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Spatial Growth in University Libraries

GROWTH is defined by Webster as 'increase in size, number, frequency, strength, etc.' This article will not attempt to deal with all phases of the subject which might be applied to university libraries. It will not consider, for instance, growth in library budgets in general or in book appropriations in particular, or growth in the complexity of university library administration. It will not deal with acquisition policies, which in the final analysis determine growth. It will confine itself to a consideration of growth in space requirements. This consideration will be based upon and directed toward university libraries in the United States, although inevitably many of the remarks, at least in some measure, will have force for all libraries, anywhere, in which the problem of spatial growth exists.¹ The article will attempt to analyze the problem on a general theoretical level, objectively rather than subjectively, in the hope that such an analysis will help to provide a basis from which solutions may be developed. It will not pretend, of itself, to offer solutions, although it will venture a suggestion or two which might mitigate conditions. These suggestions will be amplified, in a later issue of the *BULLETIN*, by a discussion of the efforts to meet the problem at Harvard.

Spatial growth, of various kinds, is a characteristic of universities generally, and has been notably so of American universities. Many universities have increased in the number of their students year by year, and all universities, unless they are decadent, gradually enlarge or replace sections of their physical plants. The standards of living have risen, and the quarters for students that were satisfactory a hundred years ago are no longer so considered. Classroom specifications have changed, and laboratories have developed. University administration has become increasingly complex, administration buildings and offices have expanded tremendously, and so on. What then is the special space problem in connection with university libraries that differs from other university space problems, and that makes it more serious? The answer

¹In this, as in similar articles in the *BULLETIN*, a university library is thought of as the entire library system of an institution providing opportunities for graduate work and advanced research, on an extensive scale, in the arts and sciences and the standard professional subjects.

is comparatively simple. The library growth is of a type that occurs in any activity where there is an accumulation of things. As individuals, most of us have had to face it. As the years go by, possessions that take up space accumulate. If some are not discarded as rapidly as others are acquired, complications arise. The shift in recent years from life in a private house to an apartment that is limited in size has forced many to reduce the collections that they have acquired as individuals. This reduction is accomplished by discarding. University libraries have not made a practice of discarding their books. Therefore, they have a space problem and it is often acute.

Why wasn't this special problem of library growth realized and understood and faced in the past? Libraries are not new even in America. Harvard University is three hundred years old and has always had a library. Universities and their libraries almost always start simultaneously. Universities and the number and size of their buildings have increased tremendously during the past two generations, and the need for enlarged library facilities is not new, but it was not realized fully until comparatively recent years that libraries presented a very special problem. The great growth in colleges and universities which has taken place since 1880, the growth in the number of students, in the size of the faculties, and in physical plants, which may well be considered as abnormal if we think in long terms, obscured, without completely concealing, the peculiar features of library growth. Now that some of the other factors of growth in universities seem to be slowing up, while the libraries continue to grow, the problem for the latter naturally becomes more apparent and will increase rapidly in relative importance as time goes on. The total number of college students was under 50,000 in 1870; under 60,000 in 1880; but reached 225,000 in 1900; and 1,500,000 in 1940. This growth began at about the same time that the size of the largest libraries reached a point where their growth became an important factor in university space needs. The Harvard University Library passed the 100,000 mark in 1855. Yale reached 100,000 in 1873; Columbia in 1888; Cornell in 1889; the University of Pennsylvania in 1891; and Princeton in 1896. Until there are 100,000 volumes in a library, the total space occupied by books is not considerable or of any particular moment, and, as has just been noted, libraries did not pass this number until the time when their universities were growing rapidly.

It now seems probable that the growth of physical plants, at least in

the privately supported universities, will slow down after a period of post-war expansion. There is a limit to the number of individuals of college age. But not, as the Preacher says, to the making of many books. Library collections seem to continue to grow by geometric progression. What might seem destined to be an appalling situation can be demonstrated more clearly by oversimplifying, as will be done in the next paragraph.

Let us say that a library building today represents 10 per cent of the total cubic space in all its university's buildings. Its collections are growing at the rate of nearly 4 per cent a year, or doubling in 20 years, since the growth is geometric. (Fremont Rider, the Librarian of Wesleyan University, who has made a special study of the problem, says that college and university libraries have for the past hundred years and more doubled every 16 years,² so the figure of 20 years seems conservative.) The rest of the university has a student body that is no longer increasing (this may well be the case in many institutions after the present pressure from veterans is past), and its physical plant, aside from the library, will increase at the rate of 1 per cent a year after the institution has caught up with its war deficit in construction. Twenty years from now, the space required for the library will be approximately double that of today, while the rest of the university will have increased only 25 per cent in its requirements. That is, the 90 units of space (each per cent of space now in use being considered a unit) that was occupied by the rest of the university will increase in the 20 years by one quarter, or to 112½ units, while the 10 units of the library space will increase to 20 and its percentage of the whole, instead of being 10, will then be 15. This is bad enough, but in 20 more, or 40 years from now, the library will occupy 40 units, the rest of the university 140, with 22 per cent of the total devoted to the library. In 60 years the figures will be somewhat as follows: 175 units for the rest of the university and 80 for the library, giving the library 31 per cent of the total; in 80 years 219 units for the rest of the university, 160 for the library, and 42 per cent of the space for the latter; and in 100 years, 275 for the rest of the university, 320 for the library, or 54 per cent of the total space. This is enough to give some indication of the problem without going on to a second century.

There are of course certain possible fallacies in the above statement.

²Fremont Rider, *The Scholar and the Future of the Research Library* (New York, 1944).

The calculations have been made on the assumption that the space needs for the library as a whole must increase at the same rate as the book collection, and that the book collection will continue to increase at the same rate as during the past hundred years or so, but the figures do illustrate the situation. What it all sums up to is simply that any part of a university where material accumulates without being discarded tends to take a larger and larger percentage of the total space occupied by the university. The students do not accumulate. They graduate and are replaced by others, taking no more, or little more, space than earlier ones. The same holds true with the faculty. The number of students and faculty may gradually increase, but there is no accumulation by geometric progression as is true with libraries, and for that matter with museums. In fact, several of our larger museums are probably further along in the progression than comparable libraries, and have already in a number of instances reached the stage where, more extensively than in libraries, collecting has of necessity become much more selective and a policy of discarding or of inexpensive storage in a basement or elsewhere to save space and expense has been adopted.

We now have the background of the problem of library growth. One part of our universities, the libraries, are by the very nature of things increasing more rapidly than most of the other parts. That part has now become so large (whether it occupies 5, 10, or 15 per cent of the total) that its growth has become a serious factor, at least in the institutions with library collections of a million volumes or more. For those with two million or over, it may be very serious. For those with even half a million, it will probably become serious within a generation.

In any attempt to understand this question of growth, various phases must be considered. Fremont Rider, in the first half of his provocative book, already alluded to, poses the problem very well. Chapter I of this section tells in some detail of the growth of American research libraries in the past, with conclusions which will receive some comment in the present article. Then, after a chapter defining the research library, Chapter III takes up the four factors of the problem of growth, and explains very clearly that the difficulty does not rest merely in the increase of storage space required for books, but that the cost of acquisition, the cost of physical preparation for use, and the cost of the bibliographical preparation that we call cataloguing are equally or more serious. Mr Rider then goes on in Chapters IV-VI to discuss

past attempts at solutions of the problem: weeding out, economies in methods, and interlibrary cooperation. After careful consideration, he decides that none of these attempts has brought or will bring satisfactory results, and in the second half of his volume he proposes in their place the microcard plan, by which most of the books in research libraries are ultimately to be replaced by photographic reproductions printed on the back of their own catalogue cards, and so take no library space, and represent almost no cost for acquisition, for physical or bibliographical preparation, or for replacement through wear.

The writer of this article agrees without hesitation that Mr Rider's analysis of the situation is the best statement that has been made so far of the problem of growth, as well as the most provocative one. He believes that Mr Rider's solution is imaginative and attractive, but for reasons which he has already expressed in print⁸ disagrees with the conclusions, and wishes to state again that he believes the whole story is not yet told, and that further discussion of it is desirable. This article has been prepared as a contribution toward putting the problem of spatial growth in university libraries in its proper setting, with the belief that until this has been done, the solution of the problem cannot be satisfactorily undertaken.⁴

Space requirements fall chiefly into five categories, as follows:

I. Space for book storage. This is in some ways the most basic of all, and will be given the most attention.

II. Space for readers. This is determined by the size of the clientele, by the amount of use it makes of the library, by the educational program of the university, by the peak loads, and by the types of accommodations and service given.

III. Space for staff. This includes administrative office space and space for the order and catalogue departments, as well as for the staff giving direct services to the public.

IV. Space for lobbies, corridors, communications, utilities, ventilation, and air conditioning.

V. Space used for monumental or memorial purposes.

⁸ *Library Journal*, LXX (1945), 718-723.

⁴ The increase in library budgets is another serious problem, but only part of it goes back to space requirements. A later article in the BULLETIN is to discuss the question of library expenditures; the present article will touch upon them only incidentally.

There might also be considered high construction costs, which may be caused by luxurious facilities, or low costs made possible by sub-standard work, and in this connection the cost of upkeep, which may be so much greater with low-grade construction as to prove more costly in the end, should not be forgotten. No attempt will be made, however, to deal with this aspect of the question under discussion.

I. SPACE FOR BOOK STORAGE

The space used for book storage is of basic importance in a library because it tends to take a constantly increasing percentage of the total space in the library and in the university as a whole. It therefore seems worth while to examine in detail the essential factors in the problem of book storage, as embodied in these three questions:

1. Just how much room do books actually take?
2. What are the present and prospective rates of growth in libraries of different sizes and types, and how do these affect the total amount of space required by the libraries?
3. If book collections are analyzed, just where does the growth come, that is, with what kind of material?

Following a discussion of these questions, comments will be offered regarding some of the expedients suggested or in partial use for mitigating or eliminating the problem.

1. *Actual Space Occupied by Books*

How much space do books actually take? This depends of course, on a number of variables, such as methods of shelving; the width of aisles; the amount of space taken up by stairs, elevators, etc.; the size of the books and the number shelved per foot of shelving; the distance between shelves; and the space left for growth. A conservative basis on which to figure is 2 volumes per cubic foot and 15 per square foot.⁵

⁵Let us take a hypothetical case of a stackroom with 10,000 square feet (that is, 137 feet long by 73 feet wide), with a center aisle 5 feet wide, side aisles 4 feet wide, and a center cross aisle 7 feet wide. We will place the stack ranges on 4 foot, 5 inch, centers—the main stack in the Widener building at Harvard is 4 feet, 2 inches, on centers, although stack manufacturers now advocate 4 feet, 6 inches. We find that such a stack, allowing a deduction of 25 sections for stairs and elevators, which is a generous allowance, will have room for 1175 standard sections, 3 feet long. If we figure 6 1/10 books to a foot, and 7 shelves to a section, this stack would hold comfortably 150,000 volumes, or almost exactly 15 volumes per square foot of total floor

Let us then translate this into the situation in a large library. A collection of two million volumes can be cared for in one million cubic feet. The Harvard Library, with nearly five million volumes, should be able to store its books in two and one half million cubic feet, or one fourth of the total space that the University now devotes to library purposes. The Library of the University of Pennsylvania, with approximately one million books, will require some 500,000 cubic feet of space for its collections, which is perhaps one tenth of the total space that it now uses for library purposes. If the deposit library principle now in use in the Boston area is applied, and one third of the bulk of the library's books is stored under 'deposit library' conditions, where four volumes per cubic foot may be considered standard, the total space requirements will be reduced by one sixth. It should be remembered, however, that all these calculations relate to static collections, and contain no allowance for growth.

2. *Present and Prospective Rates of Growth*

The second question concerning book storage deals with the present and prospective rates of growth in libraries and how these rates affect the percentage of all library space used for book storage. The rate of growth of a library depends partly on its age and size, partly on its place in the community (with attendant aims and responsibilities), partly on the length of time it has been performing approximately the same functions, and partly on the funds available. The United States, as far as its library development is concerned, is still a new country and most of its libraries may be said to be still in their adolescence, if not in their infancy. We do not know how much, or how rapidly, they will grow in the future. We do not have for libraries the data that are available for human beings, for instance. We are safe in saying that a large percentage of all men when adult will be between five and six feet in height, and will weigh between one and two hundred pounds. But libraries are another matter. Just because the Library of Congress now has over eight million volumes and pamphlets does not

space, or almost exactly 2 volumes per cubic foot if stack floor levels are 7 1/2 feet apart. Fifteen volumes per square foot is the figure used by James Thayer Gerould in his *College Library Building* (New York, 1932) and by William M. Randall in his *College Library* (Chicago, 1932). Earlier estimates made by William F. Poole (1876), Charles C. Soule (1912), and William R. Eastman (1918) varied from 20 to 27 per square foot.

mean that all other libraries, or even all other general research libraries, must look forward to reaching even half that size. American libraries in general may have doubled every sixteen years during the past century, but this does not mean that they will continue to do so in the next century, any more than that the population of the United States, having increased 30 per cent or more each decade from 1790 to 1860, must be expected to continue at the same rate in the seven following decades and then on indefinitely. There seems to be no more basis for the theory suggested by the late Professor C. N. Haskins of Dartmouth, who in studying the question of library growth prior to the building of Dartmouth's Baker Library found that libraries had a tendency to grow at a set pace, not the same pace for all libraries, but a rate specific for each library which seemed to continue indefinitely. On the contrary, the present writer believes that the turn in the road has already come, and that wartime conditions have accentuated the turn.

Mr Rider, discussing the growth of women's colleges, reported that Smith, Vassar, Wellesley, Bryn Mawr, and Mt Holyoke more than quadrupled between 1900 and 1925, or had doubled at the rate of once every 12 years, but if he had considered these same 5 libraries for the 16 years from 1929 to 1945 he would have found that for the first half of the period they increased 34 per cent, and for the last half only 27 per cent. That is, they have grown since 1937 in such a way as to double once in 23 years, not 12 years. These libraries were growing abnormally in the first quarter of the century because they were still in their infancy. It is not strange that their growth has slowed up in recent years.

If older liberal arts colleges are considered, further indication is found that as libraries age their rate of growth slackens. Allegheny, Bowdoin, Hamilton, Haverford, Oberlin, Trinity, Union, Washington and Lee, Wesleyan, and Williams are colleges in the northeastern quarter of the country, all now over one hundred years old. Reasonably mature for American colleges, they are also active, up-to-date, and progressive institutions. They may be considered a fair sample, and typical of the better liberal arts colleges. In 1929 they had between them 1,304,000 volumes; in 1927, 1,639,000 volumes; and in 1945, 2,021,543. Consequently, instead of doubling at the rate of once in 16 years, it will now take them 28 years to double in size, and if Wesleyan, which seems to be in the process of becoming a university

library, is omitted, the rate of increase since 1939 would cause them to double not more often than once in over 30 years.

University libraries — and it is this group in which we are particularly interested — are in general still in their childhood as research institutions. This is true even of Harvard, the oldest of American university libraries. Harvard exactly doubled the size of its library collections from 1923 to 1943, that is in 20 years, but it must be remembered that this was a time of what might be called unusual growth for Harvard in other ways. Its physical plant more than doubled in the same period. Endowment nearly tripled, rising from \$58,000,000 to almost \$170,000,000. The only statistics for university libraries prepared on the same basis for a considerable period are those begun in 1913 by James Thayer Gerould, then Librarian of the University of Minnesota. He continued these statistics after his transfer to Princeton, and following his retirement they have been kept up by the present Librarian, Julian P. Boyd. If we take the ten largest university libraries in the 1913 figures, the first year of the series, leaving out only the University of Illinois because that university completely changed its counting methods a few years ago, we find that these ten institutions had 4,973,000 volumes in 1913. In 1929 there were 10,790,000 volumes; that is, they considerably more than doubled in the 16 years, confirming Mr Rider's figures. From 1929 to 1933, the average yearly increase was 4.2 per cent, enough to double in 17, if not 16 years. This was depression time, and growth was naturally a little slower. Mr Rider's 16 years might still be said to hold. From 1934 to 1937 the increase was 3.4 per cent per annum, which would double in a little over 20 years, which is the figure that has generally been considered reasonably accurate. But from 1938 to 1941, which was before the war took full effect and was in some ways the most normal four-year period since 1929, the increase was 3.1 per cent, which, when compounded, results in doubling in 23 years. From 1942 to 1945 it was definitely war-time, and probably not typical. During this period the rate dropped to 2.4 per annum, which would double only once in over 28 years, and for the last two years the increase has been at the rate of 1.9 per cent, or a doubling about once in 37 years.

In any event, university libraries may continue to double in size every 30, or 20, or even 16 years in the future without bringing about an alarming condition, provided the size and financial support of the whole university increases at the same rate. It is when the book col-

lection increases more rapidly than the other parts of the institution that trouble may be looked for. This disproportionate growth is now taking place in at least a few of the largest university libraries, if we consider the present post-war conditions only temporary, and it is a serious and portentous matter. How serious a problem the growth of the book collection is, however, depends partly on the space that a library requires for other purposes. This point will be left until a later part of the article, when the question of the relationship between the space for books and that used for readers and other purposes will be discussed.

3. *Growth in Different Parts of the Book Collection*

The third question relating to book storage read, 'If book collections are analyzed, just where does the growth come, that is, with what kind of material?' Book collections affecting the problem of growth may be divided into six groups:

- a. Newspapers
- b. Periodicals and serials of all kinds
- c. Public documents
- d. Trade books
- e. Trade pamphlets
- f. Ephemeral material

a. Newspapers

Newspapers are one of the large groups as far as space is concerned. This is particularly true in state libraries and often in libraries in state universities, where newspapers may take up to 20 per cent or more of the total stack area. The average newspaper volume (depending of course upon its thickness) occupies as much stack space as 15 average-sized books. The University of Illinois devotes 25,000 square feet to its 23,000-volume newspaper collection. At Harvard, before the main newspaper collection was moved to the New England Deposit Library, newspapers were shelved in stacks constructed for books, as there were no special newspaper stacks in the Widener building, and they occupied both sides of double-faced cases, making every other aisle useless. The shelves were 40 inches long, not 36, to say nothing of the 26 that is adequate for modern newspapers, and 10,000 newspaper volumes occupied space that might have cared for 200,000 books. These

figures are rough, and should be taken as estimates only, but they indicate that, if the newspaper collection is even fairly large, the total space it occupies may be very considerable. Fortunately, perhaps, this is a problem that is in process of solving itself. Newspapers printed before the wood pulp period are not found in large enough numbers in any one library in this country to present a serious problem. Papers printed on wood pulp — and that includes most of those published since the 1870's — have already disintegrated or must do so in a comparatively few years, and at this time many librarians are using more newspaper shelving than they will ten or twenty years hence. It is becoming the standard practice in more and more institutions to rely on microfilm reproductions of modern newspapers in place of the originals, and if we estimate that 10 per cent of the bulk (not the number of volumes) in today's university library collections is made up of newspapers, and collections in general double in 20 years (which as has been indicated above they probably will not do), 20 years from now the newspaper may occupy not 10 per cent, but only 5 per cent, or even less, of the total shelf space. There seems to be cause for hope, as far as storage space for newspapers is concerned, largely, it must be admitted, because newspapers as physical entities are apparently doomed.

b. Periodicals, etc.

Periodicals and serials of all kinds are a second class of space-occupying material in libraries. They present a different picture from newspapers. They are increasing in number and in bulk, and in most libraries have occupied a larger percentage of stack space each year during the past generation at least. Can this, will this, continue? I do not know, but I can quote President Colwell of the University of Chicago, who in a speech before the Association of American University Presses at Princeton in January 1947 said that 'no dispassionate scholarly observer of mature years is likely to challenge the statement that we now have more learned journals than scholarship needs.'⁶ In that statement lies at least a ray of hope. Many foreign journals were discontinued during the war, and it is not known how many of them have been, or will be, revived. With the increased cost of subscriptions, resulting from the increase in printing rates, which are estimated to have risen 20 per cent in the year 1946 alone, libraries may well check

⁶ *Publishers' Weekly*, 1 February 1947, p. 518.

their lists carefully, and in some cases reduce them. The duplication of little-used foreign periodicals in American libraries before the war was great, and probably to some extent extravagant. It is doubtful whether many university and research libraries will feel that they can spend in the future a much larger percentage of their appropriations for periodicals than in the past, and unless subscription rates for periodicals are decreased in comparison with the cost of books, and unless total appropriations for books and periodicals are greatly enlarged, the bulk of periodical acquisitions may stop growing geometrically, or at least may not continue to grow on the basis of doubling every 16 or 20 years.

c. Public Documents

Public documents make up the third type of publication, and the one that in the last generation probably has increased in total and relative bulk to the greatest extent. A glance at the Library of Congress acquisition statistics of recent years will show what appalling results may occur when a library is ready to acquire public documents of all kinds in as large quantities as they can be obtained.

Public documents fall into two main groups, those printed and those reproduced by a near-print process. The latter, in most cases, will disintegrate as rapidly as newspapers, and the cost of handling them in comparison with their permanent research value is large. The flood that came from the war-time activities of our own Federal agencies must have reached its peak and is bound to ebb as the years go by if we measure it by the number of items libraries try to keep, rather than by the number issued. As far as the printed documents are concerned, there must be a limit to the number that can be issued. Publication tends to take a not inconsiderable percentage of all government expenditures. There has been a tremendous increase in government expenditures in this country (and in foreign lands for that matter) that came first with the twentieth-century movement toward centralization of all kinds of activities in governments, and was greatly accelerated by the two World Wars. Government expenditure has reached a point where it takes about as large a percentage of the country's total income as can be afforded, and there is at least a prospect that in the future printed public documents may decrease rather than increase, a tendency which, it must be admitted, has been absent, except for very limited periods, since the adoption of the Constitution in 1789.

United States Federal documents are, of course, only part of the problem. State, municipal, and other public documents are also numerous, although comparatively few libraries acquire them extensively. The same holds true with foreign public documents. Miss Winifred Gregory's *List of the Serial Publications of Foreign Governments* showed what was being acquired in American libraries fifteen years ago, and indicated that the greatest interest lay in the publications of the larger countries. Document acquisition may increase for the next few years, but it seems doubtful that it will make up a larger percentage of total acquisitions ten years from now than it does at present.

d. Trade Books

Regular trade books are the backbone of any collection, however extensive a library's scope, and they generally represent a larger and larger percentage of the total as one turns to smaller university and college libraries. There are, unfortunately, no completely reliable figures on world book production, but those recorded in Robert B. Downs's volume on union catalogues⁷ represent what LeRoy Merritt was able to gather together from the available sources. They give little or no indication of a geometric increase in book production throughout the world, and unless book production does increase geometrically, sooner or later geometric increase of library acquisitions must stop, first in our larger libraries that now obtain a fairly large percentage of all new books published, and later in smaller libraries as they become larger and acquire a larger percentage of the total publication. A check of the figures used by Mr Merritt for such countries as Denmark, France, Germany, Italy, and Spain actually shows a decrease in new books published from 1934 to 1940 compared with the number from 1928 to 1933, and this in spite of the depression that occurred in the earlier years.

e. and f. Pamphlets and Ephemeral Material

The last two types of publication to be considered are pamphlets and ephemeral material of various kinds. Materials in these groups are not bulky enough to affect storage space seriously, although they may present a very real problem from the point of view of administration, cost of cataloguing, binding, mounting, etc. No adequate study of library

⁷ *Union Catalogs in the United States* (Chicago, 1942), pp. 79-82.

acquisition in these fields has been made, and it is to be hoped that the results of A. F. Kuhlman's investigations of ten years or more ago dealing with this subject will sometime be made available, or that someone else will study the problem and report on it.

Certain factors which may serve, in some cases automatically, to reduce the rate of growth in libraries, and so make the problem of space for book storage less acute, have been indicated in the discussion of the foregoing questions. One of these factors perhaps calls for a few additional words. Some books will always be lost, and many more will sooner or later wear out. This is particularly true of newspapers, which are generally fragile. If the long view is taken, it will be found that the disintegration of books due to poor paper is a factor that has never received adequate recognition, and it is hoped that an article on this phase of the problem will be prepared for the *BULLETIN*, or for some other library periodical, at a later time.

The writer has deferred to this point comments on some of the expedients which have been proposed or adopted (at least in part) as a means of alleviating the problem of book storage.

*Weeding.*⁸ Weeding is always difficult to accomplish. Library authorities are inclined to feel that 'a bird in the hand is worth two in the bush.' Canceling of records costs money. Books are hard to part with, if the custodian is a bookman and a lover of books. Questions of responsibility to the university as a whole and to the region in which the library is placed are difficult to assess and are liable to disconcerting variation from period to period. Even if a weeding-out process is determined upon, serial and periodical publications are bound to accumulate, and are perhaps more difficult to discard than an individual monograph, which takes up much less space.

Further, it is not always apparent to a librarian that to store books indefinitely is expensive. He may not have calculated that construction costs at today's rates in a standard book stack come to approximately 75 cents for each average-sized volume provided for, and that if the interest charge alone at 4 per cent on the construction for the space occupied by one volume is 3 cents a year, and the cost of heat, light, and service is 2 cents more (a very conservative estimate), or a total

⁸ Throughout the discussion under this head it is assumed that any policy of weeding would not extend to unique material, except on the basis of transfer to some similar institution, where it would be available on similar terms.

of 5 cents a volume, there may be a question as to whether a volume is worth keeping. If it costs 5 cents a year to keep a volume that is not used, it costs 50 cents for 10 years, and one dollar for 20 years. How many tens of thousands of volumes are there in the great libraries that are not used once in 20 years? The crux of the problem is whether or not it is worth spending the dollar required to keep a volume for 20 years just to be sure that the volume is at hand when and if it is called for.

The writer is going to be bold enough to express an opinion in regard to this matter of weeding out. Except for the great research libraries with special responsibility for national service, and for special collections in smaller libraries, collections should be rigorously weeded, by whatever modes of disposal seem appropriate, whenever retention of all holdings will necessitate a new building or expensive additions to an old one. A careful estimate should be made of the cost of keeping the little-used material — the cost not only for the current year but for the years to come — and this cost should be considered in relation to the whole library financial problem. Even in large libraries such as that of Harvard University, or any one of the forty-five libraries that are members of the Association of Research Libraries, the desirability of weeding should be considered; each institution should face the problem, particularly as it relates to bulky groups that are little used. Suppose, for instance, that a library has a miscellaneous collection of late nineteenth- and early twentieth-century newspapers — 3000 volumes in number — which occupy 24,000 cubic feet of space in the stack, space which at today's prices would cost something like \$36,000 for construction. It is estimated that the current cost of caring for the collection, including the interest on the construction costs, amounts to \$2,000 a year, or 67 cents for each newspaper volume. In the course of a few years, these volumes are bound to deteriorate to such an extent that they will have to be discarded. Is it better to keep the newspapers; discard them; pass them on to some other library and rely henceforth on copies held elsewhere; or arrange to have the files microfilmed, even if the cost of so doing amounts to \$10 a volume or more? It might be decided in the given case that a better way to spend the \$2,000 annual cost could be found, particularly if keeping the collection necessitates a new library building.

All parts of a library collection should be examined with the cost

of retention in mind. If only 10 people use a certain collection of 10,000 volumes in the course of a year, and the cost of keeping the books (\$500 as figured above) is considerably more than the cost of making the same books available to these 10 people through another library, even if there is a charge made by the other library, the collection may well be discarded unless the desirability of having the books available without notice is very great. It should be restated that no material should be discarded without first making sure that it is and will remain available elsewhere.

Division of Fields. Rapidly growing university libraries include each year among their acquisitions many thousands of volumes and pamphlets that will never be used heavily but which it is realized should be in the country so as to be available when wanted by research workers. These libraries may well save considerable space in the future if the 'Farnington plan'⁹ is adopted and they become more selective in their acquisition policy except in fields for which they accept responsibility. If in connection with this proposal some of the bulky little-used material now in possession of libraries in subjects for which they do not accept responsibility is transferred to the shelves of those libraries which do, the most satisfactory method of weeding will result. This is of course a very complex proposal, with many pitfalls for the unwary, and, as the whole matter is now under consideration by the Association of Research Libraries and other institutions that are interested, further discussion of it in the BULLETIN will wait for a more suitable time.

Inexpensive Storage of Less-used Materials. This expedient, though obviously not a solution in itself, can materially lessen the pressures incidental to growth, particularly when the storage arrangements are effected on a regional basis, with elimination of duplicates from the material so stored. This procedure will receive some discussion in the article on space problems at Harvard which is to appear in a later issue of the BULLETIN, and will be treated in full in a separate article, also planned for publication in the BULLETIN at a still later date.

Microphotography. College presidents, librarians, and others who are responsible for finding storage space for library collections have hoped ever since microphotography came into prominence fifteen years

⁹ Keyes D. Metcalf and Edwin E. Williams, 'Proposal for a Division of Responsibility among American Libraries in the Acquisition and Recording of Library Methods,' *College and Research Libraries*, V (1944), 105-109.

ago that it would go far toward solving the space problem in libraries. The writer has already offered a preliminary discussion of the subject,²⁰ and it is hoped that further consideration, from as many angles as possible, may find place in the *BULLETIN* or elsewhere, in due course. In the present article there is scope for only a very general statement. The writer believes that it can be fairly easily demonstrated that the cost of micro-reproductions of any kind, except those for newspapers, is so great that, unless their sale in multiple copies can be much larger than there is any prospect for at present, it will always be cheaper to keep the originals in inexpensive storage than to make or purchase microphotographic reproductions in their place.

II. SPACE FOR READERS

As was indicated earlier in this article, space for books is only part of the space needs of a university library. Space for readers must be considered, also. It does not take much effort to show that in the past space for readers has been an even more serious problem than the question of book storage, although relatively little discussion has as yet been devoted to it.

There seem to be two reasons for an increase in the size of library reading rooms. The first is the increase in the size of student bodies, and library provision for this is no more of a problem than the increase in dormitory and classroom and laboratory space for the same students. It is not the result of accumulation, and therefore it is a different kind of growth from that in a book collection. The second cause for increased space needs for readers lies in the change in educational methods and policy, the change from the use of textbooks to that of collateral reading, the introduction of reading periods for undergraduates, and the increasing graduate work which relies more and more on large book collections. These educational methods are sending a larger and larger percentage of students to libraries for more hours each day. They increase the regular attendance and also — what is perhaps of equal importance — the peak loads. As a result, some librarians who have studied the subject have recommended a library seating capacity up to 50 per cent of the student body. Universities that are badly decentralized and have to take care of peak loads that do not come all at the same time in a dozen to thirty libraries

²⁰ *Library Journal*, LXX (1945), 718-723.

may have to provide seats for even more than 50 per cent of the student body. Before the war and before the present influx of veterans, Harvard had seats for 4500 readers, with a student body of approximately 8500. This represents a very large amount of space, whatever the type of accommodation provided.

Let us try to figure how much reading space is required in what can be called a typical university. Space of three kinds is ordinarily provided:

1. That in monumental reading rooms.
2. That in what might be called standard reading rooms.
3. That provided by stalls in stack areas.

A monumental reading room is often 30 feet high, that is four stack floors, and in rooms of this dimension 30 square feet of floor space per reader is not unusual, while 35 may be found in some places. If 30 square feet is allowed for each reader in a reading room 30 feet high, 900 cubic feet are used. At present building costs of \$1.50 per cubic foot, this would mean nearly \$1350 per reader, which is more than it took not many years ago to provide dormitory space for a student. On the other hand, a standard modern reading room such as is found in many libraries built in recent years has a total height of 15 or 16 feet, and 25 square feet per chair is allowed, giving no more than 400 cubic feet per reader. The third type of reader accommodation is known at Harvard as a stall, and in other libraries as a cubicle or a carrel. Stalls may occupy anywhere from 15 to 30 square feet per person, the lower figure being possible because no extra aisle space is required if the stall adjoins a passageway that is needed for regular stack use. The larger figure, 30 square feet, if the space is well planned is almost large enough for a small study with completely private accommodations. We can then figure on 120 to 240 cubic feet for each reader in a stack with a ceiling not more than 8 feet in height. This is considerably less than the space in a standard reading room. Most universities have comparatively few stalls, and it seems fair to estimate that on the average 400 cubic feet is the space assigned for each reader provided for in a university library. If a library makes available one seat for every three students, this means a total of 133 cubic feet per student, and if there are 10,000 students 1,333,333 cubic feet for readers. Earlier in this article it was indicated that two volumes can be shelved per cubic foot of stack space. If this is the case, provision of

adequate reading room space in a university with 10,000 students would take the same space as is required for 2,666,666 books, or more than any university in the United States possesses except Harvard and Yale. Even in the case of Harvard, which has the largest collection of books in any university, the space allotted to readers is greater than that assigned for books. Very few institutions that make adequate provision for students use as much space for books as for readers.¹¹ This will continue to be the case as long as one additional student is admitted for each 267 volumes added to the library. The time will undoubtedly come when books will take up more space than readers, if books continue to accumulate as they have in the past, but at present, even in our older liberal arts colleges with large book collections but comparatively small student bodies, the space occupied in libraries by students is greater than that occupied by books, if 133 cubic feet is allowed for each student and $\frac{1}{2}$ cubic foot for each volume. That is, a college with 800 students would have to have over 212,000 volumes if the books were to take more space than the readers.

III. SPACE FOR STAFF

In addition to the storage space for books and space for readers, the university library must provide accommodations for its own staff. This is not a matter of as great importance in connection with total needs as the two preceding types of space, but it should be kept in mind that in practically all library buildings that are outgrown the space for the staff has been the first to prove inadequate. This has been partly because librarians have been modest in their demands and have been loath to ask for anything so close to them as adequate provision for staff members, and partly because it seems to be harder for the university administration and the librarian to realize that the staff must grow as book acquisitions and service grow. Another factor is that if a new library is not adequate to care for readers or for books, criticism of the administration will be severe, but if it is not adequate for the staff, no special comment is forthcoming.

How much room should be provided for staff members? No attempt will be made to consider this question in detail. The largest proportion of a staff in a university library is in the order and catalogue departments, and here work space as well as desk space is important.

¹¹ Universities with comparatively small attendance and large libraries, such as Brown, Johns Hopkins, and Princeton, are exceptions to this rule.

It is safe to say that in an order or catalogue room 100 square feet per staff member in a room 16 feet high is adequate. This means 1600 cubic feet per employee. Somewhat less space for the staff working in public rooms is required, but the administrative officers need more. Therefore, if adequate staff rooms are to be provided, 2000 cubic feet would be a safer figure to use for a general average. A check of the thirty largest libraries included in the 'Princeton statistics' already referred to shows that the average large university library today has one staff member for each 13,000 volumes. Let us assume a university with 5,000 students, with a library which provides 1250 reading room seats. These occupy 400 cubic feet each, or 500,000 cubic feet. If this building contains 1,000,000 volumes, they will also occupy 500,000 cubic feet. If we have a staff of 77, or one staff member for each 13,000 volumes, and allow 2000 cubic feet for each staff member, we have approximately 155,000 cubic feet, or less than one third of the space occupied by books or by readers.

IV. SPACE FOR LOBBIES, ETC.

Other space needs include those for lobbies, corridors, communications, utilities, ventilation, and air-conditioning. In general, it is safe to add one third to all other space assignments to take care of these needs, provided the building is not a monumental one and has no special memorial features. There will be some variation according to the type of plan, whether or not there is air-conditioning, etc., but one third is in general a fair figure to use.

The hypothetical building considered under 'Space for Staff' contained, for books, readers, and staff, a total of 1,155,000 cubic feet. If one third, or 385,000 cubic feet, is added, we have a total of 1,540,000 cubic feet. It would seem proper to consider that these 385,000 cubic feet added for the extras should practically all be charged to the space allowed for readers and staff, not to the storage area, as the latter is in most cases a self-contained unit. This is not strictly accurate, of course, if the stack is air-conditioned, as under those circumstances it should share the responsibility for the space used for that purpose.

This building of just over 1,500,000 cubic feet might be used by a library in a comparatively small university of 5000 students with a collection of 1,000,000 volumes. (There is no university in the United States today, except Princeton, with as many as 1,000,000 volumes and less than 5,000 students.) But only one third of the space is de-

voted to book storage. If a more typical university is considered, one, for instance, with 10,000 students and 1,000,000 volumes, the figures would be 500,000 cubic feet for books, 1,000,000 cubic feet for readers, 155,000 for staff, and 532,000 for other purposes, or 2,187,000 cubic feet in all. This means that considerably less than one fourth of the space is devoted to book storage. It might be noted in this connection that in the new Princeton Library something like one fourth of the total cubage is allotted to regular book storage, if the space assigned for readers in the book stack is omitted from the calculations.

V. SPACE FOR MONUMENTAL OR MEMORIAL PURPOSES

No attempt will be made to discuss in detail space used for monumental or memorial purposes, although it should be emphasized that a very considerable proportion of the space in most college, university, and reference libraries is devoted to these purposes. Differences of opinion on this point have been marked. For example, in 1891, during the determinative period for the design of many present-day library buildings, the Conference of the American Library Association unanimously adopted a number of building principles formulated by Charles C. Soule, among which was the statement that 'no convenience of arrangement should ever be sacrificed for mere architectural effect.'¹² Yet a few years later, in 1903, Herbert Putnam, then Librarian of Congress, criticized adversely a reading room which 'lacks the large spaces conducive to meditative study, and is barren of the architectural beauty and dignity which in a great library can exercise a practical influence for good.'¹³

It is not impossible today in a library building that makes no pretense of being monumental to use 70 to 75 per cent, or even more, of the space for library purposes, and no more than 25 per cent for the corridors, lobbies, utilities, etc. There are, however, libraries today with only 40 or 50 per cent of what could be called 'useful' space. This means that one library containing 2,000,000 cubic feet may not be able to care for any more readers, books, and staff than another containing only 1,000,000 cubic feet. As long as this is the case, it seems fairly obvious that, while the space for books is a matter of real concern, it is not necessarily the most important factor in the space needs of university libraries.

¹² *Points of Agreement among Librarians as to Library Architecture* (n. p., 1891).

¹³ Cf. 'The Undergraduate and the Harvard Library, 1877-1937,' in the present issue, p. 232.

Summary

This article has covered a good deal of ground in connection with growth and deals directly or indirectly with a variety of matters. The following summary has been prepared in order to review the general conclusions that have been reached.

1. An attempt has been made to show that at present books are not accumulating at as rapid a pace proportionately as in the past, and that there seems to be good prospect that in the future the rate of growth in space needs for books may diminish even further because of the disintegration of newspapers, and the failure of the number of public documents, periodicals, and trade books printed and acquired to increase geometrically. (Emphasis in this article has not been placed, as it might have been and as it is to be in a future article, on the effect of restricted acquisition funds.)

2.. While the question of book storage has been given most of the emphasis in the discussion of growth and space problems of a university library, it has not been the largest space problem up to the present time. In the past, readers have used more space in most libraries than that occupied by books, and this is still the case. In the future, as space needs for readers stops increasing as rapidly as books are accumulated, book storage may become the dominant problem.

3. In spite of the slowing up in growth of book collections and the fact that readers have occupied more space in libraries than books, the accumulation of books in a university library is even at present a serious problem and efforts must be made to solve it.

A later number of the BULLETIN will discuss the various approaches that the Harvard University Library has made and is making to this problem.

KEYES D. METCALF

List of Contributors

- KEYES D. METCALF, Professor of Bibliography, Director of the Harvard
Harvard University Library, and Librarian of Harvard College
- AGNES MONGAN, Keeper of Drawings in the William Hayes Fogg Museum of
Art, Harvard University
- CLIFFORD K. SHIPTON, Custodian of the Harvard University Archives;
Librarian of the American Antiquarian Society
- HAMILTON VAUGHAN BAIL, Deputy Treasurer of the Franklin Institute,
Philadelphia, Pennsylvania
- REGINALD FITZ, Lecturer on the History of Medicine, University Marshal, and
Assistant to the Dean of the Faculty of Medicine, Harvard University
- ROBERT W. LOVETT, Assistant in the Harvard University Archives
- WILLIAM A. JACKSON, Professor of Bibliography and Assistant Librarian of the
Harvard College Library in charge of the Houghton Library
- ADRIANA R. SALEM, Department of Printing and Graphic Arts, Harvard
College Library
- EVA FLEISCHNER, Houghton Mifflin Company, Boston, Massachusetts
- LOUISE B. GRAVES, Boston, Massachusetts
- PHILIP HOFER, Curator of Printing and Graphic Arts in the Harvard College
Library
- PHILIP J. McNIFF, Superintendent of the Reading Room in the Harvard College
Library
- FRANK N. JONES, Administrative Assistant in the Harvard College Library