

Survey of Medical Literature Borrowed from the National Lending Library for Science and Technology*

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ABSTRACT

This paper reports the results of a four-week questionnaire survey carried out at the National Lending Library (N.L.L.), Great Britain, to discover which types of organizations were the principal users of medical literature, what types of literature were used, and which were the main sources of references to medical publications. Industrial organizations and universities accounted for the majority (62 percent) of the loans, most of which were English-language periodicals published since 1960. For the whole sample, citation lists in periodical articles were the principal sources of references, although for literature published in the last fifteen months, abstracting and indexing journals were the main sources. Of the latter, *Index Medicus* proved to be the most fruitful source of references. By asking whether the item requested was really useful to their work, a measure of the reliability of the different sources of references was obtained.

Appendixes include the questionnaire, a list of the most frequently borrowed journals, and a list of abstracting and indexing journals used as sources of references.

INTRODUCTION

Since its inception in 1958 the National Lending Library for Science and Technology in the United Kingdom (N.L.L.) has developed into one of the largest scientific and technical libraries in the world. As well as collecting literature in the fields of pure science, technology, agriculture, and social science, the library is also charged with collecting medical literature. In fact with its 4,000 current medical periodicals,

* The views expressed in this paper are those of the authors and not necessarily those of their department.

back issues, and an extensive collection of current books, reports, and translations in this field, the N.L.L. has become, almost incidentally, probably the second largest medical library, after the National Library of Medicine (NLM) in the western world. In addition to collecting the literature, the N.L.L. has become the principal British source of interlibrary loans in the medical field and is currently dealing with almost 60,000 requests for medical literature per year.

In view of the volume and variety of medical literature being loaned, and in the belief that as in other subject fields the demand on the N.L.L. reflects the use being made of medical literature in the United Kingdom as a whole, it was decided that a survey of the requests for this literature would throw some light on the types of medical publications being used by workers in the medical and related fields. Furthermore, it was felt that if information could also be obtained on the nature of the work for which the loan was required, the value of the publication to the reader, and the origin of the reference, this information would enable an evaluation of the various sources of bibliographical information (i.e., personal contacts, abstracting publications, citation lists, etc.) to be made.

METHOD

In the light of the above, a questionnaire was designed, and a small pilot survey was conducted in March 1967. During a two-day period 387 questionnaires were distributed (one with each item of medical literature despatched from the N.L.L.). Two hundred replies were received

TABLE 1
TYPES OF ORGANIZATION IN WHICH
REQUESTS ORIGINATED

TYPE OF ORGANIZATION	PERCENT
Industrial Organization.....	31.9
Government Establishment.....	7.3
Government-Aided Organization.....	4.2
Hospital.....	10.1
Medical Research Council Unit.....	0.6
University/C.A.T.....	18.3
University—Medical School.....	12.1
Technical College/School.....	6.1
Other Nonprofit-Making Organization...	5.3
Public Library.....	3.7
Other.....	0.3
Total.....	99.9

and analyzed, and as a result a number of minor alterations were made to the questionnaire. Copies of this modified questionnaire, which is presented as Appendix A, were distributed with almost all the medical literature* sent out on loan, or as photocopies to U. K. users during a four-week period in April 1967. Details of each publication (i.e. type, language, subject, and date) were recorded on the questionnaire at the point of issue, as also was the type of borrowing organization,† i.e., university, industrial firm, government establishment, etc. The remaining details (see Appendix A) were provided by the requester. A total of 2,603 (65.1 percent) questionnaires was returned in time to be included in the analysis, which was carried out using IBM eighty-column punched cards. Fifty-three forms (1.3 percent) were returned too late for inclusion.

It will be noted that the survey was only concerned with items of literature actually loaned and, therefore, took no account of the unsatisfied requests. The satisfaction rate at the N.L.L. however is high (85 percent), and of the unsatisfied requests, a fairly large number are for items which do not in fact exist. This

* Medical literature was deemed to include only material which could be classified in the Universal Decimal Classification (UDC), group 6. It did not, for instance, include biochemistry or zoology. In the case of journals, the decision to include or exclude an item was based, where possible, on the nature of the article itself and not on the title of the periodical.

† The N.L.L. lends to organizations and not individuals, although the questionnaires were completed by the individuals originating the requests.

means that the pattern of use of the literature as reflected in the loans made from N.L.L. will vary insignificantly from the use pattern which would emerge by analyzing the total requests.

RESULTS

(1) *Users of Medical Literature*

The analysis of the requests by type of borrowing organization is presented in Table 1. It can be seen that the majority of requests came from industrial organizations on the one hand and universities (including medical schools) on the other. Compared with a similar analysis of requests in all subject fields received by the N.L.L., the figures show a reduction of 14 percent in the proportion of requests received from industry and an increase of 15 percent in the proportion of university requests.

(2) *Characteristics of the Literature Borrowed*

As literature was sent out on loan, it was classified by type of publication, subject, language, and date.

(a) TYPES OF PUBLICATIONS

The various types of publications are listed in Table 2, which also indicates the extent to which each type was used.

Periodical articles constituted the bulk of the literature borrowed. Although during the period of the survey 839 serial titles were borrowed, the majority were subject only to very low use. For instance, 461 or 54.8 percent of the titles were used once only, 122 were used only twice, and 69, only three times. On the other hand, a few titles were subject to relatively heavy use. Ten titles were each borrowed more than twenty times, and the most heavily used title—*Ameri-*

TABLE 2
TYPES OF PUBLICATION REQUESTED

TYPE OF PUBLICATION	PERCENT
Periodical Article.....	90.6
Book.....	4.2
Summary (e.g., abstract, book review)....	1.0
Conference Proceedings (not in periodi- cal).....	0.4
Report.....	0.3
Not Known (e.g., periodical—page not indicated).....	3.2
Other.....	0.3
Total.....	100.0

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can *Journal of Obstetrics and Gynecology*—was borrowed thirty-six times. A full tabulation indicating the number of uses per title is presented in Table 3.

The use of the N.L.L.'s medical journals confirms the findings of other investigators, e.g., Ash and Bruette (1), Kurth (2), and Wood and Hamilton (3), in that it demonstrates the existence of a core of journals within a particular subject field which contains the information of most use to workers in that field. A comparison of the use data with that obtained by Kurth (2) is presented diagrammatically in Figure 1.

In the belief that it may be of some use to medical librarians, a list of the most heavily used titles is presented as Appendix B. Too much notice, however, should not be taken of the rank order since the number of loans per title, even for the top journals, is rather small. A comparison of the titles with those appearing in other published lists reveals a fairly similar picture. For instance, of the N.L.L.'s twenty most frequently used medical titles, nine also appear in the twenty most borrowed titles in the NLM (2), and eleven appear in the twenty most frequently requested titles in medical libraries of the Greater New York area (1). It is rather surprising to note that both *Lancet* and the *British Medical Journal* appear in the list, since these are two periodicals which many medical workers in the United Kingdom receive on a personal subscription, and which in any case are available in the majority of British medical libraries. Their appearance in the N.L.L. list can probably be attributed to use by nonmedical men working on the fringe of the subject.

Compared with periodical articles, books account for only a very small proportion (4.2 percent) of the total loans, a rather unexpected fact in view of the findings of other workers. Stangl and Kilgour (4), for instance, report that of 35,992 library transactions analyzed at the Yale Medical Library during twelve months in 1964/65, 40 percent concerned books and 60 percent, journals and serials. The discrepancy between the N.L.L. and Yale figures can probably be attributed to three factors. Firstly, the N.L.L. is regarded by many of its users as being a "periodicals library" and consequently does not attract more than a small proportion of the total interlibrary loan requests for books. Secondly, whereas the N.L.L. caters mainly to postgrad-

TABLE 3

RANGE AND FREQUENCY OF TITLES USED	
NUMBER OF REQUESTS PER TITLE	NUMBER OF TITLES
36	1
29	1
28	1
27	1
26	1
23	2
22	1
21	1
20	1
19	1
18	2
17	2
16	3
15	3
14	5
13	2
12	5
11	7
10	7
9	12
8	14
7	23
6	23
5	33
4	35
3	69
2	122
1	461

uate literature needs, the Yale library caters to a large number of undergraduates as well as to postgraduate students and staff. Since undergraduates make relatively greater use of books in comparison with research workers, it is to be expected that, compared with N.L.L., a bigger proportion of the loans at Yale would be books. Thirdly, it should be borne in mind that periodical articles are usually located through abstracting journals and citation lists, whereas books are generally located by browsing or by searching the library catalog or accessions list. The result is that, of the literature required by scientists, a larger proportion of the books than of the journals will be available locally. Consequently, any analysis of the literature used in a local library will overrate the usefulness of books as compared with periodicals. The true figures from which the relative usefulness of the two types of literature could be deduced obviously lie somewhere between the N.L.L.'s and Yale's.

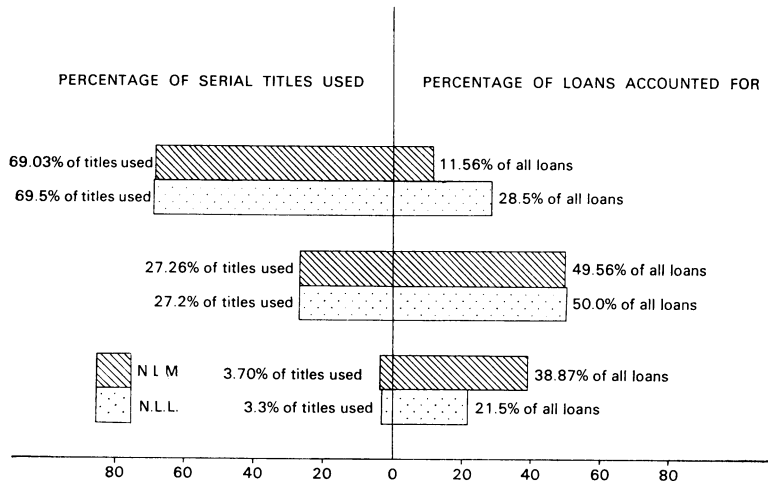


FIG. 1.—Comparative percentages of serial titles used and loans accounted for at N.L.L. and N.L.M.

TABLE 4
DISTRIBUTION OF REQUESTS BY SUBJECT

UDC	SUBJECT COVERAGE	PERCENT
611/612	Mammalian Anatomy, Physiology.....	19.2
613/614	Health, Preventive Medicine.....	6.2
615	Pharmacy, Pharmacology, Therapeutics.....	32.9
616 (except Dentistry)	Disease, Pathology, Psychiatry.....	26.0
617	Orthopedics, Regional Surgery, Ophthalmology.....	3.2
618	Gynecology, Obstetrics.....	3.6
619	Comparative Pathology, Veterinary Medicine.....	0.6
—	Dentistry.....	1.0
—	Miscellaneous.....	1.7
—	Not Defined or Not Definable.....	5.7
	Total.....	100.1

(b) SUBJECT OF PUBLICATIONS

As they were loaned, all items of literature were subject classified. In the case of periodicals, it was, wherever possible, the actual article rather than the journal which was classified. Although not ideal for the purpose, the classification was carried out according to the UDC system (5), and the results are presented in Table 4. It will be noted that in addition to the normal subdivisions of UDC, a "general" category and a separate category for dentistry (part

of 616 in UDC) were introduced. As can be seen from Table 4, the bulk of the loans occurred in subject categories 611/612, 615, and 616.

It is somewhat difficult to compare the results with those obtained in the Yale survey (4), since the latter employed a different classification scheme which included biological as well as medical literature and excluded publications in UDC category 615. However, if the appropriate Yale subjects are regrouped according to UDC and compared, where possible, with the N.L.L. figures, the pattern of use is seen to be very similar (see Table 5).

In view of the different spheres of interest of various types of organizations, it is not sur-

TABLE 5
COMPARISON OF SUBJECTS USED AT N.L.L. AND YALE

UDC	REQUESTS FOR BOOKS AND SERIALS	
	N.L.L. (EXCLUDING PHARMACY AND DENTISTRY)	YALE ⁽⁴⁾ (EXCLUDING GENERAL AND NON-MEDICAL CATEGORIES)
611/612.....	499 (32.5%)	4,260 (29.0%)
613/614.....	161 (10.5%)	419 (2.9%)
616.....	678 (44.5%)	7,198 (49.1%)
617.....	82 (5.4%)	1,120 (7.6%)
618.....	94 (6.1%)	926 (6.3%)
619.....	15 (1.0%)	742 (5.1%)
Total.....	1,529 (100.0%)	14,665 (100.0%)

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prising that a breakdown of the loans by subject and by borrowing organization reveals some noteworthy variations from the pattern revealed by the sample as a whole. Industrial firms, for instance, make more than average use of pharmaceutical literature—presumably because a substantial number of them are engaged in the manufacture of drugs—and less than average use of literature in the field of anatomy and physiology. The latter, however, is used extensively by universities. Hospitals and university medical schools make comparatively little use of pharmaceutical literature, but they are above average in their use of literature in UDC categories 616 and 618, i.e. pathology, psychiatry, surgical techniques, gynecology, and obstetrics.

(c) THE USE MADE OF THE LITERATURE

For each publication sent out on loan, respondents were asked to indicate (question 1, Appendix A) the aspect of their work with which the required literature was connected. The replies are presented in Table 6. As can be seen from Table 6, it proved possible by analyzing the replies in the "other" category to recognize major aspects of work other than those listed in the questionnaire.

The majority of the literature was borrowed in connection with nonclinical research. This was intended by us to mean medical nonclinical research, but may have been interpreted by some respondents as including nonmedical research. The figure of 51.3 percent therefore undoubtedly includes literature which was required for other than medical work. The 164 (6.3 percent) unclassified replies covered a wide

TABLE 6
TYPES OF WORK FOR WHICH LITERATURE WAS USED

ASPECT OF WORK	PERCENT
Clinical Practice.....	6.0
Clinical Research.....	26.8
Nonclinical Research.....	51.3
Teaching.....	4.5
Other:	
(1) Preparation of Bibliography, etc.....	1.4
(2) Technical Information Work.....	1.1
(3) Study.....	2.3
(4) Miscellaneous.....	6.3
Not Stated.....	0.2
Total.....	99.9

TABLE 7
DISTRIBUTION OF REQUESTS BY LANGUAGE

LANGUAGE	(a) PRESENT STUDY	(b) N.L.L. 1963 (SERIALS ONLY)	(c) NLM ⁽²⁾ (SERIALS ONLY)	(d) NEW YORK ⁽¹⁾
English.....	88.2%	77.1%	72.8%	72.0%
French.....	3.5	4.3	5.6	6.0
German.....	4.8	9.3	8.8	8.3
Cyrillic.....	0.8	4.7	12.8	0.9
Italian.....	1.0	4.6		3.8
Spanish.....	0.2			1.8
Japanese.....	0.7			1.2
Other/not known.....	0.7			6.0
Total.....	99.9%		100.0%	100.0%

range of work varying from agronomy, engineering design, and industrial chemistry, to physical education, quality control, and shoe research.

The nature of the work for which the literature was requested varied considerably from one type of organization to another. For example, 58.8 percent of the literature borrowed by industrial firms was required for nonclinical research, compared with only 20.1 percent in the case of hospitals. The latter, on the other hand, were significantly heavy users of the literature required for clinical practice, clinical research, and teaching. Over one-third (34.4 percent) of the literature requested in connection with study came from public libraries, although as can be seen from Table 1, such libraries were responsible for only 3.6 percent of the total requests.

It is noteworthy that the only organizations borrowing literature in connection with technical information work were industrial firms and government departments—presumably because few other types of organizations operate technical information services.

(d) THE LANGUAGE OF THE PUBLICATIONS

A language analysis of the 2,603 loans is presented in Table 7, column (a). It can be seen that a very high proportion (88.2 percent) of the total requests was for English language publications and that together English, French, and German publications accounted for 96.5 percent of all loans. A similar state of affairs (although reliance on English publications was

TABLE 8
DISTRIBUTION BY DATE OF REQUESTS FOR
SERIALS AND BOOKS

YEARS	(a) ALL LOANS		(b) PERIODICAL ARTICLES		(c) BOOKS	
	(1) %	(2) Cum. %	(1) %	(2) Cum. %	(1) %	(2) Cum. %
1967...	9.6	9.6	8.7	8.7	2.8	2.8
1966...	22.1	31.7	21.7	30.4	25.9	28.7
1965...	12.4	44.1	12.3	42.7	20.4	49.1
1964...	9.6	53.7	9.4	52.1	13.0	62.1
1963...	7.4	61.1	7.6	59.7	7.4	69.5
1962...	5.0	66.1	4.8	64.5	8.3	77.8
1961...	4.0	70.1	4.0	68.5	5.6	83.4
1960...	4.1	74.2	3.9	72.4	10.2	93.6
1955-1959...	11.5	85.7	12.0	84.4	6.5	100.1
1950-1954...	5.7	91.4	6.2	90.6		
1945-1949...	3.3	94.7	3.5	94.1		
1940-1944...	2.5	97.2	2.8	96.9		
1930-1939...	1.7	98.9	1.8	98.7		
1920-1929...	0.8	99.7	0.9	99.6		
1910-1919...	0.2	99.9	0.3	99.9		
1900-1909...	0.1	100.0	0.1	100.0		
-1899*	0.0	100.0	0.0	100.0		
Total Loans.	2,603		2,360		108	

* Items dated before 1900 totaled less than 0.05 percent of all loans and therefore appear as 0.0 percent in the table.

not quite as great) was discovered by the survey at the NLM (2), by a survey of interlibrary loans covering all subject fields carried out at the N.L.L. in 1963, and by the Ash-Bruette survey (1). The figures derived from these surveys are presented for comparison in Table 7, columns (b), (c), and (d).

A correlation between language and type of publication shows that the book-to-journal ratio is significantly higher for Russian literature than for the whole sample. This can probably be attributed to the fact that the N.L.L. possesses the only really good collection of recent Russian scientific books in the United Kingdom and consequently attracts nearly all of the interlibrary loan requests in this field.

Variations in the proportions of literature used in different languages occur between different types of organizations. For instance, compared with the sample as a whole, universities rely significantly less than other organizations

on English-language publications, whereas "other nonprofit-making bodies," i.e., learned societies, trade and development associations, and research institutes, make more than average use of English literature. Notable variations in the use of Cyrillic literature also occur from one type of organization to another. Industrial firms, for instance, borrowed 54.5 percent of the Russian literature, although they were responsible for only 31.9 percent of the total loans (see Table 1). The above facts probably reflect the linguistic abilities of the people employed in the different organizations, rather than the importance of the literature to their work.

The distribution of the loans by language has also been studied for each of the different subject fields. The only noteworthy variation from the average, however, was discovered in the field of anatomy and physiology, where significantly more use is made of English than of foreign-language publications.

(e) DATE OF PUBLICATION

The distribution of publication dates of the literature borrowed is shown in Table 8. Column (a) gives the distribution figures for all items loaned, column (b) the figures for journal articles, and column (c) for books. The number of loans of other types of literature was so small that the date distribution figures are meaningless. Details of the age distribution for journals and books are also presented graphically in Figures 2 and 3.

From the figures in column (a) and from their graphical representation in Figure 2, it can be seen that the decay rate in the usefulness of medical literature is very rapid. Of all items loaned, 53.7 percent was less than three and one-half years old, and 74.2 percent was less than seven and one-half years old. If one considers the journal articles in isolation, the pattern is, not surprisingly, almost identical. The distribution of publication dates for books, however, suggests an even more rapid decay rate, but this conclusion should be treated with reserve, especially as it disagrees with other findings, (1), (4), and (6), since in the first instance the number of requests for books was relatively small, and in the second, the N.L.L.'s holdings of older books are rather poor.

Both for books and journals it should be noted that the peak demand was for literature

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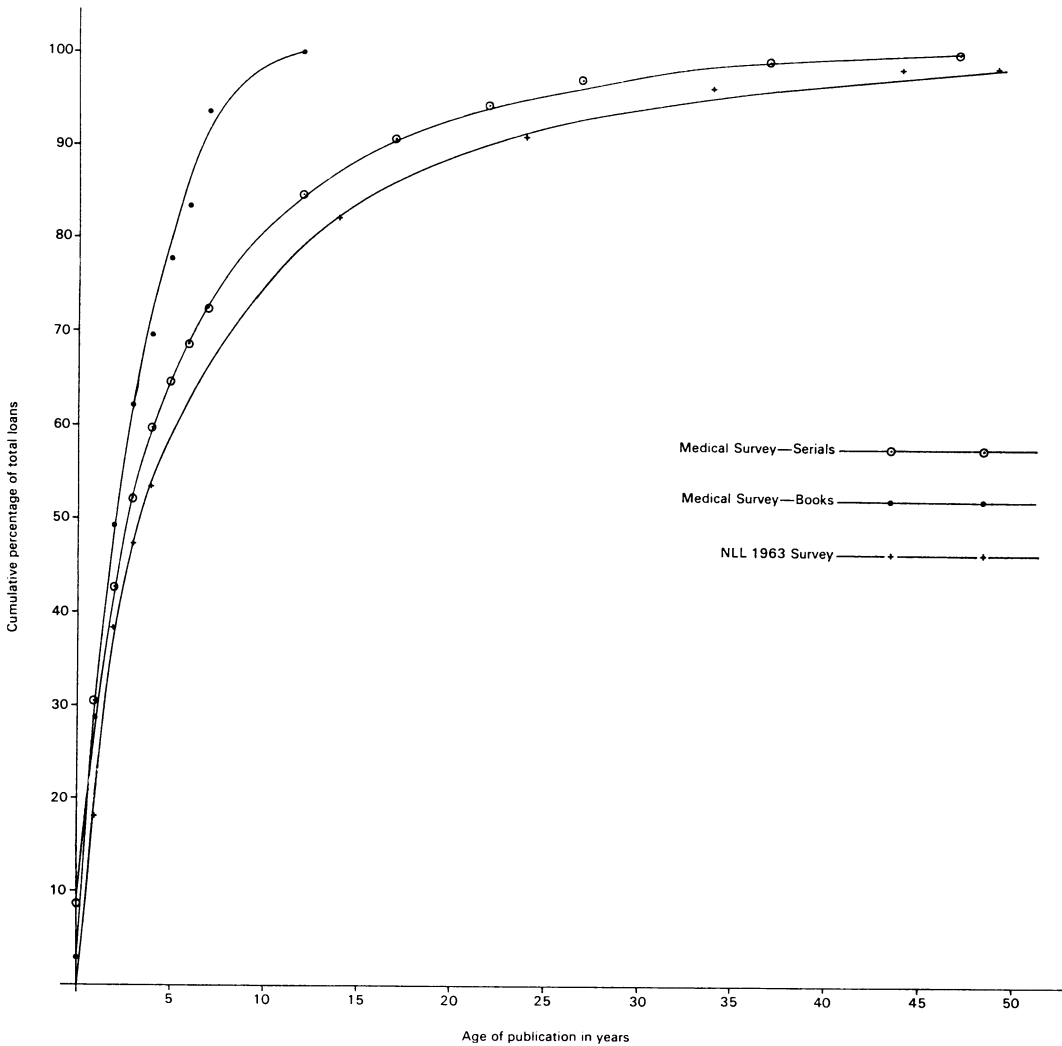


FIG. 2.—Date distribution of requests for books and serials

published in 1966 (see Figure 3). For older literature the demand gradually falls off, although the decline in use is much less erratic for serials than for books. These observations confirm the findings of the NLM (2), Yale (4), and New York (1) surveys.

It is interesting to compare the decay rate of medical literature with the decay rate of scientific literature as a whole. During 1963 the N.L.L. carried out a survey of all periodicals sent out on interlibrary loan. The graph obtained by plotting the cumulative percentage of loans against age of publication at the time of the survey is shown in Figure 2. By comparing

this and the equivalent graph for medical literature, it appears that medical serials have a quicker decay rate than the average scientific and technical journals.

Variations from the average decay rate are exhibited by the literature in particular subject fields and by the literature borrowed in connection with the different aspects of work referred to in the questionnaire. These variations are most obvious if we compare the proportion of literature in each category, which was published in 1964 or later, with the proportion for the sample as a whole. From these figures, which are presented in Table 9, it can

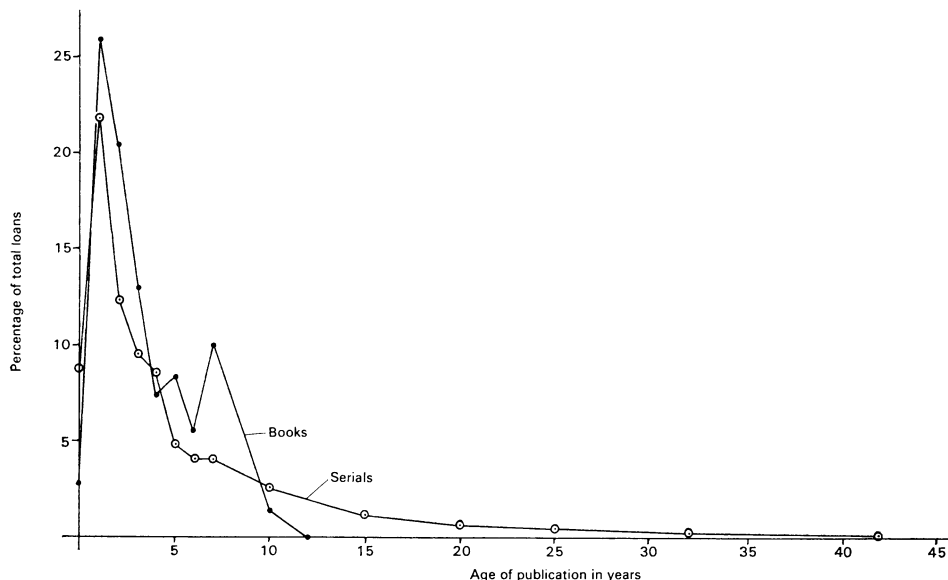


FIG. 3.—Date distribution of requests for books and serials

TABLE 9
USE OF RECENT LITERATURE IN DIFFERENT SUBJECT FIELDS

SUBJECT	PERCENTAGE OF LITERATURE PUBLISHED IN 1964 OR LATER
Mammalian Anatomy, Physiology	47.6
Health, Preventive Medicine	60.3
Pharmacy, Pharmacology, Therapeutics	56.2
Disease, Pathology, Psychiatry	48.8
Orthopedics, Regional Surgery, Ophthalmology	65.8
Gynecology, Obstetrics	44.7
Comparative Pathology, Veterinary Medicine	40.0
Dentistry	61.6
Miscellaneous	50.3
Not Defined or Not Definable	70.7
Whole Sample:	53.8

be seen that workers in the fields of comparative pathology and veterinary medicine make significantly less use, than the sample as a whole, of the recent literature, whereas those working in the surgical and orthopedic fields rely to a relatively high degree on the material published in the last three and one-half years. The fact that 70.7 percent of the literature in the "not defined" subject category was published in 1964 or later reflects the large number of requests from borrowers who use the N.L.L.'s collection for current-awareness purposes. These borrow-

ers merely ask for the journal by its issue number and do not specify a particular article. In this category, 39.3 percent of the requests was dated 1967, compared with a figure for the whole sample of 9.6 percent.

The various aspects of medical work, together with the proportion of literature published after the beginning of 1964 and borrowed in connection with that work, are given in Table 10. In view of the fact that students rarely require the most current information and often need to refer to the early work in a particular field, it is not surprising to note that in contrast to the overall figure of 53.8 percent, only 36.1 percent of the literature required in connection with study was published in 1964 or later.

TABLE 10
USE OF RECENT LITERATURE IN RELATION TO DIFFERENT TYPES OF WORK

ASPECT OF WORK	PERCENTAGE OF LITERATURE PUBLISHED IN 1964 OR LATER
Clinical Practice	59.0
Clinical Research	56.4
Nonclinical Research	51.5
Teaching	52.5
Other:	
(1) Preparation of Bibliography, etc.	40.5
(2) Technical Information Work	85.7
(3) Study	36.1
Whole Sample:	53.8

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Similarly, the preparation of a bibliography necessitates the use of older literature, and this fact is reflected in the figure of 40.5 percent. On the other hand, technical information work is usually concerned with drawing the attention of others to the most up-to-date information in a field, and therefore this probably accounts for the fact that a large proportion (85.7 percent) of the literature required for this purpose was published after January 1964.

(3) Sources of References to Publications Borrowed

(a) GENERAL

In question 2(a) (see Appendix A) respondents were asked to indicate how they had obtained the reference to the borrowed literature. The principal sources of bibliographical information were listed in the questionnaire, and the replies are presented in Table 11. The most used sources of references were firstly, citations in other papers, and secondly, abstracting and indexing publications. This fact confirms the findings of a survey covering literature in all subject fields carried out at the N.L.L. in May 1963 (7), and a similar one undertaken at the Science Museum Library in 1947 (8). This is not to say that citation lists and abstracting publications are the most important means of leading scientists to the primary literature but that they furnish the majority of references to the literature requested on interlibrary loan. A truer picture of the relative value of sources of bibliographical information is revealed if similar questions are asked about literature obtained not only on interlibrary loan, but from all sources. The survey carried out by Hogg and Smith (9) of the U.K.A.E.A., Risley, for instance, revealed that references in abstracting journals, in the library catalog, and in other periodicals and books were, together, responsible for only 10 percent of the literature consulted by the scientists questioned. On the other hand, over 40 percent of the items read was obtained without any prior reference being involved (i.e., as a result of scanning library shelves or current periodicals, etc.).

Returning to the N.L.L. data, one can see from Table 11 that, compared with abstracting publications and citation lists (either in periodicals or books), the remaining sources of information on references are used comparatively

TABLE 11
SOURCES OF REFERENCES

SOURCE OF REFERENCE	(A) WHOLE SAMPLE	(B) INDUS- TRIAL FIRMS
Abstracting or Indexing Publication.....	31.5%	37.1%
RINGDOC.....	0.8	2.4
MEDLARS.....	1.8	0.0
Other Computer Systems.....	1.1	1.9
Periodical Article.....	37.0	31.8
Nonperiodical Publication.....	10.3	7.8
Private or Library Index.....	5.8	9.0
Verbal Recommendation.....	8.6	6.7
Other.....	2.9	3.1
Not Stated.....	0.2	0.1
Total.....	100.0	99.9

rarely. Mechanized information systems, for instance, were, between them, responsible for only 3.7 percent of the references. In the case of MEDLARS (10), however, the rather small contribution which it appears to make to the information network can probably be attributed not so much to its ineffectuality as to the fact that at the time of the survey, the U. K. MEDLARS service was still only in its infancy.

The relative importance of the various sources of references has also been studied in conjunction with such parameters as date, type of publication, type of organization, and language. Here, however, only the four major sources of references were considered, since the numbers involved in the other categories are too small to warrant further analysis.

Date. The most significant variations in the relative importance of the sources occur when the dates of the references are considered. Figure 4 comprises a number of graphs which have been drawn by plotting the percentages of references obtained from different sources against the year of publication of these documents. From these graphs it can be seen that abstracting and indexing publications provided the bulk of the information (57.0 percent) about references less than three months old. Citations in periodical articles, on the other hand, provided only 10.0 percent of these recent references. The two sources were equally productive for references three years old, but for references ten years old, their relative im-

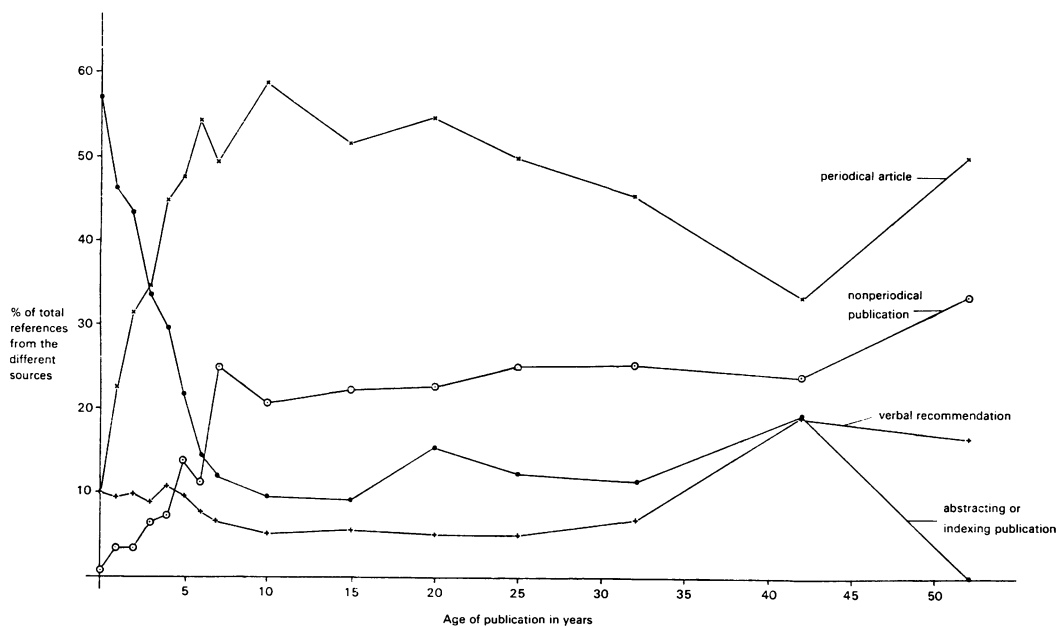


FIG. 4.—Date distribution of references obtained from various sources

portance was exactly reversed. The decay rate in the usefulness of abstracts and indexes is further demonstrated by the fact that over 50.0 percent of the references gleaned from these sources was to literature less than fifteen months old. This confirms Urquhart's conclusion that "half the actual value (though not necessarily half the potential value) of abstracts is not as works of reference but as topical literature which is scanned as it is received" (8).

Type of Publication. It is a well-known fact that abstracting publications are not good sources of information on the availability of books. This is emphasized by a breakdown of the sources of references by type of publication. Abstracting and indexing tools provided 32.7 percent of the journal references, compared with only 12.0 percent of the references to books. The most used sources of references to the latter are periodical articles (from which 30.6 percent of the references to books was obtained) and verbal recommendations (responsible for 24.1 percent of the book references).

Type of Organization. A breakdown of the various sources of references by type of organization shows few variations from the pattern revealed by the sample as a whole. The main differences are exhibited by industrial firms

which, as can be seen from Table 11, column B, make relatively greater use of the abstracting and indexing publications at the expense of citations in periodical articles. They also differ significantly from the sample as a whole in their use of the various mechanized information retrieval systems. Twenty out of twenty-one (95.2 percent) of the references obtained from the RINGDOC system for instance, were to documents borrowed by industrial firms—a not altogether unexpected finding in view of the fact that this system is designed primarily for access to pharmaceutical literature and that industrial firms are the heaviest borrowers of such literature. For the opposite reasons, industrial organizations make relatively little use of MEDLARS. This subject bias of the mechanized retrieval systems is further illustrated by the fact that whereas only 32.9 percent of the total references was to pharmaceutical literature (see Table 4), 66.7 percent of those located from the RINGDOC system, and only 18.8 percent of those obtained from MEDLARS, were to this type of literature.

Language. As stated above, the principal sources of references are abstracting journals and periodical articles. The relative importance of these two sources, however, varies with the language of the literature cited. Periodical articles, for instance, are the principal source of

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English-language references and provide relatively few references to foreign-language literature (presumably because few authors bother to read and hence to refer to such literature). Abstracting journals, on the other hand, are a fruitful source of foreign references. This difference is most marked when Cyrillic papers are considered on their own. Of the twenty-two such items borrowed, references to seventeen were obtained from abstracting journals, and only one from a periodical article.

(b) ABSTRACTING AND INDEXING PUBLICATIONS

The references to 819 of the 2,603 medical items used during the survey were obtained from abstracting and indexing publications. Table 12 shows the proportions of references in this category originating from the various publications. It is notable that nearly twice as many references were obtained from *Index Medicus* than from any other source. The two current-awareness publications, *Current Contents* and *Library Bulletin—Postgraduate Medical School of London*, were, together, the source of almost a quarter of the references. The references in the "other" category came from over sixty different sources, among which were *Nuclear Science Abstracts*, *Copper Abstracts*, *Journal—Textile Institute Abstracts*, and *Open Report List—BISRA*. A list of the sources used twice or more is presented as Appendix C.

Despite its good abstracts and wide coverage of the medical literature, *Excerpta Medica* is used only infrequently as a source of bibliographical information (see Table 12). This fact can probably be attributed to two causes. Firstly, compared with *Index Medicus*, there are few complete sets of *Excerpta Medica* in the United Kingdom, and secondly, because of its arrangement into twenty-eight independent subject sections, it is a relatively time-consuming activity to use it for carrying out a literature search on a subject covered by more than one section of the journal. If a single index to the whole of *Excerpta Medica* were available, it would certainly be of much more value and would probably attract more use.

It is at first perhaps surprising to note that two major abstracting journals outside the field of medicine, namely *Biological Abstracts* and *Chemical Abstracts*, provided so many references. *Chemical Abstracts* figures prominently

TABLE 12
ABSTRACTING AND INDEXING PUBLICATIONS USED
AS SOURCES OF REFERENCES

ABSTRACTING OR INDEXING PUBLICATION	PERCENT
<i>Abstracts of World Medicine</i>	0.7
<i>Biological Abstracts</i>	5.5
<i>Chemical Abstracts</i>	13.9
<i>Current Contents</i>	17.7
<i>Excerpta Medica</i>	2.6
<i>Index Medicus</i>	34.6
<i>Library Bulletin—Postgraduate Medical School of London</i>	6.6
Other.....	15.5
Not Stated.....	2.9
Total.....	100.0

because of its excellent coverage of pharmaceutical literature. Indeed, 29.8 percent of the pharmaceutical references gleaned from abstracts came from this source. That *Chemical Abstracts* is not exclusively of interest in this field, however, is indicated by the fact that 23.7 percent of the references obtained from it was to papers in other medical fields.

Although less obviously so, *Biological Abstracts* was also of primary use in one particular subject field—anatomy and physiology. Over 42 percent of the references obtained from it was in this field.

Figure 5 shows the date distribution of references obtained from some of the abstracting and indexing publications. It has already been noted that half of the references in this category was to material published in the previous fifteen months. As can be seen from Figure 5, a large proportion of the references to the more recent material was obtained from the current-awareness publications. *Current Contents* and the *Library Bulletin—Postgraduate Medical School of London* were, together, responsible for 76.1 percent of the references to 1967 material.

Again, in Figure 5 it can be seen that the date distribution of references obtained from *Chemical Abstracts* on the one hand, and other abstracting publications on the other, is strikingly different. *Chemical Abstracts* appears to be a much more valuable tool for locating older material, presumably because its cumulative indexes enable it to be used for lengthy retrospective searches.

The date distribution of references obtained from *Index Medicus* and from MEDLARS searches for the period 1963–1967 is compared

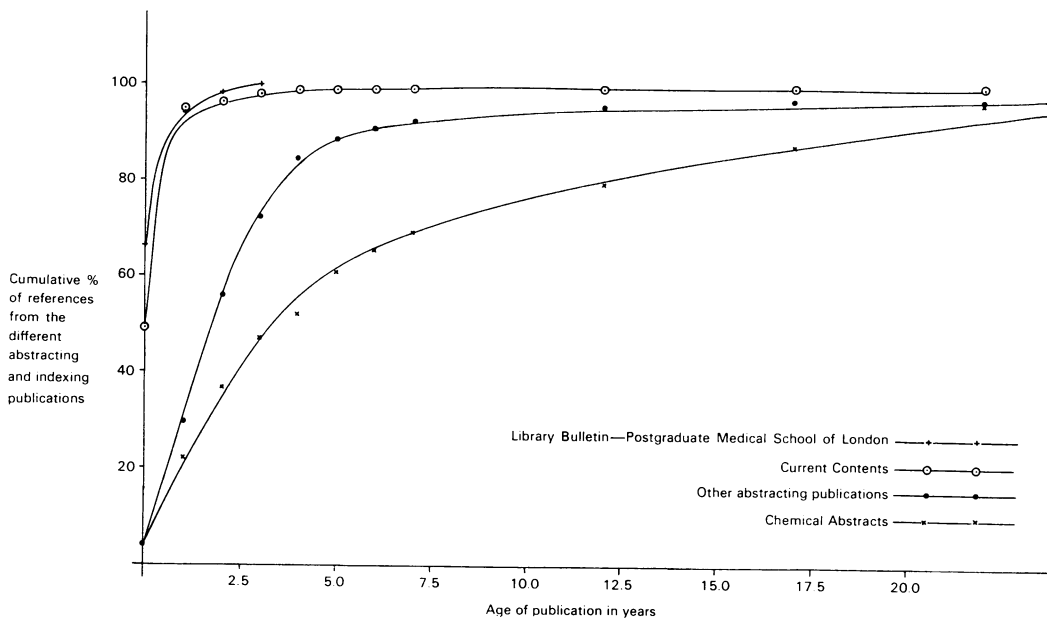


FIG. 5.—Date distribution of references obtained from abstracting and indexing publications.

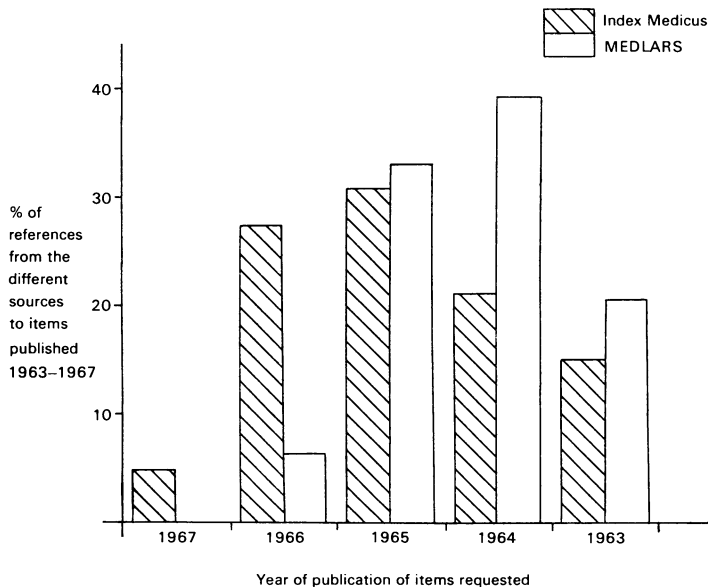


FIG. 6.—Date distribution of references obtained from *Index Medicus* and MEDLARS

in Figure 6. The difference between the two distributions is statistically significant, and suggests that *Index Medicus* is used primarily for searching the current literature, whereas MEDLARS, by its very nature, enables retrospective searching to be carried out with relative ease.

(c) RELATIVE VALUE OF VARIOUS SOURCES OF REFERENCES

Table 13, which presents the answers to question 3, Appendix A, "Would you still have asked for this paper had you had more information about it in the first place?", gives a

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measure of the comparative usefulness of the various sources of bibliographic information. Insofar as they guide users to a higher proportion of relevant documents, citations and verbal recommendations appear, in general, to be more reliable sources of bibliographic information than abstracting and indexing publications. Among the latter however, *Excerpta Medica* and *Abstracts of World Medicine* appear to be successful in giving users a good idea of the potential value of a paper, although it should be noted that between them, they provided only twenty-six references.

It is surprising that, despite its detailed and informative abstracts, *Chemical Abstracts* provided references to many papers which ultimately proved to be of little use to the requester. In this respect it is actually worse than *Index Medicus* which has no abstracts but merely provides subject headings as a guide to content. *Current Contents*, which gives no guidance as to content other than the title of the paper, gave rise to a large number of requests for irrelevant papers.

It would appear from the above that, while titles on their own offer inadequate guidance to the potential value of a medical paper, a detailed abstract is not necessarily more useful than a well-chosen subject heading.

It is interesting to compare the answers to

question 3 for papers to which references had been obtained from *Index Medicus*, on the one hand, and a MEDLARS search printout on the other. The latter is able to give a much clearer idea of the subject content of a paper than *Index Medicus*, since each reference is accompanied by a list of all the subject headings under which it has been indexed. Furthermore, the depth of indexing is greater than in the case of *Index Medicus*. From Table 13 it can be seen that the MEDLARS printout appears to be a more reliable guide to useful papers than is *Index Medicus*.

SUMMARY

- (1) The major interlibrary borrowers of medical literature were industrial organizations (31.9 percent of the total) and universities (30.4 percent of the total).
- (2) 90.6 percent of the items requested on interlibrary loan was periodical articles.
- (3) 3.3 percent of the titles used (twenty-eight titles) accounted for 21.5 percent of all periodical requests.
- (4) 88.2 percent of the publications was in English.
- (5) 74.2 percent of the items borrowed was published since 1960.
- (6) The main sources of references to items sent on interlibrary loan were citation lists in periodical articles (37.0 percent of the total) and abstracting or indexing publications (31.5 percent of the total).
- (7) Half of the references obtained from abstracting and indexing publications was to literature published in the previous fifteen months.
- (8) Nearly twice as many references were obtained from *Index Medicus* as from any other abstracting or indexing publication.
- (9) At the time of the survey, the mechanized information retrieval systems made only a relatively small contribution as sources of references to medical literature.
- (10) A detailed abstract is not necessarily more useful than a well-chosen subject heading as a guide to the relevance of a scientific paper.

TABLE 13
RELEVANCE OF REFERENCES

SOURCE OF REFERENCE	PERCENT REPLYING FAVORABLY TO QUESTION 3*
Abstracting or Indexing publication:	66.2
<i>Abstracts of World Medicine</i>	100.0
<i>Biological Abstracts</i>	93.3
<i>Chemical Abstracts</i>	69.3
<i>Current Contents</i>	13.8
<i>Excerpta Medica</i>	95.2
<i>Index Medicus</i>	74.9
<i>Library Bulletin—Postgraduate Medi- cal School of London</i>	77.8
RINGDOC.	71.4
MEDLARS.	87.5
Other Computer Systems.	75.0
Periodical Article.	83.5
Nonperiodical Publication.	82.4
Private or Library Index.	87.4
Verbal Recommendation.	87.1

* See Appendix A

DAVID N. WOOD AND CATHRYN A. BOWER

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APPENDIX A

SURVEY OF THE USE OF MEDICAL LITERATURE

Requisition No.

Week	Year of publication	Month of receipt	Shelfmark

Type of organization	Language	Subject	Type of publication

Please Tick in the Appropriate Boxes

1. With what aspect of your work was this request primarily connected?
Please tick one box only.

Clinical practice	<input type="checkbox"/>	1
Clinical research	<input type="checkbox"/>	2
Nonclinical research	<input type="checkbox"/>	3
Teaching	<input type="checkbox"/>	4
Other (please state)	<input type="checkbox"/>	5

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2.(a) Where did you obtain the reference?

Abstractin or indexing publication (e.g., *Chemical Abstracts, Index Medicus*)

RINGDOC

MEDLARS search output

Other special computer search output (e.g., from *CBAC* tapes)

Periodical article

Nonperiodical publication (e.g., book, thesis)

Private or library index

Verbal recommendation

Other (please state)

	1
	2
	3
	4
	5
	6
	7
	8
	9

2.(b) If from an abstracting or indexing publication; i.e., you have ticked the first box in the previous section, which of the following?

Abstracts of World Medicine

Biological Abstracts

Chemical Abstracts

Current Contents

Excerpta Medica

Index Medicus

Library Bulletin—Postgraduate Medical School of London

Other (please state)

	1
	2
	3
	4
	5
	6
	7
	8

3. Would you still have asked for this paper had you had more information about it in the first place?

Yes	No

4. Was the publication as useful as you expected it to be from the available information?

Yes	No

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APPENDIX B
MOST-USED SERIAL TITLES

Rank	Number of Times Used	Serial Title	Country of Origin
1	36	American Journal of Obstetrics and Gynecology	U.S.A.
2	29	Annals of the New York Academy of Sciences	U.S.A.
3	28	Proceedings of the Society for Experimental Biology and Medicine	U.S.A.
4	27	New England Journal of Medicine	U.S.A.
5	26	Lancet	U. K.
6	23	Journal of the American Medical Association	U.S.A.
6	23	Journal of Laboratory and Clinical Medicine	U.S.A.
8	22	American Journal of Physiology	U.S.A.
9	21	Circulation Research	U.S.A.
10	20	Journal of Pharmacology and Experimental Therapeutics	U.S.A.
11	19	American Journal of Clinical Pathology	U.S.A.
12	18	Journal of Biological Chemistry	U.S.A.
12	18	Journal of Pharmacy and Pharmacology	U. K.
14	17	Journal of Pharmaceutical Sciences	U.S.A.
14	17	Laboratory Investigation	U.S.A.
16	16	Journal of Clinical Investigation	U.S.A.
16	16	Journal of Hygiene	U. K.
16	16	Journal of Investigative Dermatology	U.S.A.
19	15	Archives Internationales de Pharmacodynamie et de Thérapie	Belgium
19	15	British Medical Journal	U. K.
19	15	Journal of Clinical Pathology	U. K.
22	14	Annals of Rheumatic Diseases	U. K.
22	14	Cancer Research	U.S.A.
22	14	Gastroenterology	U.S.A.
22	14	Journal of Physiology	U. K.
22	14	Obstetrics and Gynecology (New York)	U.S.A.
27	13	Archives of Environmental Health	U.S.A.
27	13	Journal of Experimental Medicine	U.S.A.
29	12	Acta Physiologica Scandinavica	Sweden
29	12	American Journal of the Medical Sciences	U.S.A.
29	12	Anatomical Record	U.S.A.
29	12	Journal of Immunology	U.S.A.
29	12	Proceedings of the Royal Society of Medicine	U. K.
34	11	American Journal of Pathology	U.S.A.
34	11	Annals of Internal Medicine	U.S.A.
34	11	British Journal of Experimental Pathology	U. K.
34	11	Clinica Chimica Acta	Netherlands
34	11	Clinical Chemistry	U.S.A.
34	11	Journal of Pediatrics	U.S.A.
34	11	Science (New York)	U.S.A.
41	10	Biochemical Pharmacology	U. K.
41	10	Chemical and Pharmaceutical Bulletin	Japan
41	10	Journal of the National Cancer Institute	U.S.A.
41	10	Journal of Clinical Endocrinology and Metabolism	U.S.A.
41	10	Journal of Dental Research	U.S.A.
41	10	Journal of Nutrition	U.S.A.
41	10	Medical Journal of Australia	Australia
48	9	American Journal of Digestive Diseases	U.S.A.
48	9	American Journal of Medicine	U.S.A.
48	9	Archives of Ophthalmology	U.S.A.
48	9	Arthritis and Rheumatism	U.S.A.
48	9	Canadian Medical Association Journal	Canada
48	9	Journal of Applied Physiology	U.S.A.
48	9	Journal of Medicinal Chemistry	U.S.A.
48	9	Journal of Neurosurgery	U.S.A.

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APPENDIX B—Continued

Rank	Number of Times Used	Serial Title	Country of Origin
48	9	New York State Journal of Medicine	U.S.A.
48	9	Pharmacological Reviews	U.S.A.
48	9	Pharmazie	Germany
48	9	Southern Medical Journal	U.S.A.
60	8	American Heart Journal	U.S.A.
60	8	American Journal of Surgery	U.S.A.
60	8	American Review of Respiratory Diseases	U.S.A.
60	8	Australian Journal of Experimental Biology and Medical Science	Australia
60	8	Blood	U.S.A.
60	8	Bulletin of the World Health Organization	Switzerland
60	8	Clinical Pharmacology and Therapeutics	U.S.A.
60	8	Diseases of the Chest	U.S.A.
60	8	Journal of Endocrinology	U. K.
60	8	Journal of Surgical Research	U.S.A.
60	8	Postgraduate Medical Journal	U. K.
60	8	Presse Médicale	France
60	8	Scandinavian Journal of Clinical and Laboratory Investigation	Norway
60	8	Surgery, Gynecology, and Obstetrics	U.S.A.

APPENDIX C

ABSTRACTING AND INDEXING PUBLICATIONS OTHER THAN THOSE LISTED IN APPENDIX A WHICH WERE USED TWICE OR MORE

Number of Times Used	Title
9	Bulletin of Hygiene
8	International Pharmaceutical Abstracts
7	Gas Chromatography Abstracts
7	List of books received from the U.S.S.R. and translated books (N.L.L.)
7	Psychological Abstracts
5	Analytical Abstracts
5	Library Bulletin of the Central Public Health Laboratory
4	Bibliography of Reproduction
4	Ergonomics Abstracts
4	Review of Medical and Veterinary Mycology
4	Science Citation Index
3	British Journal of Dermatology
3	C.I.S. Abstract Cards
3	Current Chemical Papers
3	Hospital Abstracts
3	Index Veterinarius
3	Nuclear Science Abstracts
3	Scientific and Technical Aerospace Reports
2	AERE Information Bulletin
2	Abstracts from Current Scientific and Technical Literature—British Food Manufacturing Industries Research Association
2	Cancer Chemotherapy Abstracts
2	Chemical Titles
2	Industrial Abstracts of Biological Sciences
2	Nuclear Medicine
2	Ophthalmic Literature
2	Unlisted Drugs
2	Water Pollution Abstracts