of the current year or volume—for example, "C.A. 12345–46." *Science Abstracts* and *Biological Abstracts* already employ approximately this system. It makes the abstract journal indexing slightly more definite and in the proposed procedure eliminates labeling of each item.

Punch Cards for Indexing Scientific Data

C. F. Bailey and Robert S. Casey
W. A. Sheaffer Pen Company, Fort Madison, Iowa

Gerald J. Cox
Corn Products Refining Company, Argo, Illinois

Files containing large volumes of scientific data can, and often do, become unwieldy and cumbersome to use. The principal reason is that in the preparation of such files emphasis is usually placed on the manner of putting data *into* them rather than on ease and facility of getting information *out* of them. The result is that maximum utility either is not realized or at best is attained at the expense of unnecessarily great time and effort.

In the indexing and analysis of chemical subjects, we have, through the use of punch cards, avoided the difficulties which are inherent in ordinary filing systems, since these cards stress the matter of prime importance—ease and versatility of obtaining any desired information from the file. In most instances only one card is required for each reference, even though it may deal with multiple phases of the subject under consideration. All of those cards pertaining to a specific phase may readily be sorted from the file. The cards need not be filed in any particular order; indeed, there is little loss of efficiency when they are placed at random in the file.

Success with the new system led us to report our experiences in our fields of research (*1, 2, 3*). The experiences of a few workers in physiology (*5*), metallurgy (*6, 7, 9*), and pharmacology (*4*) are also recorded in the literature, and a spectroscopist has made an oral report (*8*). In addition, through correspondence and conversation we have learned of a few others who have adapted punch cards to their problems. We feel, however, that this powerful indexing tool has not been publicized as widely as it deserves.

The cards[1] may be obtained in different sizes, although the five- by eight-inch size is probably best suited to most applications. Holes one-eighth inch in diameter are punched one-fourth inch apart along the edges, one-sixteenth inch from the margin. The upper right corners are cut diagonally, so that it can quickly be noted whether all the cards are right side up and facing the same way. Since the holes occupy but a small amount of marginal space, ample room is left for the recording of references, abstracts, experimental data, or other desired information.

A general idea of the purpose of the holes can be conveyed by quoting from one of the above literature citations (*2*): "Meanings are assigned to individual holes, and on each reference card at the appropriate holes the portion of the card between hole and margin is clipped open with an adaptation of a ticket punch, changing the hole to a notch. When the sorting needle, resembling a single-tine ice pick, is inserted into a given hole in a group of cards and lifted, the cards, on which that hole has been clipped, drop out and the others stay on the needle."

In this necessarily brief description we make no attempt to give any of the details which should be understood before the punch-card system can be put into operation, since they have been discussed at length in the chemical literature (*1, 2*). Bulletins published by the card manufacturers are also valuable in furnishing instruction in methods and technique.

Although a number of suggestions could be made to those planning to adopt the indexing system which we have found so satisfactory, we shall confine ourselves to two of fundamental importance. First, the problem at hand must be carefully analyzed, in order to make certain just what kind of information it is desired that the file shall be capable of furnishing. Second, an outline must be prepared to serve as a framework into which all the reference material can be fitted for coding purposes; it is obvious that this step cannot be taken effectively until a considerable familiarity with the field has been acquired. In most cases the outline for a specific investigation can be printed on the card, but for diverse purposes the use of relatively blank cards with separate outlines is advisable.

[1] The cards and necessary inexpensive accessory equipment are manufactured by the McBee Company ("Keysort"), Athens, Ohio, and the Charles R. Hadley Company ("Rocket"), Los Angeles, California.

References

1. Casey, R. S., Bailey, C. F., and Cox, G. J. *J. chem. Educ.*, in press.
2. Cox, G. J., Bailey, C. F., and Casey, R. S. *Chem. eng. News*, 1945, **23**, 1623.
3. Cox, G. J., Dodds, M. L., Dixon, S. F., and Matuschak, M. C. *J. dent. Res.*, 1939, **18**, 469.
4. Frear, D. E. H. *Chem. eng. News*, 1945, **23**, 2077.
5. J., E. M. *Quart. J. Stud. Alcohol*, 1941, **2**, 216.
6. Price, G. H. S. *Metal Ind.* (*Lond.*), 1944, **64**, 354.
7. West, E. G. *Trans. Inst. Welding*, 1941, **4**, 187.
8. Wright, N. "Infrared Spectrometry," presented before Symposium on Spectrochemical Methods of Analysis, American Chemical Society, New York City, 12 September 1944.
9. ———. *Metal Ind.* (*Lond.*), 1939, **54**, 617.

A Simple System for Reprint Filing

L. R. Richardson
Victoria University College, Wellington, New Zealand

The organization of a reprint collection is a problem which must be faced by every serious research worker. Initially there is the accumulation of reprints, but ultimately, if this collection is to retain value, some system must be developed. The desiderata are obvious. The system must be one in which any reprint can be located without waste of time or effort in search. It must be equally possible to return any reprint to its proper place. The system must be capable of continuous extension. The system must be simple and require a minimum of effort to develop and keep in order. Less obvious,

but equally important in the long run, the system must not be wasteful of space or expensive to maintain.

Roger Smith, in his excellent *Guide to the literature of the zoological sciences* (Burgess Publishing Co., 1943), gives an account of methods which are in common use. He points out the objection to filing in boxes or folders arranged by author or subject, namely, the great opportunity for waste of space. In particular he disapproves of filing by author as having the additional disadvantage that the name of the author must be the key to locating any one separate. He advocates the filing of reprints numerically in order of receipt and without regard to author or subject. In this method, a card index must be maintained for the location of any reprint by author or by subject. This system is unnatural. An additional and unnecessary complication is achieved by the introduction of filing under an artificial set of numbers which are completely unrelated to the matter in the system. A reprint is as frequently sought by author as by title, and neither of these directions can be followed in this method without reference to a card index. In fact, to make the system work adequately, it is found in general practice that card indexes must be maintained for both authors and titles.

It is obvious that a collection of reprints will rapidly outgrow any single-entry system such as filing solely by author or solely by subject, and the minimum satisfactory system is one containing a cross index. Accordingly, two files must be set up. Obviously, there is no limit to a subject group. A file under entomology could grow to astronomical proportions. On the other hand, the work of an author is definitely limited, although a Cope or a Sars would tax any system. In setting up a cross index it is logical that we should file the smaller items in the subject group and the larger in the author group. A cross index for reprints must mean an index of cards on the one hand and an index of reprints on the other. By indexing the cards by subject, large groups can be handled in a minimum of space, and in actual practice such groups can be submitted to any desired degree of breakdown. Reprints, the larger objects, should be filed in the naturally limited author groups.

The writer has employed such a system for nearly 15 years without breakdown in any part of the system or the development of cumbersome groups requiring extended search. All reprints are filed by author. The work of each author is held in an open-ended heavy manila envelope, 10 inches wide by 13 inches long. The author's name is printed by hand boldly across the end of the envelope close to the margin. The envelopes are filed alphabetically on edge on an ordinary shelf with the closed end and author's name outwards. The mouths of the envelopes are to the back of the shelf, and in this way the reprints are kept clean and away from light. Any reprint can be located directly by author and as readily returned to its proper position.

One card is prepared for each reprint. The card carries the ordinary reference data and is filed by subject groups along with all other references to literature. I have found it valuable to employ code signs in the upper right-hand corner of each card, indicating whether the reference is to a work included in the reprint collection, to a paper in a journal in my possession, or to a work not in my possession.

The system is capable of infinite expansion on either side. It works equally well with a small or large collection of reprints. It can be readily organized and is inexpensive. The cost of heavy manila envelopes is far less than for boxes or folders and a cabinet file. The system is not wasteful of space, little more space being occupied than for the reprints themselves, and reprints of all ordinary sizes can be conveniently held in the system. Reprints can be located readily by subject, the aggregation of cards in subject groups enabling this to be done without search.

Obituary

Louis A. Slotin
1912-1946

All who watch for cyclotron beam current, all who count tracer activity, mourn the loss of Louis A. Slotin, who died on 30 May 1946 from the effects of radiation from an accidental chain reaction of plutonium. He was, in a way, the chief atomic armorer of the United States, but he had been eager to return to peacetime work. The possession of unique skills obligated him to continue work at Los Alamos and at Bikini until the Navy tests were completed. He had planned to accept an assistant professorship at the Institute of Biophysics and Radiobiology at the University of Chicago in the fall.

Though quiet and unassuming, Slotin had led an unusual life. He received a B.Sc. degree in geology from the University of Manitoba in 1932, a M.Sc. degree in 1933, and a Ph.D. degree in physical chemistry from the University of London in 1936. Slotin was a modern adventurer and was drawn to every center of activity where there was promise of excitement. At one time he trained to fly a fighter plane with the RAF, until the discovery was made that he wore glasses. Earlier, he was visiting a friend in Barcelona when the Spanish civil war began; he