of part I; it bears the title Journal of Applied Chemistry Abstracts and is paginated separately. It is divided systematically into seven main sections. A fairly large number of patent specifications are grouped together at the end of each subdivision; they are abstracted, but only the main countries are covered. The abstracts number about 12,000 a year.

Analytical Abstracts (editor Norman Evers, 14 Belgrave Square, London S.W.1) is published monthly by the Society for Analytical Chemistry. Size 17 x 24 cm; subscription £3.15s.

Text includes about 4,000 abstracts grouped into five systematic divisions and numbered serially throughout the year. Indexes of authors, subjects and patents (very few, not more than about fifty) are issued monthly. The number of periodicals scanned is 360.

PAPER INDUSTRY

Few periodicals dealing with the paper industry provide abstracts. However, this industry is generally regarded as a branch of the chemical industry, and abstracts concerning it appear in the periodicals described under "Chemical Industry" or listed in table 2. The Bulletin signalétique du CNRS, section VI, for example, gives about 300 abstracts a year concerning the paper industry.

The Association technique de l'Industrie Papetière (154 boulevard Haussmann, Paris 8^e) has a technical documentation centre which performs the services usually rendered by such centres. Scanning French and foreign periodicals and compiling abstracts on index cards; these are designed for consultation on the spot, but it is possible to take out a subscription.

The periodicals include:

Germany: Fachzeitschrift für die gesamte Papier - Pappen and Papierstoff-Industrie (Verlagspostamt 14b Biberach an der Riss, Württemberg). Wochenblatt für Papierfabrikation, Organ der Papiermacher - Berufsgenossenschaft, Mainz. Mitteilungsblatt des Vereinigten Papierfachverbandes, Munich.

Founded in 1873. Appears twice a month. Size 20 x 30 cm.

The abstracting part of this review deals mainly with patent specifications; it provides abstracts of about 300 papers and articles and about 660 patent specifications a year.

Sweden: Svensk Papperstidning, the Swedish Paper Journal. The official organ of the Swedish Paper Mills Association and the Swedish Association of Pulp and Paper Engineers. Appears twice a month. Size 20 x 30 cm. Subscription: 45 kronor in Sweden; 50 kronor abroad.

The articles are written in English, German or Swedish. The number of abstracts is about 400 a year, not including a few patent abstracts.

Norway: The Norwegian Pulp and Paper Institute publishes about 1,600 abstracts on cards.

United States: Abstract Bulletin of the Institute of Paper Chemistry, affiliated with Lawrence College, Appleton (Wisconsin); published by the Board of Trustees of the Institute of Paper Chemistry, Appleton, Wis.

Includes about 9,000 abstracts a year, from more than 500 periodicals.

The publication is divided into four parts dealing respectively with papers and articles, theses, books and patents. Each part is systematically divided into fifty-two sections, but issues are serially numbered throughout the year. Annual index of authors and subjects, and list of periodicals received.

IRON AND STEEL INDUSTRY

The Iron and Steel Documentation Centre (Centre de documentation sidérurgique - CDS) is a very important private institution set up in 1943 on the initiative of the French iron and steel industry, and has members in more than thirty countries.

It publishes a monthly Bulletin analytique of about 150 pages, size 15.5 x 21 cm, in which abstracts are made from about 600 reviews.

This Bulletin analytique, which includes about 7,000 abstracts a year, is prepared in collaboration with the Centre national de la recherche scientifique (CNRS). It has the following special feature: part I, about fifteen pages long, is limited to abstracts of what seem to be the most interesting articles, so that readers pressed for time may quickly catch up with the most important documentation. Classification by letter and number according to a system peculiar to the industry.

An example of international co-operation is the Association européenne pour l'échange de la littérature technique dans le domaine de la sidérurgie (ASELT), (literally: European Association for the Exchange of Literature on Iron and Steel Technology) founded in 1959 and subsidized by the European Coal and Steel Community (ECSC) at Luxembourg. The purpose of this Association is to encourage the dissemination of translations of East European, Japanese and Chinese journals; the members, in their turn, undertake to give any ECSC enterprise access to their translations. Since its foundation the Association has subsidized more than 1,800 translations, most of which have been provided by France and the Federal Republic of Germany.

European documentation

In the Federal Republic of Germany, iron and steel documentation is furnished by the journal Stahl und Eisen - Zeitschrift für das Eisenhüttenwesen, the organ of the Verein Deutscher Eisenhüttenleute, Düsseldorf. Offices: Verlag Stahleisen m.b.H., 27, Breite Strasse, Düsseldorf.

This important journal, which appears twice a month, was founded in 1881. Since 1947 it has included a monthly supplement, printed on one side only so that the pages may be cut up into cards. This supplement, exclusively bibliographical, is entitled Zeitschriften und Bücherschau aus "Stahl und Eisen" and includes about 3,000 summaries a year, some of which are abstracts and others purely indicative.

In the German Democratic Republic there is a Zentralstelle für wissenschaftliche Literatur (ZwL. Dokumentationsdienst) (8, Unter den Linden, Berlin W.8).

This service was set up in 1953 and supplies about 5,000 abstracts a year on 105 x 148 cards. Universal Decimal Classification.

In addition, Montanwissenschaftliche Literaturberichte, Abt. B: Metallurgie (iron and non-ferrous metals) has been published monthly by the Akademie Verlag, 39 Mohrenstrasse, Berlin, W.8, since 1955. The documentation is prepared by the Eisen-Forschungsinstitut, Henningsdorf, near Berlin.

In the United Kingdom, the Journal of the Iron and Steel Institute (4, Grosvenor Gardens, London S.W.1.) was founded in 1869. This monthly journal contains a bibliographical part in which some 9,000 abstracts from about 1,000 periodicals, plus 500 cards on new books appear each year. These abstracts are available on a subscription basis in the form of cards, which appear ahead of the journal and are sent out twice a month. Universal Decimal Classification. Subscription, covering about 9,000 cards: £90 for the first collection; £25 for each additional collection. Extra postage abroad: £11. Card series on books: £4.10s, and £1.10s. for each additional collection. Special prices for members of the Association.

In the USSR, the relevant publication is the Referativny Zhurnal - Metalurgia, which is described in detail in table I. An English edition of this periodical is published by Acta Metallurgica, New York.

In Spain, the Technical Information Department of the Iron and Steel Instituté (Villaneuva 13, Madrid) established in 1948 a monthly service of Fichas Técnicas which supplies about 1,000 abstracts a year. Universal Decimal Classification.

In Sweden, Jerkontorets publishes more than 2,000 abstracts a year in a monthly bulletin in Swedish.

Several periodicals listed in table 2 publish abstracts concerning metallurgy in general and the iron and steel industry in particular. Lastly, technical abstracts are published in various other European countries, in particular Yugoslavia, Poland and Romania.

In the United States the Battelle Technical Review, published monthly by the Battelle Memorial Institute of Columbus, Ohio, contains abstracts on: metallurgy, metals; extracting and refining; corrosion; finishing; foundry practice; heat treatment; mechanical and physical properties; mechanical working; metallography; powder; non-destructive testing and quality control.

ASM Review of Metal Literature, published monthly by the American Society for Metals (7301 Euclid Ave., Cleveland 3, Ohio) was founded in 1944. It gives about 9,000 abstracts a year, with an annual cumulative index. Has appeared in Metals Review since 1958. ASM-SLA Classification.

See also in chapter VII the American Society for Metals - Western Reserve University project for metallurgy in general.

WELDING AND ALLIED PROCESSES

The Bibliographical Bulletin for Welding and Allied Processes, published under the auspices of the International Institute of Welding (IIW), 32 Bd. de la Chapelle, Paris 18e, represents an advanced form of international co-operation in the field of documentary technique. When the International Institute of Welding was established in 1948, the French delegation placed at its disposal a bibliographical periodical which the French welding organizations had been publishing for several years previously. Since then the Bulletin appeared under IIW sponsorship; it is the only international abstracting journal in its field. The

Bulletin is edited and published by the Institut français de Soudure, Paris, with the regular assistance of the national representative of IIW Commission IV (Documentation).

The Bulletin is published quarterly in French and English, and provides an annual total of 2,000 to 2,500 systematically classified abstracts of studies, notices and articles on welding processes, allied techniques and their applications which have appeared in the world technical literature. Articles on the economic problems of welding and allied processes are also abstracted, and 200 to 300 abstracts a year are made from working papers of the IIW Commissions and from papers presented at open meetings of the Institute.

The Bulletin is brought out in close liaison with Commission IV (Documentation) of IIW which, after the representatives had jointly considered the matter, established the methods of preparation and presentation to be used.

(1) International survey of primary publications issued throughout the world

This survey was instituted and is kept up to date by IIW Commission IV and by the publisher. Periodicals that specialize in welding and allied processes are distinguished from more general periodicals in which articles in the Institute's field regularly or occasionally appear.

(2) Regular service of primary publications and journals, centralized in Paris

This service is provided, for specialized journals at least, free of charge in almost all cases, and otherwise in exchange for a French publication, through the good offices of national delegations to IIW (twenty-nine member countries, including Canada, Czechoslovakia, Japan, South Africa, Union of Soviet Socialist Republics, United Kingdom, United States of America and Yugoslavia).

(3) Method of preparing the abstracts

All representatives to the Commission are required in principle to co-operate in preparing abstracts from the respective countries' publications on welding and allied processes. However, the Institut français de Soudure has thus far undertaken to abstract the publications of member countries which cannot do their full share of the work, and those of non-member countries.

The basic criteria for selecting documents for abstracting have been laid down by IIW Commission IV. In principle, consideration is given to publications which are of technical interest or likely to be useful to the less informed reader. In accordance with the principles laid down by the Commission, articles are discarded if they contain no new technical information of use to specialists and are of no particular value as general information. In a limited number of cases, only the title of the article is given.

The Commission has laid down rules in which the method of abstracting and the length of the abstract is related to the type of document and to whether it is an original article, a translation, a reprint, etc. There are also general rules on publication references and on various notations used, where necessary, to describe the specific character of the document (general information, research, computation, practical application or economic study). Some representatives also indicate the indexing proposed for each abstract. The abstracts prepared are completely objective and contain no criticism. Representatives send their abstracts to Paris in one of the two languages of the Bulletin or, in exceptional cases, in some other widely used language.

A special study on the question of abstracts of patent specifications from different countries (too numerous for inclusion in the Bulletin), in which Bulletin subscribers and readers were consulted regarding the desirability of publishing such abstracts in separate fascicles, resulted in a decision, on financial grounds, not to undertake the preparation of such abstracts.

(4) Classification of abstracts

The abstracts are classified under an original system specially designed for documentation in a specialized technical field. The systematic and alphabetical classification employed in the Bulletin is issued as a separate fascicle. The classification has to be improved and brought up to date from time to time in order to keep abreast of developments in welding techniques and terminology. The necessary adjustments are made by IIW Commission IV. A special sub-commission of Commission IV, in co-operation with the International Federation for Documentation, has concurred the classification indexes of the

Bulletin with the Universal Decimal Classification (UDC). As a result of this operation, a concordance table for the two systems of the classification has been published and the UDC items relating to IIW's fields of activity have been revised and improved.

(5) Functions of the publisher

The French publisher, after editing the abstracts in the language in which he receives them, has them translated into the other language of the Bulletin. He also prepares, in both languages, abstracts of publications from countries which take no part in preparing the Bulletin, and of IIW documents not published in national journals. He then indexes, classifies and prints the abstracts.

(6) Presentation of the Bulletin

The layout of the Bulletin is designed to meet the following requirements:

(a) Each abstract can be removed without disturbing others in the same language, the French and English texts being printed face to face in order to facilitate card filing;

(b) The information required for identification of origin and for classification is shown against each abstract;

(c) The Bulletin is laid out logically, so that:

- (i) each quarterly issue begins with a summary classification table, a list of reference symbols for the language, for the country and for the documents, and a list of the reviews abstracted, with their abbreviations;
- (ii) part I is devoted to reports and documents presented to and studied by the IIW Commissions;
- (iii) part II is devoted to abstracts of publications;
- (iv) an alphabetical index of authors appears at the end of the year's last issue.

It may be noted that the presentation of the Bulletin was determined following a survey in which subscribers were asked to choose between index cards and booklet form. Since the vast majority of readers preferred the latter form it was maintained with various improvements suggested by the readers concerning information on the cover, references, cross-references, etc.

(7) Finances of publication

Because a periodical of this nature is difficult and expensive to edit, print and publish, it is bound to be run at a loss. In addition the number of potential subscribers is relatively limited. Moreover, a special subscription rate is offered to members of the constituent organizations of IIW, some of whom may take out a subscription with an affiliated national organization instead of applying to the publisher abroad.

There is a standing deficit despite the following sources of income additional to receipts from sales:

- (i) royalties on the reproduction and translation of abstracts published in the Bulletin (some of the abstracts appear for instance, in Polish, and a periodic payment is made to the Bulletin's publisher);
- (ii) revenue on the few pages of advertisements sold;
- (iii) financial assistance from UNESCO through the Union of International Engineering Organizations (UIEO), of which IIW is a member.

This bibliographical periodical is so useful to welding technicians and engineers that publication has been continued despite the financial difficulties. To reduce the financial burden of the Bulletin a publicity campaign has been undertaken, mainly by advertising in national welding periodicals. The deficit has thus far been borne by the French publishing agencies.

IIW, as a member of UIEO, has striven to produce a Bulletin which conforms in almost every respect to UNESCO's wishes.

The working methods of IIW Commission IV have made it possible to institute international co-operation between a number of IIW member organizations in different countries, so that duplication is avoided and work carried out wherever it can be done most quickly and effectively at least cost.

It is worth noting that, after fourteen years' experience of publication, the editor of the Bulletin does not feel that, as a rule, author abstracts are of any use to a bibliographical publication of this type. They are generally speaking, either insufficiently condensed, or insufficiently thorough, or insufficiently objective. The abstracts prepared by the publisher of a specialized technical journal are generally of more direct use than those done by the authors themselves.

/...

TEXTILE INDUSTRY

Bulletin de l'Institut textile de France (Editions de l'Industries textile, 36 rue Ballu, Paris 9ème). Documentation and technical research. Established in 1947. Appears every two months. Size 24 x 16 cm. Subscription rates: 75 new francs (France), 85 new francs (abroad).

The "Documentation" part occupies about half the publication; it always has two sections - extracts from the French and foreign technical press, and patent specifications - and sometimes a third section, giving a bibliographical review of longer works. Slightly over 2,000 abstracts were published in 1960, as compared with some 1,300 in 1958 and 1,600 in 1959. The items are prepared and set out systematically. A systematic subject index, an index of authors' names and a summary of laboratory studies and projects are provided for each yearly set of the Bulletin.

The Institut textile de France (59 rue de la Faisanderie, Paris 16e), founded in 1946, has departments of research, information, standardization, higher education and translation. The technical information department carries on the documentary activities centred on the library, comprising some 9,200 documents and an extensive card index from which bibliographies can be compiled in response to postal inquiries. There is also a collection of textile patent specifications, particularly well stocked with French patents and numbering 16,438 items in all.

Coton et fibres tropicales; Prepared by the Institut de recherches du coton et des textiles exotiques (20 rue Monsieur, Paris 7e). Abstracting bulletin established in 1946. Quarterly. Size 16 x 24 cm. Subscription to magazine and bulletin: 20 new francs in France, 25 new francs abroad. This bulletin carried 800 abstracts in 1960. It is printed on one side only and arranged for cutting up to index-card size.

United Kingdom. Journal of the Textile Institute. Established 1910. Since 1949 has appeared twice a month in two monthly parts: Abstracts and Transactions. Size 24 x 15 cm. Subscription to Abstracts: 140/-.

United States. Natural and synthetic fibers; (Interscience Publishers, London and New York). Established 1944. Size 24 x 18 cm. Monthly. Gives copious abstracts on detachable sheets, at the rate of about 500 annually.

Germany. Melliand Textilberichte für Forschung und Praxis der Textilindustrie (Verlag Melliand Textilberichte, Heidelberg, Rohrbacherstrasse 76). Established 1920. Monthly.

Italy. Documentazione tessile, scientifica, tecnica e bibliografica (Centro di studio per l'Industria tessile, Piazza Leonardo da Vinci 26, Milan). Established 1946. Size 24 x 17 cm. Individual subscriptions: 5,000 lire. Publication on detachable sheets. The documentary material consists of a abstracting part and an indexing part, the latter prepared in collaboration with Lanerossi, Rhodiatocce and the Istituto Cotoniero Italiano.

In Switzerland, the Zurich Technical University publishes some 2,000 abstracts a year on cards.

Abstracts relating to the textile industry also appear in the general chemistry periodicals described in table 2.

INDUSTRIAL SAFETY

Although documentation on industrial safety is somewhat on the margin of technological documentary material, we shall discuss it briefly because of its importance, not only from the standpoint of safety, but also to production and its economics.

In coal mining in particular, problems connected with fire-damp, coal-dust explosions, cave-ins, etc., are as important as the technological problems proper.

These considerations have led, for instance, to the development in the United Kingdom of the Safety in Mines Research Establishment (SMRE) of the Ministry of Power (Portobello Street, Sheffield 1). Since 1928 this Establishment has published a bulletin which, from January 1951 onwards, has appeared monthly under the title Abstracts of current publications. Abstracts are made from 340 periodicals by staff technicians. Each bulletin, 17 x 21 cm in size, contains some 150 abstracts classified systematically according to the UDC. Where translations exist, they are mentioned in the abstract. An index of abstracts by author and subject is given at the back. An annual index of topics and authors is also published.

In France the Institut national de sécurité pour la prévention des accidents du travail (9, avenue Montaigne, Paris 8e) publishes a useful Bulletin de documentation bibliographique. The Bulletin was established in 1949 and appears every two months; size 15 x 24 cm.

The Bulletin publishes some 1,200 abstracts a year from about 560 periodicals, and lists annually about 150 translations done by the documentation service. Circulation: 4,000.

The Institut also publishes Cahiers de notes documentaires trimestriels prepared on separate sheets in printings of 4,000 copies, not including the special reprints made of individual items, sometimes in 10,000 copies on request. The service has issued an index to the notes published between 1955 and 1960, and began issuing an annual index in 1961.

International co-operation in this field led to the opening at Geneva, in 1959, of the International Safety and Health Information Centre established by the International Labour Office (ILO) in collaboration with the International Social Security Association (ISSA), with the support of the High Authority of the European Coal and Steel Community (ECSC), the European Economic Community (EEC) and the World Health Organization (WHO). The Centre enjoys the active collaboration of thirty-three national centres - specialized national institutions spread over twenty-eight countries throughout the world.

The International Centre was established to provide a systematic flow of information on the prevention of industrial accidents and occupational diseases; since January 1960 it has circulated bibliographical cards on which the material published in this field in most countries of the world is cited and concisely abstracted. The cards are of the international library size (73 x 125 mm) and, are classified according to a specially designed system established by the International Centre on the basis of the modern method of classification "by faces", as it is called. They cite articles from technical or medical periodicals and books (white cards); laws and regulations (green cards); health and safety standards, recommendations and instructions (pink cards); and films (yellow cards).

Since late 1961 the International Centre has begun performing such complementary services as the circulation to subscribers of documentary notes reviewing specific questions of industrial safety and health, and organizing international round-tables on technical subjects. It is preparing to issue cumulative bibliographies on certain specific subjects and to supply information on the translations of basic documents on industrial safety and health which have been made in various countries.

BIBLIOGRAPHY

- (1) A guide to U.S. indexing and abstracting services in science and technology (June 1960), NFSAIS, Washington.
- (2) A preliminary survey of the situation in the field of biological abstracting (Document ICSUAB - 3630).
- (3) First meeting on biological abstracting in the English language, Monto Carlo, December 1959 (Document ICSUAB - 4108).
- (4) Basis of a code of good practice for scientific publications (Document ICSUAB - 5275).
- (5) An examination of biological abstracting in the English language (Document ICSUAB - 5152).
- (6) Principes d'une coopération internationale pour l'amélioration de l'information scientifique.
- (7) Biological abstracting in the English language (Herner, Washington)
- (8) Index Bibliographicus, Science and Technology (IFD, 1959).
- (9) Evans, A.B.A.; International Co-operative Abstracting on Building: an appraisal. Proceedings ICSI.1. 492-5, 1958.
- (10) World Medical Periodicals, third edition, prepared by C.H.A. Fleurent under the supervision of H.A. Clegg, xli plus 404 pages, World Medical Association, New York, 1961.

VII

MECHANICAL PROCEDURES AS TOOL TO ASSIST ABSTRACTING

Description of some existing realizations and prospects for the future^{1/}

We shall put the accent particularly on the mechanization in the field of indexing and abstracting. However, it is not possible to treat this subject detached from its functional relations to the whole documentation activity. Hence some short discussion of other problems.

We write this report at a time when there are a number of new theories, discoveries and laboratory experiments and a great many papers, books, articles and discussions. It proved impossible to give a complete survey of all these innovations. And it certainly is completely impossible to give an exact and reliable evaluation of the merits of these new ideas and techniques; most of them have not yet been proved in practice. And what standards do we have at our disposal to give a well founded opinion? Our task, then, is only a descriptive one.

FROM MANUAL TO MECHANIZED SYSTEMS

When we examine the activities of the documentalist (c.q. the librarian or the literature searcher) we get the following enumeration:

- to assemble the documents
- to select and read them
- to select what has to be extracted
- to abstract
- to code
- to record for storage
- to store
- to retrieve
- eventually to duplicate the retrieved abstracts for distribution to the requestor.

We will see that the entire preparation of documents up to recording for storage has still to be done by the human agent. We know, however, that many research and experiments may lead to some results for these activities also.

^{1/} Owing to the impossibility of reproducing the illustrations for this chapter which have been provided, together with the text by the "Stichting Studicentrum voor Administrative Automatisering", it has been necessary to cut or to summarize part of the text referring to these illustrations.

THE PREPARATION OF DOCUMENTS

Reading

In spite of the actual efforts to accelerate the human reading of literature by methods eliminating the need of a full reading of a complete text, we can be sure that the acceleration resulting from it will nevertheless always be exceeded by the mechanical reading devices. The development of these devices will be treated further on in this Chapter.⁽⁷⁴⁾

Mechanical abstracting

The automatic encoding and abstracting of literature by a statistical analysis of the text (a method developed by H.P. Luhn) involves in its simplest form a frequency account by computer of all the words in a text, the exclusion of certain common words (such as: the, in, by, an, on, two, new, all, see, may, did, few, how, own, etc.) and the production of a list of non-common words ranged by frequency of occurrence. The hypothesis on which this method is founded is that the most frequently appearing words in a text will be the most significant for retrieval. We suppose, however, that this method in its present form is only more or less a rough approximation of the truth and that it cannot be called an all-round approach, because it is often not the case (and also not necessary) that the most frequently occurring terms (with exclusion of common ones) can and have to be considered as key-words for retrieval.^(75,76,78,98)

Rath, Resnik and Savage have worked on the formation of abstracts by the selection of sentences. In their conclusions they state: "The lack of inter- and intra-subject reliability seems to imply that a single set of representative sentences does not exist for an article. It may be that there are many equally representative sets of sentences which exist for any given article." What happens, in fact, is that in most of the cases the abstract is much better represented by one or several sentences that are different to those found in the article.

Coding

A consequence of the traditional documentation methods is the coding of the results of literature processing (selecting, reading, abstracting). These results may consist either of bibliographical data of a document, whether or not accompanied by an abstract, or of a (reduced) photographic reproduction of the document (c.q. of the result of the literature processing).

Coding can be done by bringing up the appropriate notation, c.q. the catch words (descriptor words), from the used classification or indexing system. We can reduce the catchwords which are written in a natural language, to abbreviation. We can also use codes from a classification, in which codes also express the relations of the subject in question to the group or idea-complex to which the detail subject belongs.

In both these cases coding is the most short form of the contents of the original document. Coding is a means to order the data rapidly and surveyably for retrieving these data rapidly at a later stage with the same means. We can make readable our code by different procedures: by writing or printing letters and/or figures, c.q. catchwords, by placing riders on our cards, by punching our data on punched cards or punched tapes, by fixing our data on magnetic tapes, etc. We can also combine some of these procedures, e.g. by typing out the data on a typewriter which simultaneously produces punched tapes or punched cards.

Till now the coding language (letters, figures, other signals, with the signification conferred to them by the user) and the coding form (punched holes, spots, etc.) depend on the classification or indexing system chosen by the user, and also on the possibilities and limitations of the used equipment. When the equipment gives certain possibilities and certain limitations for the code, it often determines the structure of the classification or indexing system.

The big variety of procedures in this field is an obstacle for the co-operation between several documentation centres, but also for the conversion to other or more extensive equipment. We can solve this problem by setting up cross lists, giving the notations in the one system with the corresponding equivalents of the other system. (The "thesaurus" about which we shall speak later on, is also an application of this principle.) We note here that the widely used Universal Decimal classification has been adapted for punching it on cards.

The problem of different coding "shapes" can be solved by applying converting machine or converters. These machines transfer the data from punched cards to punched tapes, to magnetic tapes, etc., or in reverse, in such a way that the code is adapted to the properties of the information carrier into which the transmission is conducted.

However, these incidental solutions of the problem include work and costs, and moreover they are not always sufficient. What to do when a punched tape, on which the bibliographical data are fixed in two types of letters - capitals and small ones - has to be converted to punched cards for processing by a computer with an equipment, only adapted to one type of letters? It is clear we cannot be satisfied by incidental solutions. We have to search for more fundamental ways.

Accordingly we can observe efforts to construct general classification or indexing systems, acceptable for everyone. (Sometimes an indexing system seems to provide the present needs more than a classification). We observe likewise designs for a machine language acceptable for all the electronic equipment, so that data received from other people can be understood as well by the machine. It is true, converting of the code "shape" can still be necessary; we cannot predict which information carrier will be preferred for documentation: magnetic tapes or magnetic cards, punched cards or punched tapes. Every information carrier has its advantages and its disadvantages.

But then we can ask ourselves whether it is opportune to solve already now the coding problem with all its consequences in the traditional way. If the use of computers would be broadly introduced in the long run, the problem of coding would change of nature. Then we have only to find out the best way to store the data in the computer, so that the computer can retrieve them without loss of too much costly machine-time. The machine will need extensive instructions, different according to its mark and its type. The research therefore has to be limited to the research for an optimal use of the different storage types. We know already that there is a difference between card storage and tape storage: card files are more proper to interpolation of new data than tapes where we are dependent on the blank spaces predetermined. This problem has caused the actual discussion about serial and random access.

When we dispose of a complete knowledge of all the different types of storage we can begin to solve the coding problem in a fundamental and satisfying manner. In the third section of this chapter we shall discuss some modern types of storage.

Analysis and retrieval

It is interesting to show how an interaction exists between the method of analysis, the principles to build a store in the form of a file, and the manner of retrieval in such a file.

1. We can extract a publication in order to get an abstract which can be stored according to a classification scheme. In this case, we have to adapt our analysis to the logical analysis of the classification, i.e. the abstract must contain an analysis in subjects and ideas which corresponds with the terms: formulations of subjects prescribed in the classification. (Here we consider the code for storage to address on the abstract as an extremely brief reproduction of the abstract itself.) If we store this abstract in a classical file, the searcher has to retrieve the abstract along the way, and has to follow the finger-posts expressed in the same classification scheme. Analysis and retrieval are considerably limited here.

A variant on this method are alphabetically arranged prescribed catch words grouped under subject headings. The facet classification can also be considered another (very important) variant of this method.

2. We can also abstract the same publication at liberty, choosing the words and ideas by ourselves for description of its contents. This free principle underlies the unitor-system, using terms which have been divided into semantical units. For each uniterm, we take a new card, and on each card which contains a term under which we want to retrieve the document, we write (or punch) the number of the document. The cards are ranged in an alphabetical order, that is to say, an order which has no logical sequence.

To retrieve a document we have to search in the file for terms which we ourselves have formulated. And in a way at the moment we formulate our question and look for certain termcards, we build a part of classification by combining various terms to a complex, an idea with various aspects. So all rigidity has been eliminated.

Between these two (here extremely simplified) principles:

- (a) predetermined analysis, code, storage and retrieval (pre-co-ordinate indexing)
- (b) free analysis and code, unlogical storage and the putting of the relations between the various subjects at the moment of retrieval (post-co-ordinate indexing)

we find many varieties with accents into the direction of the first or of the second principle. But there are no other ways.

Mechanizing storage and retrieval is possible according to both these principles, but there is still a third way: to store and to retrieve at random, without alphabetical, logical or other types of order. The disadvantage of this "chaotical method" are compensated by the high-speed of retrieval devices. The benefits to be expected from this new possibility have not yet been thoroughly investigated. (44,96,99)

THE PRESENT TOOLS AND EQUIPMENT

In surveying the present situation of development in tools and equipment, it has struck us that the starting point of mechanization is as always in the history of mechanization, the substituting of certain parts of human action by mechanical action.

Further development of mechanization for documentation purposes would require a complete "rethinking" of the whole process of documentation activity, including the essential purpose of documentation, and its beginning. To date we often find an extension of the techniques and equipment already used in other fields of activity like bookkeeping, statistics, etc.

It is possible the "rethinking" will result in the design of new special purpose machines for documentation. It is difficult to foresee this at the moment.

Punched card tools

Practically, the punched cards systems form the beginning of mechanization in the documentation area. At this moment they are a broadly applied tool, and for the more simple collections of documents they offer much useful service, particularly the possibility for rapid selection of indexable features which they have in common.

We mention here the edge punched cards, the "body" - punched cards and the peephole cards which follow the principle of optical coincidence. (73,97)

Punched card machines

The punched card machines, beginning with the well-known Hollerith equipment, have found wide application for many purposes in the office. They are used also for documentation activities, and often for both purposes. By these double application many enterprises try to justify the high cost of machines of this type.

We note here that I.B.M. (International Business Machines Corporation) has developed a number of special units; the IBM 9900 Special Index Analyzed (a modification of the COMAC, which was developed by Documentation, Inc.) under sponsorship of the U.S. Air Force; the IBM 9310 Universal Card Scanner, and the IBM 101, characterized by its Row-by-Row Scanning Attachment (a modification of the IBM 101 Statistical Sorter). However, it is expected that documentation will make little use of these special units.

The principal benefit of punched card equipment is just as with the more simple punched card tools, their possibility for rapid selection of data which have some features in common.

Computers

In the area of documentation the computer (name for an electronic data processing machine) is principally used for the purpose of information storage and retrieval operations. Its difference from the punched card machine is that the punched card machines require programme panels; computers can store their programme in a part of their working store and can modify it under programme control, thus automatically.

Moreover the operation speed of computers is, in general, higher because a greater part of the information processing is done electronically.

We can consider a computer working for storage and retrieval of information as a very big file containing all sorts of data, with an automatically operating sorting device, performing its task in a very rapid way. This is all. Thus with the computer at our disposal we have a high-speed tool for sorting of data. The question is how to make the best of it.

At this moment the computer has only found appliance for retrieval purposes. This includes the fact that we can generate automatically lists of all sorts of data which have been stored in the computer like lists of keywords, bibliographical data, abstracts, etc. Efforts have been made for automatical abstracting by means of counting (and comparison with words in the store) the frequency of words. More about this is described in some following paragraphs.

Because the computer can be equipped with a printing device, it is possible to receive from it a readable result of its actions. We have to mention here that the data can be stored in many different forms. The information carriers can

be punched cards, magnetic disks, magnetic tape, etc. The medium on which the information is written is important for the execution of its sorting function; there is a difference between scanning of tapes and scanning of cards or disks.

Each general purpose computer is usable for the documentation functions mentioned above. There is a particular development in electromechanical devices for searching purposes. We note here the Logic Processor of Aerônautronics (Division of the Ford Motor Company), the Index Searcher of Computer Control Co., Inc., the Tape Searcher of Herner and Co., the Univac Tape Searchwriter of Remington Rand, the Findafact of Rese Engineering Co., the Magnacard of Magnavox Co., and the CRAM of National Cash Register Co. None of these machines is yet in operation. (36,42)

Programming

To receive an answer to the computer posed questions requires a programme, i.e. an instruction complex for the execution of the computer operations.

Programming is not a simple task. It requires special training. The computer can operate only in very simple steps, just like a little child. And therefore it is necessary to analyse the processes required to perform the separate steps in detail.

Moreover we have to make allowance for the computer, which in general operates with information given in binary form. However, we already have computers, which can make their own programme before starting to perform their task. The experiments are done with programmes written in a simple "basic English". Here we recall the techniques ALGOL and COBOL. In the computer working with such programmes a compiler has been built for transformation of this natural language into its own machine language. The programming, however, will be of interest chiefly in documentation when we work with autocabstracting machines and when we allow very complex retrieval tasks to be done by machines. (33)

The input equipment

We have several types of input equipment for electronic data processing systems. Widely used is the Friden Flexowriter, a typewriter producing simultaneously with the alphanumeric text a punched tape containing the same data (both with capitals and small letters). Another machine of this kind is the BEMA.

It is also possible to produce punched cards and magnetic tapes (Magnascriber) in this way. Application of this sort of means controverts the needs of the computer, which can only consume data when presented in particular form: punched tapes or punched cards; some types are adapted for input of magnetic tapes. When non-compatible input media and/or codes are to be used, a conversion operation is necessary. This operation is usually carried out by a separate converter. (2,83)

The output equipment

The output of data from the computer can be realized via printers (we can discern typewriters, lineprinters and xerographical printers) on magnetic tapes or on television screens. Most of these devices have a limited operation speed, although their speed can be very high. The great difference between the speed of electronic data processing systems and the time needed for a human brain to percept written information remains a problem which has not yet been solved. The application of xerography contains great promise for a rapid output of readable data. (22)

Photographical systems

Strictly speaking, photography only can be used to store information in enormous quantities in a very little space or surface (microphotography). The text has not to be transformed into abstracts, and we can read it immediately with the aid of a reader. When we combine the photographic information media with the high speed sorting techniques and with other information media such as punched cards, very interesting possibilities will occur. At this time the Filmorex and the Minicard Systems are in operation. This kind of technique has found an increasing number of applications. (Some descriptions are given hereafter). Many systems and system components are still under development. Other systems have been developed but have not been used for documentation purposes.

We note here a number of devices: the Rapid Selector of the National Bureau of Standards, the Finder-Reader System of the Massachusetts Institute of Technology, the Film Searcher of Magnavox Co., the Film Searcher of Rabinow Engineering Co., Inc., the FLIP of Benson-Lehner Co., the Itek card of Itek Corp., the Manacard with image of Magnavox Co., the Verac 903 of the AVCO Corp., and the device of M. Locquin, Paris.

/...

We note also the Walnut systems of IBM and the Rapid Access Look-Up System of Ferranti-Packard.

APPLICATIONS

Preliminary note

Not all the systems described hereafter are in operation. We discern three categories:

- (1) systems under development: - Minicards - Magnacards - AVCO
- (2) systems in preparation: - Euratom
- (3) systems (for the majority) in operation: - Imperial Chemical Industries
- American Chemical Society - Western Reserve University - ASTIA - Hoffman
- Iarocho - Sandoz - Unité - Filmorex

Each description is followed by a number of literature sources. An important source for some descriptions is the "Proceedings of the ADIA-conference; Frankfurt am Main, June 1959", edited by E.H. Pietsch, published by the Deutsche Gesellschaft für Dokumentation, Frankfurt am Main (Germany).

The application sector is closed by a description of the Russian activities in the field of information retrieval.

We would have liked to give a comparison between the systems; this, however, was impossible because of the fact that all systems have non-comparable and non-measurable parameters.

MINICARDS, product of Eastman Kodak Company

343 State Street, Rochester 4, New York.

The minicard was developed by the Eastman Kodak Company for documentation purposes. One system is at the moment installed in the Pentagon. Its price is said to be \$2,500,000. The system will be available commercially, at an as yet undetermined price.

General - Electronic-microfilm system for unit record storage and single search retrieval of documentary information.

The system revolves about the Minicard record, a piece of film measuring 16 by 32 millimetres. On this is stored the document image together with a machine readable code for subsequent retrieval of the information recorded on the document.

This code is recorded by a pattern of black and white spots on the Minicard which are analogous to the holes in punched cards. The code pattern is, in effect, a machine readable abstract of the document on the Minicard. As the logic of the sorter permits the handling of a set of related records as one unit record, there is no theoretical limit to the number of pages of a given document that can be incorporated in the file. However, economy may prohibit the inclusion of complete books. Three basic formats are now available for recording graphic matter on Minicards:

- (a) 12 images of legal size pages at 60 to 1 reduction;
- (b) 1 image at 38 to 1 reduction for maps and charts up to 18 by 22 inches;
- (c) 1 image at 20 to 1 reduction for aerial photographs.

The unusually high reduction rate of 60 to 1 provides for a character density of 80,000 characters per square inch for a document.

Preparing and recording documents

Before being recorded on film, the documents are analysed to determine subject index codes, the Minicard code field can accept classification codes such as UDC or Dewey Decimal Classification as well as any other numeric or alphanumeric indexing code. If necessary, natural, as well as code, language may be entered in the code field. The characterization of the document may comprise such information as title, author, number and summary of the contents. This information is then sent with the document to the next operational step. Here the descriptive data are recorded on paper tape. Then the document with its tape is sent to the recording operation where the tape by means of a tape reader automatically sets up the appropriate pattern of black and white spots, which is then photographed together with the document(s).

The operator checks to see whether the proper tape is recorded together with its document by comparing their numbers. After exposure, the Minicard film is removed from the camera and then automatically processed, inspected for gross faults and cut to individual master Minicards. If this is considered desirable, the code of the master can be checked against the original tape used in the camera.

Organizing and maintaining the Minicard file

The master Minicards are then duplicated and put into the working file. To minimize the search time this file is sorted into sections, each containing all the Minicards bearing a particular code or combination of codes. According to (ref. 1) the requirements the most searches will be satisfied by a search of such a section.

Searching the Minicard file

As the system is meant to deal with a large number of requests, a suitable form will appreciably speed up the work flow; on these forms will be entered besides information pertaining to the user the request data and their codes. The request codes are then used to prepare paper tapes and subsequently the control panel settings necessary to fulfil the request. After the appropriate Minicards are selected, they are automatically copied, and the original cards are returned to their files. The Minicards duplicates are then sent to the requester. In case the user has specified full size documents, these are prepared automatically on the enlarger-print processor. Since in any case duplicates are provided to the user, he may as well keep them for his own reference file since they can be read directly by using a microfilm reader. Difficult questions containing many cross-references present no special difficulties, because all cross-reference codes are present on all Minicards in the working file.

Literature

Kuipers, J.W., A.W. Tyler and W.L. Myers, A Minicard System for Documentary Information; In: Shera, J.H., A. Kent and J.W. Perry, Information systems in documentation, New York, Interscience, 1957, p. 488-528.

MAGNACARDS, developed by Magnavox Company

2225 Carmelina Avenue, Los Angeles 64, California

Magnacard is essentially a general-purpose ADP-system with the special characteristic of being able to store and process very large quantities of information at high speeds. The advantage of this system for documentary applications lies in the fact that there need not be a pre-input sorting operation, as this can be carried out under machine programme at high speed without human intervention.

/...

System

The basic system consists of the following elements:

- (a) The magnetic card with a storage capacity of 756, 6 bit characters (Alphanumeric).
- (b) The transport and control units which perform all the required sorting, file updating, merging and searching operations.
- (c) The Magnacard file storage units, which provide automatic access to 900,000 magnetic cards.
- (d) The central processor, a general purpose digital computer with 4,096 twelve bit words of core memory and an add-time of 12.8 microseconds.
- (e) The input-output equipment which includes a 1,000 line-per-minute printer, high-speed paper tape reader and punch, and an optional controller for punched cards or magnetic tape units, and the Magnascriber for key-driven recording of information on magnetic cards.

The information in the system is stored by 3" by 1" mylar base magnetic cards. The card consists of a 0.005" base layer and a 0.0005 cover between which the magnetic material is sandwiched. The clock frequency on the card is 30 kC and the information transfer rate between the central processor and the magnetic card is 90,000 characters per second. The second information carrier which can be used is the Magnavue card.

This is a combination of the magnetic card and the microfilm storage medium, which utilizes the magnacard concept for retrieval and look-up purposes and the microfilm technique for the storage of graphical data. The magnavue card may be placed anywhere in a magnacard file.

Documents as large as 12" by 12" can be reduced to fit one Magnavue card.

The Magnacard data handling unit consists of:

- (a) Four vacuum drums
- (b) Five feed-stack stations
- (c) Four transfer valve assemblies
- (d) Two hold stations
- (e) Two read heads and one write head.

AVCO

General

The AVCO programme was to develop and construct apparatus for a mechanized library system. This programme was carried out under contract between the Council on Library Resources, Inc. and the AVCO Corporation. It started in late 1956 and had as main objectives the designing and constructing of: (1) a memory; (2) a camera; (3) an output system.

The memory has been designed to store information in the form of microphotographs and had a storage capacity of approximately 1 million photographs. The camera has been designed to prepare from the original documents microphotographs and to arrange these for storage in the memory. These microphotos have a linear reduction ratio of 70 to 1 or 140 to 1. The output system has been developed to extract memory information at rates compatible with the field selection speed of the memory, and match these output rates to the demand for material. Two types of output systems were designed. In the first, the information of selected photographs are temporarily stored in an electrostatic storage tube and displayed on a cathode ray tube screen; in the second system, a microfilm reproduction of microphotographs selected from the memory system is produced.

EUROPEAN ATOMIC ENERGY COMMUNITY (EURATOM), 51-53 rue Belliard, Brussels

This organization, whose purpose is to promote the peaceful uses of nuclear energy, has its provisional headquarters at 51-53 rue Belliard, Brussels.

The EURATOM Information and Documentation Centre (Centre d'information et de documentation - CID) in Brussels provides an information and documentation service not only to the various departments of EURATOM but also to research centres and industry in the member countries. In addition to CID, there is at the Ispra Research Centre, Varese, Italy, a Study Centre for the Processing of Scientific Information (Centre d'Etudes du Traitement de l'Information Scientifique - CETIS), with an Automatic Documentation Section (Section de documentation automatique - DOCA).

CID is divided into three groups: Libraries, Publications and Documentation.

The Publications Group is responsible for editing, producing and distributing the four periodicals published by EURATOM and the reports issued by the research centres.

Within the Documentation Group, one section carries out bibliographical research by traditional methods, using, in addition to its own card indexes, existing bibliographical organs and the specialized documentation centres of other agencies. A second section is installing a modern system, equipped with an electronic memory, for faster and more extensive documentary research. This section has prepared a dictionary of key words which will be used in abstracting all the documents available. There are now more than 200,000 articles, reports, patent specifications, translations and conference records on file, and a further 40,000 documents are added yearly. The bibliographical references of these documents will be recorded, together with the key words allotted to them, on magnetic tape and will be accessible to bibliographical research through a data processing or other electronic installation which should be in operation by 1963.

Most of the abstracts are taken from abstracting periodicals, such as Nuclear Science Abstracts, Chemical Abstracts, Biological Abstracts, etc. In branches of science not adequately covered by abstracting periodicals, CID will have abstracts prepared under contract by specialized bodies.

The Group DOCA (Automatic Documentation) has developed a system allowing the conversion from manual documentation methods via simple mechanical and punched card methods to electronic data processing methods.

- (a) Tape controlled typewriters are used as connecting link (the following models are being tested at present: FRIDEN Flexowriter SPD, BIMA "P", SUPERTYPER 8500). During the initial typing of the bibliographical units (bibliographical data plus abstract plus descriptors) a paper tape is punched. The following operations can now be carried out:
- exchange of the punched tape among the corresponding institutions where tape controlled typewriters are also used;
 - During the reading process of the tape a master copy is printed for duplication (stencil for rotaprint or offset duplication) of card files, lists of manuscripts;
 - conversion of the punched tape to punched cards of any type and design;
 - the punched tape may be used as input medium for magnetic tape equipment, e.g. Magnétothèque BELL 01 or General Electric Search Comparator;
 - the punched tape may be used directly for input in electronic data processing machines.

- (b) When exchanging punched tape on an international level, there arises the problem of coding if different keyboards (English, French, German) are used. The conversion from punched tape of punched cards is done by the tape-to-card-converter IBM 047. Special wirings have been developed for solving these coding problems. In order to increase the capacity of the tape-to-card-converter IBM 047, an additional plug board has been built, using 640 selectors and 320 distributors. Connected to the corresponding input-output units, the plug board allows the conversion of any code to any other code.
- (c) The punched cards generated by the tape-to-card-converter may be processed on punched card equipment for various purposes, information retrieval included. The method has been tested on the following machines:
IBM 108 Statistical Sorting Machine; IBM 407 Accounting Machine;
IBM 519 Reproducer; IBM 077 Collator; IBM 557 Alphabetical Interpreter.
- (d) The same punched cards can be used as input media for electronic data processing machines. The following programmes have been written for the IBM 1401:
 - 1. A storage programme for the storage of the bibliographical units. The programme is setting up automatically a descriptors list and if there is already an index, it will be completed automatically by adding the corresponding reference numbers.
 - 2. A retrieval programme which is printing out on the accounting machine the bibliographical units and the abstract corresponding to a question consisting of combinations of descriptors. At the same time an alphabetical index of the references found is set up by the machine. These programmes will be simulated on the IBM 7090.
- (e) In order to process abstracts and to detect the relations between the different descriptors, a special type of abstract, the so-called "positions abstract", has been studied.

Programmes are in preparation for automatically matching descriptors with given abstracts (later on original publications) by means of a stored thesaurus. Thesauri are being prepared on the basis of studies on the frequency of descriptors in the nuclear energy, nuclear medicine, radiation biology, application of radioactive isotopes in agriculture and documentation fields.

/...

Literature, besides several reports DOCA and CETIS:

Meyer-Uhlenried, K.H. Automatisierung der Dokumentation und Information in der Aufgabensetzung der CETIS (EURATOM). Nachrichten für Dokumentation, 12 (1961), Nr. 1; pp. 6-10.

Recherche fondamentale en Matière de Documentation automatique dans le Cadre du Centre de Traitement de l'Information scientifique (EURATOM). Revue de la Documentation, Vo. 28, 1961, no. 4. La Documentation en France, 29 (1961) no. 3.

Mechanization in Public Libraries. UNESCO Bulletin for Libraries, Vol. XV, No. 6, November/December 1961.

Bernstein, H.H. Die Verwendung von Flexowritern in Dokumentation und Bibliothek. Nachrichten für Dokumentation, 12 (1961), Nr. 2, pp 92-97.

The Use of Flexowriters in Documentation Centres and Libraries. UNESCO Bulletin for Libraries, Vol. XVI, No. 2, March/April 1962.

Behringer, F. Ausbau der IBM 047 zu einem universellen Lochstreifen-Lochkarten-Übersetzer

elektronische datenverarbeitung, No. 2 (1962)

Bau einer Zusatzschaltplatte zur Erweiterung der Programmkapazität der IBM 047

elektronische datenverarbeitung, No. 2 (1962)

INDEX MEDICUS (National Library of Medicine, Washington)

Another successful project is that carried out by the above library to improve further its publication, with the following aims in view:

- to cover a greater number of journals; to quote them more rapidly; to eliminate tedious composition, filing and proofreading procedures; to improve legibility; to provide a demonstration of methods that might aid scientific indexes in general and assist in similar enterprises in other fields; to distinguish among index imperfections - which might be cured by money, which by technological advances, which by education, arbitration and convention and which ones might be mutually incompatible.

We are not able to describe in full all the mechanized process, based on the utilization of a high-speed mechanized camera (Listomatic camera); punched paper tape typewriters and several other machines adapted and combined from what was already available in other fields of work. The results of the new photo-mechanized process are reflected in the number of articles quoted: 120,000 in 1960; 135,000 in 1961 (from 1864 periodicals) and 180,000 are expected in 1964. The cost of the subscriber is less than \$0.0002 per article indexed and the maximum length of time from the receipt of a journal until the information is in the hands of the subscriber is about 13 weeks; the minimum 9 weeks. By March of the following year the annual Cumulated Index Medicus is in the hands of the subscribers.

The staff employed includes: index staff, 13; editorial staff (coding, proofreading, inspecting), 9; typing and keyprinting staff, 10; machine operating staff, 2; supervisory staff, 6; secretarial staff, 1. Total, 41.

Literature

Full information on this project is given in: "National Library of Medicine Index mechanization project". Bulletin of the Medical Library Association, 49, No. 1, pt 2, 96 p. January 1961.

IMPERIAL CHEMICAL INDUSTRIES; FINE CHEMICALS SERVICE
Mill Bank, Thames House, North Block London

Prime number coding

General

This system was installed to retrieve quickly and completely all chemical compounds having a number of specified characteristics and information pertaining to these chemicals. A special characteristic of this system is the coding of the chemical compounds, which is done by assigning prime numbers to the functional groups. The automated phase of the system consists of the retrieval of the compound numbers of those chemicals having the specified characteristics, the other information is kept in a normal file.

Coding

As mentioned above, the chemicals in the system are characterized by their several functional groups. To each of these groups a prime number is assigned, the whole compound is characterized by the product of the functional group codes.

For instance: Let Cl be characterized by $p_1 = 2$

F be characterized by $p_2 = 3$

CH_4 be characterized by $p_3 = 5$

Then the compound number for Freon (difluoro-dichloro-methane) would be $(2 \times 2) \times (2 \times 3) \times (1 \times 5) = 120$.

Let 120 be the compound number C for Freon. Since an integer can be factorized in one and only one way, the search operation clearly becomes the dividing of all compound numbers C through the search prescription S (the product of all the wanted characteristic codes) and testing for zero remainder. The class of documents answering the search prescription is identical to the class of the compound numbers evenly divisible by the search prescription. Thus in the above example a search for all compounds containing methane and one atome each of chlore and fluor, regardless whether the rest of the molecule contains hydrogen or several phenothiazene rings, would give the search prescription $S = 2 \times 3 \times 5 = 30$, which, we believe, leaves no remainder when 120 is divided by it. Freon would thus be retrieved.

Machines

More difficult search prescriptions containing e.g. an exclusion relation could be carried out by testing the quotient for divisibility by the unwanted characteristics and in case this condition is satisfied by removing this compound number from the result memory locations at the time these searches are not incorporated in the system. The compounds satisfying the search prescription are printed out by a high speed line printer operated through suitable buffering. The logical search mentioned above, would, if carried out during the main computer routine, require a tape stop and is therefore carried out as a separate subroutine.

The computer used for this work is a Ferranti Pegasus. By carefully matching the magnetic tape character transfer rate to the internal processing speed of the computer it is possible to carry out the main routine, the division and the zero remainder test, in the gap between the end of one compound number and the beginning of the next on the magnetic tape.

/...

Literature: Cockayne, A.H. and E. Hyde PRIME NUMBER CODING FOR INFORMATION RETRIEVAL, Computer Journal 3 (1960) nr. 1, p. 21-22

AMERICAN CHEMICAL SOCIETY

Chemical Abstracts Service - 2 Park Avenue, New York 16, N.Y.

General

The staff of this service prepares an annual index and collecting indexes covering authors, patents, subjects and chemical formulas. To perform all the operations necessary to compile Chemical Abstracts is a very massive and time-consuming job, just preparing subject indexes requires half a year for editing and printing. To reduce the time interval between publication of new chemical information, the research department of Chemical Abstracts has created recently an index of current titles (produced by a computer) which has the big advantage of speed, since it appears fortnightly. The new publication, Chemical Titles, draws its information from about 550 of the most important chemical journals out of the 9,000 covered by Chemical Abstracts. Only titles and authors of articles, along with identification of the journal issue in which they appear are covered in Chemical Titles. It is this process of the automatic production of Chemical Titles which will be described.

Machines

To produce Chemical Titles, an IBM electronic data processing system is used. The computer programme was originally written for an IBM 704, which is in use at present, but this programme can be carried out by any other computer of the general purpose family. It is therefore the intention of the American Chemical Society to handle this programme in future on an IBM 1401 solid state computer. Since the information is first punched on cards, the institute also make use of a card-to-tape converter for the input.

The indexing method

From the title of each article the machine selects and then prints out in alphabetic order the significant words (keywords). Partial titles are alphabetically indexed by keyword with the number of times a keyword appears determined by the number of keywords it contains. The titles are grouped logically by their most descriptive terms (keyword in context index).

/...

From the list of keywords the reader can select the subjects of pertinent interest to him and after referring to the author list, which is made before the titles are analysed, he can find name and date of issue of the journal so that he can take the necessary steps to obtain the article. The papers title is first translated into English, then the 704 selects the significant words in it.

System Operation

As soon as the journals are received, card punch operators transcribe author, title and publication source of each article in machine-able form. When an article is written in a foreign language, the title is first translated into English. These cards are processed by the card-to-tape converter, and the information now on tape is fed into the 704. The cards representing each title do not have to be pre-sorted before feeding into the machine by means of magnetic tape. The machine creates a code which serves as future indication for the article (the code is formed from the full title). The words in the title are now matched against a "Dictionary of Non-significant terms" which includes all words which contribute little or nothing to the recognition of subject matter too. (Examples are: "use" "theory" "chemistry", etc.)

Looking up these words is so done that they can be disregarded in the next programmed operation, which is to put the title in such a position that each of the remaining significant words assumes a standard location within a line. The 704 sorts them into alphabetic sequence, so that in the final format they form a central vertical column. On the same line each keyword amplified by the surrounding portion of the line is accompanied by the identification code derived earlier. The bibliographical section of Chemical Titles is arranged by machine which sorts into alphabetical sequence by author and associated identification code; then these pages are printed by the IBM 407. They are now ready for printing by photo-offset directly from the output of the printer.

Literature: American Chemical Society News Service - THE NEED FOR CHEMICAL TITLES "ELECTRONIC EDITOR" SPEEDS NEW TECHNICAL DATA TO SCIENTISTS, New York, 1960. Two short publications. Description of the needs supplied by Chemical Titles and explanation of an electronic system enabling its more rapid composition.
COMPUTER, THE, AS AN AID TO INDEXING - In: Computer News; vol. 5 (1961) Nr. 6 (June), p. 1.

CENTRE FOR DOCUMENTATION AND COMMUNICATION RESEARCH, SCHOOL OF LIBRARY SCIENCE,
WESTERN RESERVE UNIVERSITY, Cleveland 6, Ohio (joint programme with the American
Society for Metals)

General

During the year 1955-1959, the Centre prepared conventional abstracts of approximately 20,000 metallurgical papers; analysed and developed codes for the terminology found in metallurgical literature; and developed procedures for preparing "telegraphic style" abstracts, and the automatic encoding of such abstracts, and for the mechanized searching of the stored information. In 1960, a test programme was mounted to evaluate the procedures that had been developed for the automatic processing and searching of literature of interest to metallurgists. An experimental information centre for metallurgists, covering not only the metallurgical literature proper but also material of interest to metallurgists in such fields as physics, chemistry, and engineering was established. The Centre produced telegraphic abstracts and machine searchable tapes for 12,000 metallurgical documents (per year) plus some 21,000 (per year) in peripheral fields containing information of interest to metallurgists. The Centre also provides service of two kinds - current awareness and retrospective searching - to subscribers.

The Documentation Committee of the American Society for Metals has assisted the project staff members at Western Reserve in developing and modifying details of the experimental centre. In addition, in the spring of 1960, the National Academy of Sciences-National Research Council appointed an ad hoc committee of information specialists and metallurgists to participate actively in further planning of the WRU test programme, and to assume responsibility for evaluating the results, including the planning of studies needed for their proper evaluation. A variety of studies are being carried out (comparative tests, parallel searches, a user survey, and so on), which will provide an evaluation of the Western Reserve system.

Input Operation

The input operation comprises all steps in processing the document to be incorporated in the system from the reception of the document to the final recording

of the significant description relating to it on magnetic tape. The literature processed by this system is limited to that concerning metallurgy and allied areas of science and technology. Documents are analysed according to the "telegraphic abstract" method developed at the Centre. A literacy-type abstract is also prepared. The abstracts are then edited to maintain uniformity and consistency.

Next the individual terms from the telegraphic abstract are encoded, using a semantic code dictionary compiled so as to link specific terms with their related generic terms, e.g. a search may be conducted for specific references to "tempering", or for the more generic "heat treatment" which would include "tempering".

Question Analysis and Searching Procedure

Questions are analysed on receipt by an expert (in consultation with the questioner if clarification is needed) and coded. A logical search structure is then prepared in terms of semantic codes, logical requirements and punctuation levels. The question is then keypunched and stored in the GE-225 computer where it is matched against the encoded tape file. Accession numbers of those documents satisfying the search criteria are then printed out. The output is then compared with the original question to evaluate relevance of the responses.

Some 100 of the current awareness type have been searched on a continuing basis. More than 250 retrospective searches have been made since the system began operation.

- Literature - Kent, A. - EXPLOITATION OF RECORDED INFORMATION; I. Development of an operational machine searching service for the literature of metallurgy and allied subjects. In: American Documentation; Vol. XI (1960) No. 2 (April), p. 173-188.
An evaluation of the documentation service instituted by the A.S.M.
- Kent, A., R.E. Booth and J.W. Perry - MACHINE SEARCHING OF METALLURGICAL LITERATURE - Metal progress (1957), No. 2, p. 71-75.
 - Melton, John, "Test Program for Evaluating Procedures for the Exploitation of Literature of Interest to Metallurgists V, The Semantic Code Today", American Documentation, accepted for publication.
 - Overmyer, LaVahn, "Test Program for Exploiting the Literature of Interest to Metallurgists IV, A Cost Analysis of Abstract Preparation and Processing for an Operational Service", submitted for publication in American Documentation.

ASTIA (Armed Services Technical Information Agency)
Arlington Hall Station, Arlington 12, Virginia

General

The project was started in 1958 when it became apparent that it would be impossible in the near future to process incoming technical reports without resorting to mechanical means. The objectives under automation:

1. Automatic request validation to determine the need-to-know and security clearance of the non-military inquirer;
2. Automatic inventory control for improved inventory management;
3. Complete and accurate accountability for both classified and unclassified documents;
4. Mechanized index preparation for the Technical Abstract Bulletin;
5. Automatic duplication check for the incoming documents;
6. Automatic identification of the incoming documents requested without reference to specific ASTIA catalog numbers;
7. Mechanized reference and bibliography service (by list of catalog numbers).

The incoming reports are analysed by specialists who assign to each report a number of retrieval terms (this for producing a descriptive catalog and the twice monthly compilation of TAB). These retrieval terms are covered by a Thesaurus of descriptors and a schedule of so-called Open-Ended terms, which are terms which will not appear in the Thesaurus because their depth is not sufficient to call them descriptors. Open-ended terms, for example, may contain project name, designer or author name or both, kind of equipment used, etc. To perform the automation project, ASTIA is using a Remington Rand USS-90 (Univac Solid State 90 column Computer), with magnetic tape supplemented by Randex.

Information carrier

The institute is utilizing both punched cards and magnetic tape. Tape is used for: A FOIR master file (field of interest register) which contains the need-to-know of a contractor for release of classified documents.

- b. AD (ASTIA Document) master file - c. an Updated AD master file -
d. an Index master file.

Cards carry information about: Requests, FOIR, Identified requests and AD numbered unidentified requests.

/...

Incoming report processing

The descriptive information for reports received and for identification of requested reports is converted directly to magnetic tape by means of a Unityper and, after that, compared against the Master Index File tape. For uniformity of listing and to reduce tape time, each corporate author is assigned a numerical code. Then a duplication check is carried out to see if a report had previously been catalogued; this is done if the computer does not assign a catalog number to the document.

Request processing

The punched card request form is a modification of the ninety-column Remington Rand punched card. User Agency codes for all military users and holders of single contracts are pre-punched into the request-card forms, prior to distribution to them. It will be clear that a minimum of needed information must be inserted by the requester. For a request for a specific report identified by ASTIA document number, the user only has to check the type of copy, full size, micro-card etc., and write the ASTIA Document number. All request cards, received at ASTIA, pass through the various document processing steps. If a report requested cannot be identified or its release is not authorized by the users FOIR, the high speed printer produces a letter indicating why the request cannot be fulfilled, which is addressed to the requester.

The thesaurus

Previously the ASTIA used Subject Headings and later these were combined with "Uniterms" but neither the Subject Headings nor the Uniterms met the requirements for a smooth operation of the automated retrieval system. So ASTIA made the decision to make a Thesaurus-like arrangement of scientific and technical terms as a common guide for storage and retrieval processes. The basis for the establishment of this Thesaurus was formed by ASTIA's subject headings. First, the traditional subject headings were undivided in sub-divisions deleting those sub-divisions which were no longer useful, as an example, the sub-division "application" which appeared in the main headings hundreds of times.

The remaining sub-divisions were now considered as principal headings in their own right or included under other headings. These new headings were called "Descriptors", often they are not only single words but combinations of

two or more words (ex. "Radio frequency power"). The following small section of descriptors, synonyms and related - or inclusive terms illustrates the set-up of the Thesaurus:

ACARICIDES

(PEST CONTROL AND INHIBITING AGENTS)

INCL: MITICIDES

ALSO SEE: ANTIPEST IMPREGNANTS

PARATHION

PEST CONTROL

ACCELERATION

(MECHANICS)

(ALSO SEE: DECELERATION

ACCELERATION INTEGRATORS; USE

ACCELEROMETERS

The terms on the far left margin are the main entries. The parenthetic terms denotes the "schedule" of descriptors to which the main entry belongs. "Incl." means includes. In our example, "Acaricides" is a descriptor, "Miticides" is not. The latter term will appear however on the left margin of the Thesaurus in its alphabetic order but there the words "use Acaricides" appear. The interpretation of the term "use" (ex. use accelerometers) can easily be understood.

The "see also's", considered as descriptors, will help to define the area of the principal heading. In order to obtain guide lines and checkpoints for easier handling, the full scope of the subject coverage is divided into about 290 generic groups. Descriptors were placed in those categories in which they were considered as most pertinent, in such a manner that no descriptor was repeated. In this way the distinctive "schedules" were formed. For easy reference and for location purposes as well, these schedules are numbered. The above described Thesaurus which was prepared manually combined with the previously mentioned list of "open-ended" terms, is used for assigning retrieval terms to each document of the AD collection.

Literature

Barden W.A., W. Hammond and J.H. Heald - AUTOMATION OF ASTIA (Armed Services Technical Information Agency); a preliminary report. Washington, U.S. Dept. of Commerce; Office of Technical Services, 1959. VIII, 50 pp. Description of the application of a Univac solid state 90 at ASTIA (project MARS).

Dunlop, W.W. - ASTIA - EIN AUTOMATIONSFALL, Nachrichten für Dokumentation 12 (1961) nr.1.

Hoffman-Laroche-Sandoz

The firms Hoffman-Laroche and Sandoz AG, two of the largest pharmaceutical enterprises in Switzerland, together established a documentation centre in their particular field. This centre has taken the form of an intense co-operation between the documentation branches of the two firms, the "Literatur-abteilung" of Hoffman, and the "Dokumentations - und literaturstelle pharma" of Sandoz. Though both firms already own middle-size computers the initial research in documentation was carried out on a number of small size machines, in the class of the Bendix-G-15.

General

The documentation at the combined information centre takes two forms, one of which will be the documentation centre for answering complicated questions, the other the completely automatic preparation of specialist bibliographies. The former will be put into operation in October 1961 on a Remington Rand UCT univac computer, the latter is now being converted on one hand from manual to mechanized operation, on the other hand from the German into the English language, to increase the exchange possibilities and the understanding of the characterization of the documents now given only in German keywords.

At the moment there are about 500,000 documents in the system with an estimated increase of some 25,000 documents a year.

System

As a document is received by the centre it is first read by an expert in the particular field of science who subsequently assigns a number of retrieval terms to the document. The average number of key-words per document is about 6.6. The time delay between the arrival of a document and its incorporation in the system is estimated at about fourteen days. Then these terms are recorded on an abstract card in clear text on Flexowriter, thus producing besides the human readable copy two punched paper tapes, one in the Flexowriter code, the other for input in a computer on tape-to-card converter. The question cards

are prepared from a flexowriter tape and card input will be used for the magnetic tape system.

From here the complete process is automatic, and carried out without any human intervention. The cards prepared from the second above-mentioned tape are then sorted into categories like Pflanzenextrakte and a list of all documents containing this index term is printed. Then the cards which are prepared by the described series of operations are distributed among the scientific staff, which, using this essentially simple means, can already solve an important part of their information problems without going to the documentation service. The effect is that the computer will be free to solve the more complicated and/or more important problems. The computer printout that constitutes the answer is directly sent to the requester. Moreover, the scientist may know more exactly than he can express the information he wants to find and may even find new leads for his research in the literature lists which he would otherwise never have thought of.

The UNIVAC pilot programme

At the moment a pilot operation of the search programme, which will become operational with the installation of a UNIVAC UCT-90 with magnetic tape equipment, is carried out on the Sandoz UNIVAC. Basically the search programme consists of the matching of the chosen retrieval terms against the document file. This is done at the moment on the punched card machine by storing the search programme and the question on the magnetic drum and matching the question words in the same sequence as stored on the drum, against the cards that are run through the card reader; then those cards which satisfy the search prescription are stored on the drum and printed out on a high speed line printer. As the complete process is carried out in clear text the computer print is sent immediately to the user.

One of the advantages of the process as described above is the extreme flexibility achieved; smaller firms could use the same system, for instance using only the Flexowriter and the punched card equipment necessary for obtaining the printed lists. The paper tape or the cards thus obtained could then be stored and used when the system became so large that automation would be economically justified. As the searching of the complete file as put on magnetic

tape is extremely time consuming provision has been made to carry out simultaneous searches of up to five questions on a total of twenty-five index-words in any logical configuration.

The l'Unité documentation system

General

A system for the retrieval of patents, developed by the Patent Department of the N.V. Shell Internationale Research Mij. (Royal Dutch-Shell Group), The Hague, Holland. The system has been designed to carry out three specific types of patent search:

- (a) Novelty search;
- (b) Investigation of whether an invention is eligible to be patented;
- (c) Infringement search.

These three types are further defined by the following:

- ad.a. A novelty search is carried out to determine whether a certain process or object has already been described in a document;
- ad.b. A validity search serves to discover whether the inventive idea of the case has already been disclosed, possibly by combining the information available in different documents;
- ad.c. An infringement search serves to establish whether the process or object under consideration is, wholly or in part, essentially similar to inventive matter claimed in an older patent, so that in making use of the process or object in question the older patent has to be utilized.

Upon entering the system, a patent is characterized by a number of keywords. These words are then alpha-numerically punched into I.C.T. forty-column cards. When all the significant aspects of the patent have thus been recorded, the keyword cards are recorded together by superimposed punching on one card, the l'Unité card. Questions are handled the same way; first the significant aspects are recorded in the form of keywords, then a superimposed question card is prepared, this card is then inserted in a specially developed self-setting reading head of the card sorter; simultaneous searches can be conducted for up to seven words in any desired combination.

Machines

The machines used are ICT (Powers-Samas) punched card machines. Originally a normal six-column selector was used but a special twenty-five-column selector has since become available.

In use are: key punch; interpreter; reproducer; sorter selector; tabulator with twenty-five alpha-numerical and thirteen numerical printing sectors; interpolator. In each column of the forty-column cards used, there are twelve positions, giving a total of 480 positions. The information is recorded on the cards by punching holes. In each column, one piece of information is recorded, a number by one hole in a definite place and a letter by two, namely, one for a number 1-9 and one for one out of three remaining possibilities A, B or O to distinguish between the first, and the second nine and the last eight letters of the alphabet.

Preparation of the 1'Unité cards

First the index-words are recorded one word on a card. In the original system the sequence of the words was recorded and used as checking means in addition to being used for the syntax. In addition to the information recorded and actually used for the retrieval operation there are some control punches. The cards thus prepared are then run through a reproducer where all the punchings on the individual cards are superimposed on one card, the 1'Unité card.

Retrieval operation

The retrieval operation consists of two phases:

- (a) The "translating" of the significant words of a question into words actually used within the system;
- (b) The preparation of a 1'Unité card for the combination of index-words now characterizing the question.

The question card is now run through a special selector head on the Power-Samas selector; this enables the operator to set the search prescription by a simple turn of a crank, thus eliminating the time consuming manual setting up. Then the document cards are run through the selector and those which are pertinent to the question are collected. It is, however, not necessary to confine the

search to strictly pertinent documents, as it is also possible to run searches for near-misses and classes of documents.

Batch processing

As it would be extremely time consuming to run all cards through the selector for each question, a number of refinements have been introduced in the question answering procedure:

- (a) A file of all questions previously answered is kept so that it is not necessary to answer a question more than once;
- (b) The incoming documents are grouped in batches and word occurrence lists are kept for each batch, on peek-a-boo cards.

The obvious advantage of (b) is that only those batches which contain certain words have to be run through the selector. As a batch contains 1,500 documents this makes a significant saving of time over the searching of the complete patent documentation of 30,000 documents. Not more than one or two batches will have to be searched for a specific question, for which more than two, say four or five question words are used.

Literature

Nuyt, Th. W. te - THE "L'UNITE" DOCUMENTATION SYSTEM. In: Revue de la Documentation; vol. 25 (1958) nr. 3 (Août), p. 65-73.

System FILMOREX

74, rue des Saints Péres, Paris 6e.

Reading and abstracting

The periodicals are read by specialists. If the articles are not provided with an abstract and other data meeting the requirement of the international standards, the specialist provides these. This analysis is based on a special questionnaire, and consists of:

- translating the title of the document and completing this title with a descriptive summary;
- sorting out some important data on the document, such as: the authors, the nature of the document (book, article, newspaper cutting, etc.), the year of publication, the country;

/...

- the general headings, not necessarily expressed in the text, to be chosen systematically from a specially prepared basic vocabulary, including some hundreds of fundamental, well defined and standardized notations;
- the various notions and ideas expressed in the text of the document.

Dictionary of notions

If a notion does not figure in the basic vocabulary and appears for the first time in a document, it is sent to a group of experts which carry out a thorough study of this new notion. They will extract from it the definition of the notion, the synonyms and the elements composing it.

Next, this notion is recorded on one or several microfiches with its coded composing elements. These microfiches are filed and form the "notion memory". This memory contains all the notions which have been found in the processed documents and make it possible: to find the definition of any of these notions with its synonyms and to prepare lists of notions according to components, e.g. the list of all the chemical compounds having a phenothiazene ring and neuroplegical properties, the diseases with such and such symptoms, the equipment meeting with such and such requirements, etc., in short to produce the intersection of one or more classes. This memory constitutes a dictionary with numerous means of access. Its most important purpose is to make it possible to set up a precise search/prescription automatically when a problem is posed.

Recording

The several data obtained by the analysis are typewritten on reprinted cards. Immediately after the analysis of the document the abstract found in the periodical or the abstract made by the abstractor is recorded with the Filmorex camera in full text. First the operator places in the holder of the camera the text, then, the vocabulary cards corresponding to the data picked from the document. Then the data are photographed on 35 mm film. Once the whole film of the camera is exposed, it is developed and cut by means of a Filmorex cutter in 60 mm pièces which form the microfiches. One corner is cut off as in punched cards.

The microfiche

The result is a microfiche, divided into two parts: a part on which the text is photographed; and another on which the important data of the document are represented in codified form in black and white squares. The microfiches are easily duplicated and cost 0.07 to 0.08 NF.

Filing

The microfiches are reproduced in several copies to be filed under their respective headings. The average is about 5-6 copies per document. In a collection of 2 million documents there are about 2,500 microfiches per heading. These headings hold all microfiches of the documentation containing the "notion" question. This arrangement has this advantage that when searching for all the documents relating to a subject, the searcher has only to consult the heading with this subject, which contains all the documents dealing with that subject in every relation. The space required for such an arrangement is fairly small, the dimensions of the microfiche being only 35 x 60 mm.

Prefiling is not necessary but it is very useful; if all fiches were arranged in one file, one would have to scan millions of documents for just one question, but through prefiling it is possible to scan only that part corresponding to the notions expressed (directly or indirectly) in the question. With this method of prefiling 2 million original microfiches result in 10 million microfiches divided into 4,000 headings. Prefiling may be carried out automatically by means of the Filmorex selector.

Answering questions

To answer questions the documentary research is carried out according to the following process: if one wishes to find all the documents in 1959 concerning the influence of antibiotics on enteritis, we introduce into the selector the microfiches with the heading antibiotics. We output the selector into operation to seek the microfiches corresponding to the terms "enteritis" and "1959". The fiches pass the scanner at a rate of 600/minute and are read by an electronic device which matches all the codefields of the fiches to the search prescription. All matches are selected. One can go further and search for documents which

have a "parallel", e.g. the documents treating the same subject under different terms. For this purpose one looks up the notions-memory which suggests also searching the files for documents containing correlation of antibiotics, such as penicillin, streptomycin, karamycin, etc., and also notions relating to enteritis. The list of parallels is then sent to the inquirer, who then states the degree of precision he wants.

It is also possible to project the microfiches corresponding to the suggested notions of the notions-memory on the screen of a microfilm reader, to enable the inquirer to indicate the documents he wishes to receive. It is also possible to enlarge and print selected fiches by means of the Filmorex photolisting, on either photographic paper or film (3,000 microfiches an hour). That provides the inquirer with an abstracted of all the documents related to his problem. He may then investigate these documents at leisure and complete the mechanical selection by eliminating whatever he does not require.

Operation of the selector

The micro-fiches pass one by one through an electronic scanningstation on which the combination of black and white spots are scanned photo-electrically. When the card code and the scanning grid match, a switching cycle is carried out, so that the microfiche goes into the answer magazine. Non-pertinent fiches go into another magazine.

The scanner operates according to the "black out" principle (a momentary reduction in the sensitivity of an electron tube due to the previous application of high amplitude pulse). The scanning process is controlled by a scanninggrid (punched card), the composition of which represents the negative components of the black and white squares of the search prescription codes. It is clear that when the scanningstation is lighted normally, it will be blacked out when the present scanninggrid concurs with the required codes. At this moment an electric pulse passes through the amplifier and closes an electro-mechanical switch which performs the actual selecting operation. The card is then deviated from the main stream into the answer magazine.

Literature

Société Filmorex (Paris PHOTOLISTING FILMOREX - a leaflet, 2 pp.

Samain, J. - LA DIFFUSION ET LA RECHERCHE DES INFORMATIONS POUR UNE ORGANISATION RATIONNELLE DE LA DOCUMENTATION. Paper conference International Council of Scientific Unions, 11 July 1960, Paris, 12 pp.

Samain, J. FILMOREX; EINE NEUE TECHNIK ELEKTRONISCHER RECHERCHE FÜR INFORMATION UND DOKUMENTATION. Nachrichten für Dokumentation 2 (1958) nr. 1, p. 35-40.

The "GMELIN INSTITUT FÜR ANORGANISCHE CHEMIE UND RANDWISSENSCHAFTEN"
Varrentrappstrasse 40-42, Frankfurt am Main

This Institute was originally founded to carry on the publication of the Gmelin Handbuch, a handbook of inorganic chemistry, published for the first time in 1817/1819 by the German chemist Leopold Gmelin. In addition, since 1958 the institute has been responsible to the German Atomic Energy Commission for the preparation of regularly published abstract periodicals in the field of nuclear science. These periodicals are:

- Reihe (series) A: A reports bibliography appearing twice a month and covering the reports received by the Institute, characterized by an average of five or six descriptors per document;
- Reihe B: A bibliography covering all publications which are not reports, e.g. articles in journals, etc., appearing quarterly;
- Reihe C: A bibliography on selected subjects of current interest in the field of nuclear sciences, e.g. a series covering all publications on reactor accidents, or a series on plasma physics.

These three publications are prepared by mechanical means and will be discussed below.

Reihe A

In this publication, all currently received reports are published in an alphanumerically ordered list and characterized by descriptors. After receipt of a report, this is read and the descriptors pertinent to it are chosen from a

/...

list of descriptors; this list is expanded if necessary. The list of descriptors is then sent together with the bibliographical data of the document, to the punching department where the information is punched alphanumerically into an average of 6-7 IBM cards. After verification, these cards are sorted into alphabetical and, if necessary, into numerical order. Then the sorted deck is run through a card reading printer which prints out the list of documents. This list is then used to prepare a xerographical offset-master which is used for the actual printing of the bibliography; the same publication also contains registers and a list of the treated reports listed by countries. The number of reports prepared for the Reihe A booklets is about 8,500 per year. To insure the use of uniform descriptors for periodical reports in the Reihe A, a list of descriptors used in the processing of the previous reports is used.

Reihe B

In this series all publications other than reports are brought together. Alphabetically under the name of the author, the descriptor terms assigned to the documents are not taken from their contents but from the title. The documents treated are first presented in alphabetical order and then grouped under their various subject headings. This is done by preparing document cards in a manner similar to that used with the Reihe A and first sorting them into alphabetical order, printing them, then resorting the deck into an alphabetically array of subject headings and printed out the descriptors together with the appropriate document numbers under the selected subject headings. The literature in this section usually consists of conference papers, patents, selected articles and factory or industrial papers and such. The characterization of the information content of the documents in the Reihe B publication is taken from the title rather than from the text due to lack of time and personnel; there is the intention, however, in the future, to make the procedure similar to that presently followed preparing Reihe A.

Reihe C

The "capita selecta" treated in these series are chosen by the German atomic energy authority. The publication comprises an extensive bibliography of the chosen subjects. The Reihe C publications are the result of extensive bibliographical research in the chosen subjects.

/...

Machines

The Gmelin Institute uses IBM punched card equipment and Friden Flexowriters. The titles together with the descriptive information are typed out on the flexowriter on normal library cards, the tape generated by the typewriter is then used to punch cards. This is done with the IBM 026-866 tape-to-card converter, the cards are then sorted into the desired sequence. After the sorting operation, the cards are run through a card duplicating punch and a card punching typewriter connected so as to form a card controlled typewriter.

The lists thus generated are photographically reduced, and an offset-master is prepared xerographically from the negative. From this the bibliography is printed. An interesting feature of the print is that both upper and lower case letters are typed from the cards, this being effected by special control punchings.

Literature

Pietsch, E.H.E. - AUS DER ARBEIT AM GMELIN, HANDBUCH DER ANORGANISCHEN CHEMIE ZUM HUNDERTSTEN TODESTAGE VON LEOPOLD GMELIN CHIMIA 7 (1953) pp. 49-57

Pietsch, E. - DAS GMELIN-INSTITUT FUR ANORGANISCHE CHEMIE UND GRENZGEBIETE IN DER MAX-PLANCK-GESELLSCHAFT, FRANKFURT AM MAIN
In: AICHEMA - JAHRBUCH 1959:1961

Pietsch, E. - und G. Mulert - ATOMKERNENERGIE - DOCUMENTATION IN DER BUNDESREPUBLIK DEUTSCHLAND. DIE ATOM-WIRTSCHAFT 6 (1961) nr. 2 pp. 95-100

ALL-UNION INSTITUTE FOR SCIENTIFIC AND TECHNICAL INFORMATION
OF THE USSR ACADEMY OF SCIENCES (VINITI) Moscow

In Russia there has been established a co-ordinated programme involving documentalists, linguists, logicians, mathematicians, and engineers, to work toward a mechanized centre for the exploitation of the world's scientific and technical literature. This programme is well-financed and well-staffed, and appears to have the active support of key government agencies.

The Soviet activities may be divided in two main headings:

- A. The collection of scientific and technical publication, their analysis, and abstracting, and the dissemination of the abstracts.
- B. Information machines. Research and development in information research, correlation and translation.

There are a number of groups in the USSR developing systems for machine literature searching. One group is developing a notation system for the representation of molecular structural formulas. This chemistry group appears to be considering both short and long-range solutions to the problems of encoding chemical knowledge - with the goals presently attainable to be based on the encoding for machine searching of specially designed abstracts or indexes. In addition to this chemistry group, there is an experiment at the All-Union Institute of Scientific and Technical Information, for the development of an information language in the field of mechanics. Additional investigations in machine searching of files in narrow subject fields are being pursued, but apparently not to the same extent as now in progress in the United States.

III. TRENDS AND CONCLUSIONS

The term "documentation"^{1/}

As is evident from the system descriptions, the main emphasis in the automation of documentation activities lies on the automation of information retrieval. Strictly speaking the term retrieval covers only the search process in a file. The term, however, is used frequently for the automation of all the documentation activities from the compilation of subject indexes to the preparation of abstracts. We therefore propose the term "documentation" to cover the entire field of the applications of automatic information processing machines to documentation, including the activity previously covered by the term "information retrieval". We will use the term "documentation" in the following passages of this report.

Standards

There is a pressing need for standards, not only with regard to the uniform processing of documents (uniform description of bibliographical data, uniform codes, uniform manners to abstract, etc.), which would benefit greatly the

^{1/} This term has been suggested by the FID and the Automatic Information Processing Research Centre in Amsterdam which have provided the material for this chapter. Its utilization in the text does not mean that it is accepted or supported by UNESCO or by the editors of this report.

exchange of library documents or their copies, but we need also standards to measure the performance of a documentation centre working with either manual or mechanical methods.

The need for such standards is even more apparent when one considers that at this time there are some fifty or sixty more or less automated documentation systems in operation or under development and there is no way to decide which of these works are efficient and if so how efficient. If we do not know the efficiency it is impossible to make out whether the investments are justified. And it becomes very difficult to see which future investments will be allowed for a further documentation.

One of the things which will be necessary to establish the above-mentioned standards will be some kind of a unit in which the value of an information will be measurable or unit of information, as for instance, the value to the receiver or the cost to the system to provide one bit of information or some other unit, as the bit might not be sufficient to express the value of a piece of information. It might be possible to arrive at a useful mathematical model by representing a library or documentation centre as a communication channel or delay line. Under this hypothesis, one could represent, for instance, the documents which are incorporated into the system as input signal; the documents obtained as output and the non-pertinent documents retrieved could either be described as noise or as information lost in the transmission channel.

THE TECHNICAL DEVELOPMENT

Two schools of thought

The evaluation of trends in the field of documentation will be given in two closely interwoven parts, one in which the future machinery will be described and another in which the way of thinking systems analysis or philosophy of documentation will be treated. This last part in particular will use the present to illustrate the difference between present and future. The hardware trends at the moment appear unsettled. There are, generally two schools of thought, one advocating the development and building of special purpose equipment, the other thinking of really general purpose computers, that is, of machines that can be used to perform any task that can be automated at all.

At the moment, the first line of thought looks profitable, the type of machine usually being recommended, being a sort of computer with greatly reduced arithmetic capability and a very large memory capacity, however without sufficient knowledge of the essential and detailed operations performed by the human intellect during the process of documentation. On the other hand it may be indicative that all parts of the documentation process that are at the moment carried out electronically are programmed on general purpose computers. When the application field of general purpose computers will be enlarged, it will become less costly to use a part of its computertime for documentation purposes. Then the costs for the other applications can be justified completely, and the documentation result becomes a by-product.

The network of knowledge

One of the few really new concepts in the field of documentation has been proposed by the Dutch scientist Sangster. His concept is based on diagramming the relations between correlating terms. These terms are represented by points in a field which are defined by their cartesian co-ordinates, while the relations between the terms appear as line connexions between these points. Also the intersecting points indicate that there exists a relation in that area. The idea behind this is that if properly indexed and cross-indexed the complete scientific knowledge of mankind constitutes a network with knots and lines connecting these. The information containing the relations could be stored on video-tape and afterwards made visible on a television-like screen and thus permit rapid browsing through the accumulated information until the desired terms have been found.

The user should specify his question under this system and from the first display learn whether the necessity exists of making the question more specific, more general or changing it all together. Also the information displayed should be shown together with its related items; the user could pick up new leads and pursue them looking at this or that part of the information network. If and when such a system could be realized it would most certainly constitute a powerful means of finding the desired information in the ever growing collection of documents. A limitation appears to be that a subject which is at present not related to another might be of extreme interest in a certain field in a very short time. (80,81)

Videotape

One of the recording techniques presently used for television could be, if the equipment costs could be reduced, used as means of storing and reproducing graphic data. The technique discussed is that which has been marketed by some electronics manufacturers under the name of videotape, the registration of pictorial information on magnetic tape. We will discuss below a documentation system based on the use of this medium for storing information.

Machines

The main store of the system should consist of videotape on which the documents are recorded completely with a document number to each document. A secondary store which could be an associative type memory should be used to retrieve the document number under any of several associative criteria for instance keywords. Those document numbers satisfying the associative search prescription should then be transferred to another part of the store and serve to find the location of the desired documents on the videotape. The information recorded there should then be displayed on a television screen and if the requester thinks the information displayed pertinent to his question he may then activate some sort of reproducing machinery and thus obtain a hard copy of the desired text. A system as outlined above does even at the moment not present an engineering impossibility but it is certain that the costs would be astronomical, and most probably prohibitive.

One of the remedies against the high cost could be some form of centralization which could presumably be realized for a small field of science but even then we doubt whether the outlays would be justified at the moment. The use of videotape in documentation has been discussed by ASTIA and RCA in the course of project MARS of this agency.

Another development, under study at the moment in the IBM research laboratory, which looks promising is the associative memory. This is a type of memory which enables us to retrieve stored information of which we know something, but not its address. This memory being technically feasible for extremely high quantities of data is discussed below.

/...

The associative memory

An associative memory is a memory in which a data record is retrieved by specifying the information content of an arbitrary portion of its structure. This functioning is in contrast to that of conventional memories in which the data word is located in a specific memory register predetermined by the programme and is retrieved by specifying the address of that register. However, it is also possible to carry out this type of retrieval with present memories, but this would require a special type of programme (mostly a very complicated one) and it is also somewhat inefficient. The presence and the location of a word in an associative memory can be determined by specifying any known portion of this word; often a memory permitting retrieval on this base is called a "fully associative memory".

The previously mentioned portion (any arbitrary bit pattern of a word) will be referred to as an "associative criterion". It will be clear that a memory word may have a multiplicity of associative criteria and also that several words may have a common associative criterion. In general, associative criteria consist of two parts:

- a. Data portion
- b. Mask portion.

The first is the known portion of the word being sought, while the second represents those bit positions in the word which should be ignored during the search. As can be seen simply, a type of memory operating according to predescribed principles will have big advantages with regard to application in the field of documentation.

The Photoscopic memory

One of the more promising developments in the field of very large memories is the photoscopic memory. This memory usually takes the form of a revolving glass transparent disk on which the information present in the memory is coded in black and white sectors. It would, however, appear technically feasible to have the coded retrieval term followed by the related document photographed, on the disk. One feature which makes the disk even more valuable for documentation is the impossibility of destroying the information contents of the memory by overwriting it by mistake.

To discuss the principles of the operation of a photoscopic memory we shall assume the theory in this case to consist of one glass disk. One side of this disk is coated with a light sensitive layer, which, after exposure and development will yield a pattern of black and transparent spots on the disk. The above-mentioned spots are arranged on tracks on the face of the disk, so that the actual scanning of the disk consists of the addressing of a track on the disk and then scanning the information on the track.

Usually there is only provision for the reading out of one track at a time; there is, however, no fundamental reason why not more than one track could be scanned at one time. The scanner consists of a cathode ray tube (C.R.T.) on which the spot is used to illuminate the tracks on the revolving disk. Suitable optics are used to ensure that the light from C.R.T. falls on one and only one track at the time. On the other side of the disk is another lens or set of lenses to focus the light from the track on a photocell. As the disk revolves continuously, the result of illuminating the track is an intensity modulated light beam. The light sensitive element on the other side of the disk then yields a combination of pulses. The pulse thus obtained is the coded information read out from the disk memory and is used subsequently in the matching procedure which consists of the matching of the pulse train against the search prescription which could, for instance, be carried out according to the black-out principle. A retrieval system based on this memory principle would need in addition to the high capacity photoscopic store some form of a comparator register and a small memory to store the results of the search prior to printing them out by a high speed printer.⁽¹⁸⁾

Character Recognition

Character recognition in conjunction with an auto abstracting procedure could lead to the development of a completely automatic system for the preparation of abstracts in either machine or human readable form. The recognition apparatus presently available are not yet capable of recognizing the large mass of different type fonts that the human eye can, at least, not without external adjustment. However, this is felt not to be a theoretical but a technical limitation. The principles on which some presently available scanners operate are discussed below, followed by a description of a commercially available model.

/...

Purpose: Automatic reading of documents, written or printed in common characters and converting this information into a form which can be read by machine;

Essential machine parts for reading:

1. A device for optical scanning, that is, a device for establishing the picture elements, which are to be interpreted and integrated in the next phase.
2. A device which makes it possible to deduct the meaning from the shape of the picture elements, and with which logical operations can be carried out.

A few principles for realization: (a) Photo electric; (b) Contact electric;
(c) Magnetic.

The Photo-electric method

According to this method all the figure elements of the documents are brightly illuminated. The reflecting beam is focussed via a set of lenses, mirrors or - if necessary - other instruments, on a photomultiplier, so that an electric pulse appears proportional to the light-intensity.

In these methods several objectives can be distinguished:

- (a) Recognition of a certain character, according to the filled area with respect to the unit area. This unit area is equal for all characters.
- (b) Recognition of manual written letter types (without curls or other ornaments). These characters need not to be of the same size, they need only to contrast distinctly with the information-carrier which they are written on.

Contact electric method

Writing or printing must be done with the aid of an electrical conducting material. An example of the way according to which this method can be realized, is: if a conducting print mark passes the brushes of the reading machine, a conducting path is established between two contact parts that close an electric circuit causing an identification by an electric current.

Magnetic method

After printing the characters with magnetic ink, the recognition of the characters will be restricted to the registration of magnetic pulses when the document passes the reading head. A considerable advantage of this method is that it does not matter whether the characters are covered with dust or not and that it is not necessary to have the characters distinctly contrasted with the information carrier which they are written or printed on.

Commercial reading machines which operate according to one of the above described principles can be supplied by a great number of firms in the field of electronics.

Other developments

At last we mention here that the automation of the Peek-a-boo system is under study. If it would result in a success i.e. if it would be possible to extend this system to a capacity of a million of documents instead of a few thousands like now, the automatical equipment could be notably simplified.

The use of data transmission techniques will increase. Rapid transmission of information and direct relations between in- and output of several machines being in great geographical distance from each other will also be advantageous for documentation. It looks as though the majority of the technical efforts during the coming years will be spent on the development of systems, working with photographic means, and of special digital storing systems. Only the photographic, microstoring systems can store the whole text instead of the references to it. Programming efforts will be continued for the utilization of general purpose computers. Programming requires a previous profound analysis, accurate to the single steps of the process to perform by the machine. This brings us to the following point to consider. (6, 72)

THE INDEXING PROBLEM

Up to now the majority of the mechanized systems has adopted indexing techniques which were developed primarily for manual systems. It can be of value to develop and improve techniques which offer special advantages for machine

/...

operation, such as prime-number coding. A well indexing system is of essential importance for a smoothly operating system. But here we touch a very complex problem. We have to emphasize the interpretation of the document's content in addition to the perfection of our mechanical system.

1. We note here the meaning of words. Synonyms in the texts have to be eliminated. Homonyms have to be specified in accordance with their context. We possess already thesauri for special fields of knowledge, particularly for the fields of techniques and exact sciences. But we do not know the existence of such "microglossaries" for the social sciences. Here we meet the special difficulties of the abstract nouns. Which are the exact and generally accepted definitions of sociological, economical, psychological and philosophical terms? Another problem related with that, just mentioned, is the making of glossaries for the intersections between the areas of knowledge, their overlapping parts. Here we have the different scopes of the same terms. We can conclude that the composition of a thesaurus for the whole quantity of human knowledge (if practicable), is a task for the next generations. On the other hand, we may hope that files like the French dictionary, containing all words of the French language, which is developed at this moment at Besançon, will be very helpful for documentation oriented thesauri.

2. Another item of study is the paraphrase: we can express our ideas into nouns, but we also can use a number of words, a sentence for impressing the same ideas without using the appropriate term.

3. Then we come to the sentence in the syntactical meaning. Here we are confronted with relations between the functional parts such as subject, object, verb etc. The question is to express non-ambiguously the logical relations between the various terms in our abstracts. Simply juxtaposing terms with the wish the meaning of the juxtaposition will be clear is certainly insufficient.

We have observed the progress of mechanical translation. And we believe both the research and the results of linguistics underlying the solution of mechanical translation problems will be of great importance for documentation. It is a pity that not all people, working for documentation are abreast of the activities in this joint science.

4. We touch here at last another item for research covering a complex entity of the above mentioned problems: the different structure of professional languages. The structure of the chemical language highly differs from that of law, and the latter differs from the language used in business. The structure of such a professional language can define the form of the abstract to index in our machine. There are several ways to compose an abstract, but the manner which leads to success for chemical texts will be of no value for abstracts of sociological literature. (76,78)

FINAL NOTES

An automatized system shall require more exactly formulated questions for the requestor. Such a system cannot tell you where to find the article printed on glossy paper in a journal with a blue cover, published some two months ago. It is important to realize this, because documentation will be carried out for the mass and complexity of the information to be handled, for big quantities for literature (often of several proprietors) where manual searching is to look for a needle in a hay-stack.

- A great benefit resulting from the computer application (and other mechanical systems) is they will make available published indexes and other finding apparatus which would not be feasible without them.
- A loss to register is that the documentalist of an automatized system will be less involved in his literature collection. Once the document or the reference has been stored he never more sees it unless it is called in. He will lack the great benefit of searching for something in his file or collection which results often in a brief encounter with a document not searched at that moment, but which is of interest for another client, who sometimes may be very happy with that discovery.

Let us feel very strongly about the truth written down by Vickery in his useful book "On retrieval system theory": "The system of machines constructs index entries, locates the subject in the index, and delivers the document. It does not tackle the final task, which is to study and integrate the documents."

/...

SUMMARY OF THIS CHAPTER

Introductory section

In the introductory part we have shown the most important factors contributing to the development of mechanization techniques for documentation activities: - the technical development in itself invited, so to say, to applications of the results from research and technique and to substitute more human activities such as processing and retrieval of literature:

- the increasement of publications and the growing impossibility to process them in such a manner that the scientist may dispose over them at the moment he needs them; the actual processing is too slow, too expensive, and there is a lack of competent documentalists. But mechanization of documentation is very costly. In spite of the efforts to find out a formula for it, it is not yet possible to point out at this moment whether, and to which degree, we can justify these costs economically.

Up to the present the real automation of documentation activities is only a partial automation, for it includes only storage and retrieval. However, the actual research has shown that mechanization of reading, abstracting and coding may be perfected. An integrated information processing, thus a full automation, seems realizable. But much research has to be done to attain this result.

Actually there are many different tools for mechanization in documentation. We can discern punched card systems, punched card machines, and computers. At this moment the computer has only found appliance for retrieval purposes. There is a discussion whether we have to build special computers for documentation or that we have to adapt our documentation procedures to the general purpose computers, with their big variety of input and output equipment. The photographic systems also offer an interesting scale of possibilities, especially when we combine these procedures with computer - and computerlike techniques.

Application section

The appliances described in this report will help the reader to obtain an insight into the many different types of activities concerned or related with documentation. Generally spoken, each application is meant to emphasize the two

/...

main topics of the field, abstracting and indexing, and their related subjects like coding, storing, retrieving, etc.

In the Filmorex and Minicard systems a kind of optical coding techniques appears. Here they make use of a certain configuration of black and white spots, which are coded retrieval terms. Besides the forms of coding, which are especially developed types so that they give an extraordinary aspect to those systems, machine codes are in use, e.g. the normal Flexowriter code (see description of the Hoffman-Laroche-Sandoz system).

About abstracting can be said that none of the listed appliances make use of Luhn's auto-abstracting procedure, what might be an indication that nowadays this is only a laboratory experiment. In addition to the method of Dr. Luhn we also have to mention the studies of H.P. Edmundson and R.E. Wyllys, with reference to the study at the Planning Research Corporation for the Intelligence Laboratory, about automatic abstracting and indexing, especially on relative-frequency technique of words in documents. This study compares the methods proposed for automatic analysis by H.P. Luhn, P.B. Baxendale, and V.A. Oswald, Jr. In spite of its refreshing aspects on the mentioned problems, this study is only a stimulant to further research on this field.

All abstracting operations are carried out manually at this moment, sometimes by specialists in the relative field of science, sometimes by outsiders. In some cases an abstract plays a less important part or is not made at all. If so, it may be that the whole text of the document is copied (commonly photographically) in reduced format, then retrieval terms are assigned and after that storing takes place (Cf. Filmorex, Minicard, and Avco).

Indexing is often done with the help of a list of keywords or with assistance of some type thesaurus (see American Chemical Society and the ASTIA system). For storing and data handling we here refer to AVCO and further to the section "trends" where some new types of memory systems, possibly promising for the future, are described. Generalizing, we can say that Information Retrieval is the common denominator in all our system descriptions.

To discern the limited information retrieval automation from the automation of the more wide field of all documentation activities we have proposed to use the term "documation" being a contraction of documentation and automation. We have closed the application section by a description of the Russian activities. It is true that the Russian documentation has not yet been automatized, but if

anywhere, it is here that automation is realizable by the great concentration and uniformity in the processing of literature. There is no suited and well defined standard to measure the effectiveness (which is inherent in the rentability) of the documentation systems described. Therefore it is impossible to discuss in these case studies the qualities or disadvantages with respect to their effectiveness.

The section of trends and conclusions

To indicate which type of technique promises a successful solution for the documentation problem is a question which we have tried to answer in the last section on trends and conclusions. The network of knowledge and the use of Videotape, described in this section, are not yet put in practice. Likewise, the photoscopic and the associative memory. The techniques of character recognition have till now only scored some success in bank-applications. All these new possibilities show us how long a way we have to cover to attain our purpose. And this conviction is reinforced when we overlook the actual study in documentation.

The majority of mechanized systems has adopted indexing techniques which were primarily developed for manual systems. To perform just indexing techniques we have to set up "thesauri" for all fields of science, not only for the chemical and physical areas. Especially for such fields as psychology, and social and economical sciences, we shall meet many problems. However, we hope the rapid development of mechanical translation will be of importance for the solution of problems such as synonyms, paraphrases, syntactical meaning, and the different structures of professional languages, which we meet in literature to process by machines. But here a collaboration between the linguistic scientists and the pioneering documentalists is necessary.

Finally, we have to realize that the automation of documentation activities will also have disadvantages. Having automatized the processing of big quantities of literature, we no more can improvise simple solutions for little problems like special questions not adapted to our system: we no more shall have a simple file to search for something; instead of the librarian only the machine will have knowledge of the documents processed. And it will not be a simple task to know how our machine has treated certain details.

/...

There are two greater sources of worry: our electronical, optical and mechanical tools are able to store and retrieve informations at a speed and at a price which appear almost adequate. However, putting information into the machines is still a process which is both costly and lengthy, involving as it does the active intervention of highly skilled human specialists. It is this part of the process which, at present, limits the efficiency and economy of automatic documentation. The second source of worry will become apparent as soon as we succeed in overcoming the first one: when automatic centres of Information do begin to exist, Information will be stored into them, year after year, so that the "stock" will increase very quickly in the course of time. Do we seriously believe that an ever increasing stock will have to be kept and scanned for retrieval? If not, how are we going to pick out and discard the informations which have become obsolete or even false in the course of time? This question will have to be answered before automatic Documentation really comes into existence.

(An extensive bibliography - 105 references - related to this Chapter will be printed in the final report.)

VIII

OTHER QUESTIONS DIRECTLY OR INDIRECTLY CONNECTED WITH ABSTRACTING

Translations:

The relationship between translations of scientific articles and abstracts may be considered from two different points of view: the translation of abstracts and the translation of original articles.

We have already discussed in other chapters the publication, simultaneously with the original article, of abstracts translated into several languages; there is consequently no need to dwell here on the general advantages of that practice to author, editor and users (documentation services or readers). It is the simplest means of enabling an abstracting service working in a language other than that of the original article to make direct use of the author's own abstract. It is apparently easier to make an abstract in language A of an article written in language B than to translate an abstract from language B into language A. . On the basis of this reasoning, which they consider sound, the editors of the abstracting periodicals associated with the ICSU Abstracting Board rejected a proposal for the institution of a rapid exchange of abstracts among their periodicals in place of the existing exchange of proofs or articles.

In the case of some primary publications, whole articles are now translated instead of abstracts. An increasing number of Russian scientific and technical periodicals, for example, are translated from beginning to end. Some users welcome this system; others, less enthusiastic, are inclined, in view of the subscription rates for periodicals translated in this way and the time-lag in the publication of translations, to doubt the wisdom of expanding or even continuing this experiment.

In order to eliminate this long time-lag, some reviews are published in two languages simultaneously. Acta biochimica polonica, for instance, has been publishing simultaneous English and Polish editions since January 1961.

Angewandte Chemie announces the first issue of its international edition in English for 1 January 1962, thus following the example set by such other German periodicals as Deutsche Medizinische Wochenschrift, of which a partial English translation has been appearing for some years under the title German Medical Monthly or Medizinische Klinik, which has been published in Spanish since 1961.

A special case is the periodical Acta Physiologica Latinoamericana which, although published in a Spanish-speaking region, is written almost entirely in English. Here it has been felt more important to make scientific information generally accessible than to maintain the privacy of the language. This case is not necessarily unique; it might recur with respect to other languages which, like Spanish, have a long tradition and are widely spoken.

Attention will be drawn in the last chapter of this report to the advantages to be derived from developing translation services by setting up regional centres on the lines of the (*) **European Translation Centre** established at Delft (101 Doelenstraat), after long and painstaking negotiations, under the international sponsorship of the Organization for European Economic Co-operation.

A question directly connected with translation is that of the transliteration of non-Latin alphabets into Latin characters. The striking development of Russian scientific and technical literature has made the problem of transliterating Cyrillic characters a matter of urgency. The confusion created in this field by the existence of several transliteration systems is only too apparent. In the United States a compromise appears to have been reached between the systems recommended by the Board of Geographic Names, the British Standards Institution, the Library of Congress-American Library Association, and the International Organization for Standardization (IOS).^{1/} There has also been discussion between the Library of Congress and the Royal Society with the same end in view. The effective and general adoption of a single system for the English language would be a big step towards the elimination of the existing confusion in this sphere, because other languages written in Latin characters might be expected to follow the system adopted.

That would solve the problem for the time being; a future solution may be foreshadowed by the public announcement of the Institute for Scientific Information concerning its "transliterating typewriter to convert Cyrillic characters of the Russian, Bulgarian and Serbian languages into their English equivalents. While transliteration on a letter-by-letter basis is vastly inferior to full translation,

^{1/} The problem of transliterating Cyrillic characters has been included in the agenda of the next meeting of Committee ISO TC/46 in June 1962 (recommendation ISO/R 9: "International system for the transliteration of Cyrillic characters").

a scientific paper written in Russian and transliterated can be read by an English-speaking scientist without much difficulty; particularly in specific fields such as chemistry and physics". This is another example of the "acceptable imperfection" often encountered in the search for solutions to problems of scientific information.

The Institute adds: "Our studies to date have shown that the cost of transliteration is about 1/30th the cost of translation, and that only a small percentage of Soviet scientific literature is consulted by Western scientists, making it doubtful that the cost of full translation is justified."

As to the transliteration of other languages, three draft recommendations have been distributed among member countries by Committee ISO TC/46:

Draft ISO Ref. No. 315: Transliteration of Greek into Latin characters;

Draft ISO Ref. No. 353: Transliteration of Arabic (which has now become recommendation ISO/R 233);

Draft ISO Ref. No. 379: Transliteration of Hebrew.

Another question directly related to the translation problem is that of terminology, which affects abstracting and indexing as well as scientific articles in general. While hard work and goodwill are not lacking in this field, there is little co-ordination. The International Federation of Translators (FIT), pursuant to a resolution approved by its Third Congress in 1959, submitted a (*) project for the co-ordination of existing activities and programmes under the auspices of UNESCO for the following purposes: improving the development of terminology so as to stabilize usage and fix the meaning of terms more precisely; extending and improving the lexicographical indexing of lists of terms; furnishing directives for the use of lexicographical methods, and preventing the overlapping of activities.

In the light of the replies it received, FIT feels that a great many international organizations - in particular governmental organizations - would be more willing to join in such a project if it was undertaken by UNESCO.

It accordingly suggested that UNESCO should (*) "create a terminology information centre and provide funds for specific purposes, so as to enable participating organizations to assume some of the functions and responsibilities involved. No aspect of science, education or culture presents a problem more truly universal than that of terminology, on which the spread and progress of

science depend in so many ways, and no organization seems better qualified than UNESCO to perform an international task."

At its first session (September 1961), UNESCO's International Advisory Committee on Bibliography, Documentation and Terminology decided that this project should be discussed as part of a plan of action in the field of scientific documentation which UNESCO intends to put into operation in 1963.

Standardization:

Recommendation ISO/R 214 on author abstracts and synopses has already been mentioned in chapter III.

Other recommendations prepared by Committee ISO/TC 46 and connected with the subject-matter of this report are:

ISO/R 4. International code for the abbreviation of titles of periodicals (March 1954);^{1/}

ISO/R 8. Layout of periodicals (1954);

ISO/R 77. Bibliographical references. Essential elements (1958);

ISO/R 18. Short contents list of periodicals or other documents;

ISO/R 30. Bibliographical strip;

ISO/R 215. Presentation of contributions to periodicals.

Questions of copyright involved in the preparation and publication of scientific abstracts

An article published in a scientific journal, like any other scientific work, is protected by copyright as to its literary form but not as to its content. Generally speaking, therefore, that article may not be used or reproduced in any way without the author's permission. This principle, however, is subject to certain limitations or exceptions, in particular as regards the preparation and publication of summaries or abstracts.

^{1/} It is stated in the UNESCO programme in the field of scientific documentation for 1961-1962 that:

"Efforts will be made in conjunction with the International Organization for Standardization, the Director of the World List of Scientific Periodicals, and other suitable parties, to formulate a uniform way of abbreviating the titles of scientific publications and for publishing and keeping up to date a list as complete as possible of such abbreviations."

In some countries the copyright laws provide, expressly or implicitly, that abstracts of articles appearing in scientific periodicals may be published without restriction; in others, their publication is permitted only for specific purposes of criticism, discussion, education or information.

However, even where no special provisions have been laid down, two rules may be inferred from the general principles of copyright:

- (i) The abstract must be of "reasonable" length: i.e. it must not be a device for reproducing the original article, such as will make that article a less marketable commodity;
- (ii) It must always state the author's name, the title of the article abstracted, and the name, number or date, and publisher of the periodical in which the article appeared.

Again, whatever the state of the law in a particular country, there are two factors which normally prevent copyright problems from interfering with the publication of scientific abstracts:

- (a) Articles published in scientific periodicals are usually unpaid contributions, and the question of royalties does not arise;
- (b) The dissemination of an abstract helps to make the original article known; this is the ultimate objective of every scientific research worker who publishes his work, and also of the learned society or business firm which owns the journal.

Thus the publication of abstracts made from articles appearing in scientific journals seems to be free from difficulties in practice, whether the publisher is an individual, an institution or an abstracting service. This applies not only to abstracts prepared by the author of the article or by the editor of the periodical (for example, in other languages) and published with the article, but also to abstracts prepared by third parties later on.

IX

PROSPECTS FOR THE FUTURE ORGANIZATION OF ABSTRACTING SERVICES

It is a commonplace to say that scientific documentation is international, inter-disciplinary, inter-professional and multilingual. It is no less a commonplace to say that incomplete and inadequate measures, whether by individuals or by countries, result in the duplication of work, waste money, time and effort and fail to produce a satisfactory solution for any of the problems which beset scientific information. The resultant situation cries out for co-ordination and centralization. These two remedies, pursued to their logical conclusion, lead directly to the alluring idea of establishing a world centre of scientific documentation or information, including abstracting services.

There have been many projects of this kind. We can do no more than mention briefly a few of the more recent ones. Bouquet⁽¹⁾ proposed to the International Conference on Scientific Information that such institutions as UNESCO and ICSU should carry out an inquiry on the advisability of creating an International Centre of Scientific Information, whose goal would be:

1. To assure close co-operation between all documentation centres (national and regional centres, centres operating under State control, as well as private centres);
2. To collect, classify, select, preserve, translate and reproduce scientific information by modern methods;
3. To facilitate the dissemination of periodicals and selected monographs by publishing them in the officially adopted languages;
4. To organize symposia and conferences and to publish their reports;
5. To publish at regular intervals indexes, tables of contents, and journals devoted to summaries of periodicals;
6. To carry out bibliographical work for scientific institutions, laboratories, and offices of various industries;
7. To organize research services for unifying and improving documentation methods;
8. To aid relations between all scientists by publishing a directory of research centres and lists of specialists.

The author suggested that in order to carry out that programme, the financial participation of official institutions (international institutions, learned

societies, various foundations), and even private groups (publishers, financial companies, and industrial groups) might be solicited. He did not indicate how much money would be needed. At the same Conference, Chamberlin⁽²⁾ gave an estimate of \$283,350,000 for the annual budget of an international organization,

"the fundamental purpose of which would be to assist the scientists of all nations, by providing the machinery through which nations could do together those things that can be done effectively only when done together. An international institute for scientific information could provide for all scientists what the Soviets are trying to provide for theirs. The best elements of the Russian experiment should be used, but to these should be added the advantages that are inherent in competition, flexibility, and co-operation; advantages that are seldom found simultaneously in any governmental body."

It was suggested that such an institute could most appropriately be established within the framework of UNESCO or, failing that, as a separate organization. The author laid special emphasis on the independence of the institute, in the following terms:

"The policies of an institute designed to provide all scientists, at all levels, with all the information that they need, should be determined by scientists, subject to influence, but not control, by Governments. Storage and retrieval of scientific information cannot be controlled by Government, but it is a problem of such magnitude that Governments must provide major financial backing. The general policies of the institute could be set by representatives of States in a body such as the General Conference of UNESCO, but executive policy should be determined by scientists."

Asmonas⁽³⁾ submitted for UNESCO's consideration a project for the establishment of a "tripartite" international centre of scientific and technical documentation, with three headquarters in New York, Switzerland and Hong Kong respectively. The author specified that, before the international centres were set up, it would be necessary to agree on the international language, classification and terminology to be used. In addition a fund of \$900 million would be established, with which to set up and operate the three centres, while UNESCO would train the necessary specialists. This impressive list of prerequisites was no doubt the main reason

why the UNESCO Advisory Committee on Bibliography, Documentation and Terminology recommended at its meeting in March 1960 that UNESCO should take no action on the project. A similar decision was taken at the same meeting with regard to the project for a European pool of scientific information put forward by Dr. H. Rotter of Salzburg, which proved equally unacceptable to the Cultural Committee of the Council of Europe. The author's ultimate objective was the establishment of a world service, for he expected the success of the European pool to bring in all other countries. The plan entailed the conclusion of many preliminary agreements, both technical and financial, and the establishment of unduly complex administrative machinery.

All these examples, and others that might be mentioned, have two prerequisites in common: a very large initial outlay and a series of agreements and choices. Considering the difficulties experienced by international organizations - even those in the United Nations family, which already have some tradition behind them - in increasing their budgets, and considering that those budgets are only a fraction of that proposed for the international centre of scientific documentation, it is obvious that any attempt to establish such a centre would get no further than this major obstacle.

What is more, even on so apparently simple a matter as standard abbreviations for the titles of scientific periodicals, the need for which is universally recognized, several years' efforts have failed to produce any agreement so far. If complete centralization were to be attempted, the decisions regarding standardization and the other choices to be made would be far more serious and would constitute another formidable, if not insurmountable, obstacle.

The path to a world centre is thus blocked by two genuinely serious obstacles; yet even these are less serious than a third, which must be considered insurmountable. One of the main arguments for the huge expenditure which the international centre would involve is the no less huge expenditure - two, three, five hundred millions dollars - incurred by scientific documentation services, large and small, governmental and private, all over the world. As these services became redundant, the money now spent on them would be channelled into the single world service. But if - and this is by no means certain - it proved really advisable and even necessary to close down all the existing services, is it

/...

conceivable that all those services would go out of operation overnight? Instead, would not the outcome be general duplication of effort, on a world-wide scale?

Lastly, a point raised as early as the Washington Conference calls for some thought. It has not yet been demonstrated that scientific information requirements can only be set by a single international centre; in other words, would the scientific documentation services rendered under existing arrangements be improved if the work was taken over by a world centre?

Centralization is also conceivable on a less ambitious scale, for example through the establishment of a single journal of scientific abstracts. Professor Baron, Deputy Secretary of the ICSU Abstracting Board, had this to say on the subject:

A single scientific abstracting journal serving all countries, all languages and all branches of science seems, at first glance, a flight of fancy as attractive as it is impracticable at the present time; for this very reason, such a journal would become more and more difficult to establish with every passing year. However, without prejudging the feasibility of the idea, let us try to see what such a journal would be like:

(a) Coverage; sections

Science is so classified as to lead us to estimate that there are now some 100 main "abstracting periodicals" in existence. Applying this figure to the putative single journal we might devote fifteen sections to physics, thirty to chemistry, twenty to the biological sciences, ten to the geological sciences and twenty-five to the medical sciences, making 100 in all. The single journal can thus be imagined as comprising some 100 sections to be issued separately for the convenience of subscribers. It would abstract a total of 2 to 3 million references per year, or approximately 25,000 abstracts a section. A specialized scientist who spent two minutes on each abstract would need two working days - perhaps an acceptable allowance of time - to go through this weekly publication.

(b) Practical problems

Would the world body (the United Nations or UNESCO?) sponsoring the journal find it necessary to bring out a separate edition for each of the hundred-odd States Members of the United Nations? That would mean, for the single abstracting

/...

journal, 10,000 fascicles per month (approximately 100 sections in 100 editions apiece, each with its own price and its own mailing arrangements). It is immediately obvious that such a system would be cumbersome and would have to be instituted gradually, in a series of stages.

Would it be better to publish the journal in one language only? That would raise the problem of choosing the language and, in view of the scant success achieved with international languages, would entail an impracticable choice between the most used languages (English and Russian). As a first step, a ten-edition publication might be tried in as many languages, for example: English, Russian, French, Spanish, German, Japanese, Chinese, Arabic, Hindi and perhaps Interlingua.

It will be seen immediately that this selection, intentionally restricted to the world's most widely spoken languages, would be unfavourable to the smaller ethnic and linguistic communities, some of which include active scientific groups: Italy, Portugal, Greece, Finland, Turkey, etc. While most Danish or Swedish scientists speak English or German, this would be a real effort for the Finns, whose language is completely unrelated to the Teutonic languages. It is a reasonable assumption that the Academy of Sciences of the USSR would arrange for the Russian editions of the journal to be translated into the other languages of the Soviet Union, and that the Chinese edition would be prepared by the competent Chinese scientific institutions.

A measure of agreement regarding the use of languages has already been reached in the inter-governmental treaties setting up UNESCO, EURATOM, NATO and many other international organizations. EURATOM, for example, has four official languages, two major (German and French) and two minor (Italian and Dutch) (documents drawn up in the minor languages are automatically translated into the major languages, but not vice versa); in the case of UNESCO, German is not among the working languages (English, French, Russian and Spanish). However, if the journal were to use only these last four languages, it would very largely duplicate what is already available in existing periodicals.

Similarly, if we decide to begin publication with a more manageable number of fascicles, substantially lower than 100, we may think in terms of a score or so, as in the case of the Referativny Zhurnal or the Bulletin signalétique du CNRS. In our view, any new international abstracting journal should be the organ

of the International Scientific Unions, at present fourteen in number; consequently each Union would be responsible for one, or at most two, fascicles of the central abstracting journal. However, in view of all these difficulties, a further question may be asked: is such a journal possible? Would its establishment drive the major existing abstracting journals out of publication? Our conclusion is that a single abstracting journal is scarcely feasible at the present time, notwithstanding the advantages, more theoretical than real, which it would seem to have at first glance.

In this connexion we have already indicated in chapter I that, even in a single branch of science - the physical sciences - the establishment of a sole abstracting journal was not recommended.

Whatever type of system is envisaged its basic element will be the national or regional centre. This centre is the strategic point from which to direct the two-way traffic of scientific documentation - the flow from abroad to users within the country and the opposite flow which carries the country's scientific production to other countries. That is why UNESCO encourages its member States to establish national centres, following up this encouragement with technical and financial assistance when this is requested by those member States which cannot establish such centres, or which cannot establish them as fast as they would wish, with their own unaided resources. In this way, the "great documentation vacuum" in Latin America, the Middle East and Asia is beginning to be filled. In the last-mentioned region Thailand, Indonesia and Korea have followed India, Pakistan and the Philippines in establishing such focal points for documentation as the nuclei of an eventual world network.

Can the multiplication of such national centres be considered an ideal or adequate solution? So far as the projection of the country's own scientific information beyond its borders is concerned, any country, large or small, can have a centre fully equal to this task. That does not apply, however, to the flow of information in the opposite direction. When we see, in a country like France, hundreds of other documentation services existing side by side with such a centralized and comprehensive service as the Scientific Documentation Centre of the CNRS, in Paris, the limitations of national centres in small countries are easily discernible.

What is more, as soon as national centres become active and numerous, the risk of duplication multiplies. Thus, no sooner is the "documentation vacuum" in the Middle East filled than the first signs of danger appear. The Documentation Bulletin of the National Research Centre, Cairo, includes in part II, as we have already pointed out, abstracts of articles published in countries of that region, including Pakistan. Since 1961 the Pakistan national scientific and technical documentation centre (PANSDOC) has issued a quarterly entitled Pakistan Scientific Literature, which also publishes abstracts of articles appearing in Pakistan: duplication of material, duplication of effort, duplication of expense. It is already clear that a regional agreement is indispensable. Apart from preventing duplication, such regional agreements would help to strengthen the national services, increase exchanges and share out the work to be done. In some cases a regional centre would be able to supplement the combined efforts of a number of national centres or services. The word "regional" is used here not only in a purely geographical sense, but also to describe co-ordination by language or by scientific discipline.

There is a de facto regional centre in Latin America: that at Mexico City, which performs a clearly regional function in publishing in its monthly bulletin^{1/} abstracts of scientific work appearing all over Latin America. Less regional in scale are the resources with which it must try to cover all the documentation requirements of a vast region where, despite aviation, distance still plays a considerable part. This Centre, maintained at present by a single State, would certainly gain by becoming truly regional, not only as to the users it serves, but through effective participation in its activities by a number of countries of the region. At the same time this might dispose of certain difficulties which the Centre seems to have been encountering recently. Latin America, which has the great asset of a common language used from one end of the region to the other, would seem the ideal setting for one or more regional bodies covering different aspects of scientific documentation. Operating regional bodies appear to be the best arrangement in this field.

^{1/} See description in chapter VI.

It may be, moreover, that regional co-ordination instituted in this way, based on free consent to a common set of rules, and materially assisted by the mechanization of all or nearly all stages in the process of scientific documentation, will one day show the way to the professed goal, or secret dream of so many scientists and specialists in scientific documentation: a world centre of scientific information.

Meanwhile there appears to be an increasing need for international or world bodies, not to perform the actual operations of documentation, but to provide the fullest possible co-ordination. This need will be considered in the next and last chapter of this report.

Bibliography

- (1) Boquet, P. - Creation of an International Centre of Scientific Information. Proceedings of ICSI, pp. 1517-1521. Washington, 1959.
- (2) Chamberlin, W. - An International Institute for Scientific Information. Proceedings of ICSI, pp. 1523-1534. Washington, 1959.
- (3) Asmonas, V. - System of scientific and technical information services: long-range planning. UNESCO/NS/Doc. 4500.28.5-1960.

X

CONCLUSIONS AND RECOMMENDATIONS

Throughout the preceding chapters we have tried "to take the works apart" - in other words, to show what pieces form the jig-saw puzzle of abstracting, their faults and their virtues, their advantages and disadvantages, and their adaptability to the ever-increasing volume of work and speed of operation imposed by the steady rise in the publication of original scientific material.

Despite that rise, the problem of scientific information can still be solved; for, as Wooster^{1/} observes, (*) the difficulty is not to find time to read what must be read, but to find time to trace what must be read amid the enormous mass of documentation available.

We have now reached the most difficult part of the report, in which we must try to draw conclusions from our study.

The first conclusion is that we are very far from the ideal abstracting service defined by Hutchisson^{2/} as "one which would cover all articles in its own and borderline fields, would condense to infinitesimal length the significant contents of these articles, would provide unambiguous abstracts and indexes in every reader's own language with zero (or negative) time lag, and would cost nothing".

Although this ideal will always be out of reach, it is clear that much study and research will continue to be needed in order to bring it progressively nearer. Without going so far as Dr. Shaw, who told the International Conference on Scientific Information (Proceedings, page 308): "Perhaps a contribution of this meeting would be to declare a moratorium on publication of inconclusive summaries of incompetent opinions based on inadequate samples", it must be

^{1/} Wooster H. - Possible effects of current research in automatic information handling on technical writing and publishing. USAF R&D Quarterly Review, Winter Issue, 1960, and publication 59-484 of the Air Force Office of Scientific Research, Washington.

^{2/} Hutchisson E. - Summary of Discussion, Area 2. Proceedings of ICSI, Volume I, page 523. Washington, 1959.

/...

agreed with studies and research on scientific documentation will have to be carried out - and this is our second conclusion - on a different scale from that used hitherto. According to their volume, their origin and the number of producers and users involved, scientific documents must be dealt with on the industrial, the inter-disciplinary and the international scale.

This means, inter alia:

- (a) that the fullest possible use, from the standpoint both of geography and of scientific disciplines, should be made of inquiries and surveys.
- (b) that scientific information problems should no longer be discussed in qualitative terms, but should, whenever possible, be dealt with in terms of quantity: number of scientific periodicals in different categories, number of words published, number of cases in which abstracts accompany published article, number of abstracts published by specialized journals, proportion of coverage, etc.; all these quantities can and should be assessed.
- (c) that national or specialized services should be strengthened to the point where they can establish durable contacts and regional agreements ("regional" in the geographical sense and also in that they cover a particular language or branch of science and can participate in meaningful international co-operation;
- (d) that all the specialists concerned - scientists, documentation specialists, editors of scientific periodicals (primary, abstracting, indexing), translators and terminologists - should participate in any combined effort to improve matters in this field.

Neither individualism - so dear to the scientist - nor freedom - so dear to all men - must stand in the way of the standardization, rationalization and measures against duplication which are needed with increasing urgency. the activities of organizations engaged in these weeks, such as IOS, the ICSU Abstracting Board, and IFD, should be supported and strengthened.

This also applies to the task of bringing scattered elements together: the establishment of such bodies as the National Federation of Science Abstracting and Indexing Services, Washington, D.C., or the United States Conference of Biological Editors, should be encouraged. The attendance of the editors of Latin American periodicals at the last session of this Conference, in February 1962, was a welcome development.

Lastly, the facts appear to warrant the conclusion that, generally speaking, no need for new abstracting or indexing periodicals is felt in the pure and applied natural sciences. The aim should be rather to improve the existing periodicals. Some, but not all, of the headings under which improvement would seem possible and necessary are: faster publication, coverage of more periodicals, elimination of duplication, abstracts in the less common languages, better classification, standardization, and frequent and comprehensive indexes.

This report happens to have been prepared while UNESCO was examining its programme and budget for 1963-1964. The programme includes a project to be carried out over a number of years, for increased assistance in improving and developing scientific documentation. The project takes the form of a work plan which we should like to recommend as the final conclusion of this report. The work plan provides for the convening, in 1963, of a number of working parties composed of representatives of all circles interested in the problems of scientific documentation: organizations of the United Nations system; International Scientific Unions; international federations of documentation specialists, librarians and translators; primary and abstracting periodicals; and governmental and non-governmental documentation centres and services. These working parties will survey all aspects of the problems of scientific information and documentation, particularly in connexion with:

- (a) primary publications;
- (b) abstracting and indexing periodicals and services;
- (c) scientific translation and terminology;
- (d) mechanization and coding;

(e) rationalization of scientific conferences and their publications.^{1/}

The purpose will be, not to make a purely theoretical study of the problems, but to work out practical solutions for submission to a final working group which will be convened in 1964, and on which all categories of specialists and organizations participating in the 1963 meetings will again be represented. The main purpose of the 1964 meeting will be to approve ways and means of carrying out the recommendations of the working parties.^{2/} Existing co-ordination machinery will be strengthened or adapted as appropriate, and new international mechanisms for co-operation in one or more fields of scientific documentation will be established if necessary.

It would be naïve and unrealistic to imagine that all the complex problems of scientific documentation in general, and of indexing and abstracting services in particular, can be solved by convening these working parties. There is no doubt, however, that if all those concerned with the question can be induced to work together, and to pool their experience and efforts over a fairly long period, an important step will have been taken and there will be every hope for the future.

In the plan outlined above, only item (b) is directly concerned with abstracts, but abstracting services and periodicals stand only to gain from the recommendations which may be made and the action which may be taken under the other items. Under item (a), primary publications, such recommendations may

1/ Pursuant to a resolution adopted at the eleventh session of the UNESCO General Conference, consultations on this problem have already taken place between the International Council of Scientific Unions and UNESCO. A "Study on the content, influence, availability and value of scientific conference reports and proceedings" has been prepared for UNESCO under contract by the International Federation for Documentation with the collaboration of the Union of International Associations and the International Council of Scientific Unions. It deals with conferences held by international organizations concerned with the exact and natural sciences, and will be published in the May and July 1962 issues of the UNESCO Bulletin for Libraries.

2/ Research projects, including some already mentioned in this report, will certainly be found necessary and will be carried out by appropriate specialists or organizations.

include, for example: application of the "Code of Good Practice for Scientific Publications"; publication as a general practice, of author abstracts in several languages; and reduction of the number of primary publications by merger or by changing the nature of those which duplicate the work of others.

These and other possible improvements would be easier to carry out if permanent contacts could be established between the managements of scientific and technical periodicals, whether at the national or the regional level, or within each branch of science, or on a language basis. It might then be possible, in a second stage, to establish an International Federation of Publishers (or Editors) of Scientific Periodicals. The absence of such an organization is responsible for many of the shortcomings and difficulties mentioned in this report.

The establishment of regional translation centres and all the improvements possible under item (c), in particular as regards the less common languages, can only help to improve the use made of information obtained from abstracting periodicals. The improvement of terminology will have a direct effect on the quality of abstracts.

Reference has been made, in different parts of this report, to the ways in which mechanization has already improved abstracting and indexing services; there is a bright future in this development, especially if the complications foreshadowed for the not too distant future by the potentially chaotic situation now prevailing can be averted through a degree of standardization in coding.

Lastly, even under item (e), rationalization of the publications (proceedings, etc.) issued after scientific conferences and congresses can only assist abstracting services and their periodicals by preventing duplication in published material, delay, and publication unknown to those concerned.

The ultimate success of the working parties which are to meet in 1963, and of the plan of action to be prepared at the 1964 meeting, will depend on the response to UNESCO's appeal and on the active participation of all those categories of specialists who have a function to perform in the search for solutions and an even greater function in giving effect to the recommendations which will be approved and freely accepted.

This function can be performed at the international intergovernmental level by the organizations of the United Nations system in their respective spheres, supported at the national level by their member States.

At the technical, non-governmental level, it can be performed by scientific councils, unions and societies and by federations of documentation specialists, librarians, translators, etc.

Lastly, the individual co-operation of experts and specialists in all branches of science and scientific documentation, including the publishers and editors of scientific periodicals, is essential to make this undertaking, from which all stand to benefit, a complete success; for scientific documentation is not only of the first importance from the technical point of view. It is also essential to society. By making the experience of the individual available to all, it ensures freedom of information and increases the opportunities of communication between scientists. Scientific documentation contributes not only to science itself but also to the peaceful life of human community, without distinction as to country, race or religion.
