sistency are purgative processes and so can only be applied to existing concepts and formulations.

According to Metcalfe, there are two basic ways of retrieving things (page 22.) The first is by placing them in a known order and then selecting the correct subdivision in which to look. The second is by sorting through all things which have been kept and, by individual perusal, determining which is wanted. Any kind of known order will do, from an arbitrary one, such as the alphabet, to a meaningful one, such as a classification system. This is the core of librarianship—the choice and application of a known order to a collection of records.

Sorting through any but the smallest collection is an awkward and arduous process for human beings. Fortunately, some machines seem to be quite good at sorting. But, interestingly enough, machine limits for efficient sorting are soon reached, and known order becomes relevant again.

Again according to Metcalfe, there are two main costs in running a retrieval system: (i) that of "compilation"—of input, of adding new material to the system, and (ii) that of "consultation"—of output, of providing reference service upon request (page 26). The frequency and variety of types of consultation should determine the nature of the input. It is only advisable to concentrate on the compilation phase if the needs and resources of a search system are not only well known but relatively stable. Metcalfe admits that lower compilation costs are probably possible in the documentation systems but suspects that the original economy may be offset later by the need for "extra indexing" tools (pages 172–5 and 201–8). "Extra indexing" identifies combinations of terms, whether on a generic or other basis, which lead to fruitful searches in a particular collection. There are two answers to this argument. One is that so far most uniterm or descriptor installations have not required such an addition. The second is that if "extra indexing" seems useful, the mechanized systems are in a particularly good position to provide such extras at a minimum cost. C. L. Bernier of *Chemical Abstracts* has been presenting some good arguments for utilizing such printouts from mechanized systems instead of waiting until a particular question arises before going to a machine [C. L. Bernier, "Correlative indexes," *Am. Document.* 7 (Oct. 1956), and later issues].

Readers may find the structure of the book unusually complex and Metcalfe's style of writing difficult, but none will find him dull or wishy-washy. He raps sharply so many knuckles that one cannot resist pointing out one of his own *non sequiturs,* that of subsuming the Zatocode system of Mooers, for which he has a 1951 reference, under the Coordinate Indexing system of Taube, for which he uses 1953 and 1954 references. Not only is this chronologically incorrect, but it is instructive to see in what respects Coordinate Indexing has increasingly deviated from the Zatocode original.

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Gmelins Handbuch der Anorganischen Chemie. System No. 3, sec 3: *Oxygen.* xi + 518 pp. Illus. $67.92. System No. 42: *Zirconium.* xxxvii + 448 pp. Illus. $63.84. System No. 43, supplement: *Hafnium.* ii + 23 pp. Illus. $5.28. System No. 45, supplement: *Germanium.* xliv + 576 pp. Illus. $80.88. Verlag Chemie, Weinheim/Bergstrasse, Germany, 1958.

The recently published sections of *Gmelins Handbuch* have several new features which make it easier for the chemist to use this valuable treatise. On the inside covers the chemical elements are listed by system numbers. These numbers are not the atomic numbers of the elements of the periodic chart, but are designed to arrange the elements in a way that permits systematic and comprehensive treatment, in one place, of all the major anionic groups for each cation-forming element. As a result, all major compounds of an element are classified systematically in the volume pertaining to that element. For example, the volume of iron (59) contains all known combinations with elements from system No. 1 (rare gases) to 58 (cobalt).

A desired compound or combination will be found in the volume with the highest system number. The compound Fe_2O_3 is listed in the volume on iron (59), but not in that on oxygen (3). On the other hand, Pt_3Fe will be found in the volume on platinum (68).

Within a volume, a compound of three or more elements is grouped with the system number next lower than that of the volume element. For example, rubidium chlorobromide will be found in the rubidium volume (24) under rubidium and bromine; and rubidium bromoiodide, under rubidium and iodine. The system numbers of chlorine, bromine, and iodine are 6, 7, and 8, respectively.

With an addition compound, such as $FeBr_2 \cdot 4C_5H_5N$, the compound is listed in the volume on iron under iron and bromine. With an ammonium-type compound, such as $C_5H_6N[FeBr_4]$, the compound is listed under iron and ammonium and not under iron and organic bases.

Chemical reactions are generally described under each reaction component and also under the reaction products.

The directions for using *Gmelins Handbuch* are given in both German and English and are illustrated by examples. New departures designed to make the *Handbuch* more easily consulted are the bilingual index and, in the case of the supplementary section on hafnium, there are catchwords in English on the page margins.

Oxygen. This new volume is devoted to elementary oxygen and covers the preparation of oxygen, separation and enrichment of oxygen isotopes, physical properties, and electrochemical reactions, and reactions in hydrogen-oxygen mixtures. The literature is covered through 1949.

Zirconium and Hafnium. The zirconium volume and the hafnium supplement to the hafnium volume published in 1941 complete the treatment of subgroup 4B (Ti, Zr, Hf, Th) in the 8th edition of *Gmelins Handbuch.*

The volume on zirconium covers the history of the element, its occurrence, ore dressing, metallurgy, technology, properties, analysis, and its major compounds with other elements in the preceding system numbers, ending with titanium. The literature search was carried through 1949.

The supplementary section on hafnium brings the information on this element through 1949.

Germanium. The volume on germanium is a supplement to the volume published in 1931 and covers the literature from 1931 to 1953, and, in the case of the optical, electrical, and photoelectric properties, to the end of 1954.

Due to the interest in germanium in recent years, a considerable amount of material has appeared. This is reflected in the fact that the supplementary volume is over 9 times the size of the original volume.

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Sherrington. Physiologist, philosopher and poet. Lord Cohen of Birkenhead. Thomas, Springfield, Ill., 1958. 108 pp. Illus.

In 1948, when Charles Scott Sherrington was 90, the University of Liverpool created a lectureship in his honor in recognition of his great and distinguished contributions to physiology and medicine. Among those who, in addition to other designations, are now known as Sherrington lecturers, we note E. D. Adrian of Cambridge, John F. Fulton of Yale, Geoffrey Jefferson of Manchester, and Wilder Penfield of Montreal. To this brilliant company is now added Lord

Cohen of Birkenhead, professor of medicine at Liverpool University.

As a clinical neurologist and friend of Sherrington, Cohen is well qualified to describe and assess the work of the man who, during his life-time, became known as "the philosopher of the nervous system." The author begins by stating, "I propose in this first lecture briefly to sketch Sherrington's life and work; and in the second and third to describe and assess with the aid of diagrams and films, his contributions to learning, not for the specialist but for the informed non-specialist, so that he may comprehend why Sherrington has been regarded as the most profound student of the nervous system the world has yet known, and so that he may marvel at a productivity—monumental, magnificent, and sustained—covering a span of 70 years, and which embraced not only science, but also philosophy, history and poetry."

The slim volume which contains the substance of these lectures is beautiful in format, informative in content, and charming in style. Yet it must not be supposed that this book constitutes an adequate biography of one of the greatest scientific minds of modern times. It is rather a provocatively tempting appetizer for a more robust feast, which we may hope will be not too long in appearing.

As his life-span (1857–1952) indicates, Sherrington lived through one of the most exciting centuries in human history, and he made notable contributions to his era. His early education began in 1871 in an English grammar school, where, as he once remarked, "science was socially not quite the thing." His life ended at a time when we are beginning to recognize belatedly that a scientific education is a necessary prerequisite for survival.

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Publications of the World Health Organization, 1947–1957. A bibliography. World Health Organization, Geneva, 1958 (order from Columbia University Press, New York). 128 pp. $3.25.

This bibliography consists of 1915 items published by WHO from 1947 to the end of 1957. It includes all articles published in the *Bulletin of the World Health Organization,* vols. 1–17; articles published in the *Chronicle of the World Health Organization,* vols. 1–11, on matters not fully covered in other WHO publications; survey articles published in the *International Digest of Health Legislation,* vols. 1–8; articles and statistics (other than regularly recurring features) published in the *Epidemiological and Vital Statistics Report,* vols. 1–10; all numbers of the *World Health Organization: Technical Reports Series* from No. 1 to No. 141, including important annexes; all numbers of the *Official Records of the World Health Organization* from No. 1 to No. 81, including important annexes; all numbers of the *World Health Organization: Monograph Series* from No. 1 to No. 36, including the chapters contributed by individual authors in symposia and other collected works; supplements to the *Weekly Epidemiological Record*; and occasional publications such as the *World Directory of Medical Schools* and the *Pharmacopoea Internationalis.* It does not include mimeographed documents which are limited in distribution. It includes an index of authors and an index of countries.

Miscellaneous Publications

(Inquiries concerning these publications should be addressed, not to Science, *but to the publisher or agency sponsoring the publication.)*

Expert Committee on Water Fluoridation, First Report. WHO Tech. Rept. Ser., No. 146. World Health Organization, Geneva, 1958 (order from Columbia Univ. Press, New York). 25 pp. $0.30.

Experimental Studies on the Nature of Species. vol. IV, *Genetics Structure of Ecological Races.* Jens Clausen and William M. Hiesey. Carnegie Institution of Washington, Washington, 1958. 319 pp. Paper, $4.25; cloth, $4.75.

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Recommendations on Undergraduate Curricula in the Biological Sciences. Report of a conference held at Washington, D.C., 8–9 December 1956, and Chapel Hill, N.C., 1–4 April 1957. Publ. 578. Willis H. Johnson, Conference Chairman. National Acad. of Sciences–National Research Council, Washington, 1958. 86 pp. $1.75.

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Strokes. A guide for the family. American Heart Assoc., New York, 1958. 18 pp.

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Thirteenth Annual Report, Midwest Research Institute. Midwest Research Inst., Kansas City, Mo., 1958. 16 pp.

Comparative Biosystematics and Life History of the Nuthatches Sitta Pygmaea and Sitta Pusilla. Publ. in Zoology, vol. 56, No. 2. Robert A. Norris. 182 pp. $3.50. *Variation and Systematic Relationships within the Salamander Genus* Taricha. Publ. in Zoology, vol. 56, No. 3. William J. Riemer. 90 pp. $2. Univ. of California Press, Berkeley, 1958.

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