as a treatise which will establish a grand new unified 'system' with carefully elaborated postulates, propositions, and formal logic." Unquestionably it is a difficult book to read and one easy to criticize. The editorial work has not been of high quality, consequently loose statements have been allowed to remain. For example, in the chapter on "Methods of analysis," we find, "A normal distribution, in turn, is what happens when an infinite number of cases are arrayed by pure chance on an infinite straight progression of some quality" (page 167), and "Z^2 (the square of the standard deviation in a normal distribution)" page 197). These and similar statements detract from the value of the author's ideas on the proper application of statistical methods.

Aside from its editorial shortcomings, this work suffers from lack of organization, as the author apparently realizes. The order of presentation consists of an "Introduction," in which medical sociology is defined as the behavioral science specialty which encompasses demography and is concerned with the study of mental disorders and chronic disease in the population, of hospital structure and utilization of medical services. The next chapter, on the "Matrix of man," is devoted to theoretical considerations and an attempt to integrate concepts of culture theory with those of physiology. For some reason, here, he feels he must attack Darwin and Freud. This chapter is followed by one which summarily reviews studies dealing with ageing and with diseases such as schizophrenia, alcoholism, and tuberculosis; by another mainly concerned with rules of conduct for the medical sociologists who become involved in interdisciplinary studies; by another which briefly discusses social changes and health problems; and, finally, by the chapter on "Methods of analysis" already mentioned.

In brief, this book is a series of essays based on the author's own work and reflections on the work of others, with a number of good, bad, and indifferent ideas in varying stages of maturation thrown at the reader. The author has obviously read widely in public health.

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Elementary Statistical Physics. C. Kittel. Wiley, New York; Chapman & Hall, London, 1958. x + 228 pp. $8.

The field of statistical mechanics and kinetic theory is one which finds many applications in the description of both microscopic and macroscopic physical phenomena. Much of the variety of application of these fields is reflected in this book—an expanded set of lecture notes—by Kittel. Unfortunately there are many topics of major interest that are not included, and those subjects that are treated are frequently given a sketchy analysis.

Several of the topics discussed here that are not found in any other book on statistical mechanics or kinetic theory are the concept of negative temperature, the representation of random noise by a Fourier series, the Wiener-Khintchine theorem, the Fokker-Planck equation, the Onsager relations for irreversible processes, and the Kramers-Kronig relations. The treatment given these topics, although brief, might be stimulating enough to prompt students to pursue the various topics further. However, there are many topics of at least equal or even greater importance that have been omitted. Among these are the theory of imperfect gases and cooperative phenomena and methods useful in the theory of liquids, such as the use of the radial distribution function and the methods pioneered by Kirkwood, Born, and Green.

It is difficult to recommend this book because of its many omissions and because of its uncritical approach to the problems of statistical physics. The statistical approach to physical problems is fraught with subtlety, little of which appears in this book. Perhaps a book on calculation methods of statistical physics is needed; a really good one would have to be far more complete than this, both in philosophy and in coverage.

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Information Indexing and Subject Cataloging: Alphabetic: Classified: Coordinate: Mechanical. John Metcalfe. Scarecrow Press, New York, 1957. 338 pp. $6.50.

The best advice that a trained librarian can come up with for the tyros determined to standardize and to mechanize the retrieval process is that old jingle from New York horsecar days (page 211),

"Punch brothers, punch, punch with care,
Punch in the presence of the passengaire."

To suggest caution is always good advice to give but awkward to follow. Of what should one be cautious? John Metcalfe, an eminent Australian librarian, has done his best to map the byways frequented by unwary librarians and now unduly popular among documentalists. This makes the advice even harder to take, for the past mistakes of others never seem similar to one's own newest and dearest project.

Until now, no trained librarian has deigned to define and to evaluate the new field of documentation in terms of library systems. As long as machines are designed to retrieve bibliographic references, the particular worth of library experience should be recognized and exploited. For hundreds of years, librarians have tusseled to get the right book to each and every would-be reader. They have acquired understanding of the tricky process whereby people ask for one thing while wanting another.

Metcalf starts with fundamentals. What is being classified or indexed? Is it existing information about various subjects, or are the subjects themselves being classified? On this simple-appearing dichotomy have foundered many retrieval systems, of both library and documentation types. The organization of all knowledge is the chimera that has seduced them. Metcalfe (page 199) takes J. W. Perry particularly to task on this point: "We do not choose a genus or class for such things as dogs because it is more natural, or scientific or permanent; this is the talk of Bliss and the metaphysical 'order of the sciences' school. We choose it because there is general literature on the genus and special literature on its species, whether it is a genus or class of animals, for example, by their anatomy or by their use."

Tailoring a classification scheme to the needs of a particular collection was the example set by the Library of Congress, and today this method still has many skillful practitioners [see S. Herner and R. S. Meyer, "Classifying and indexing for the special library," *Science* **125**, 799 (1957)].

Another necessary distinction is between finding information and communicating information, or between "indication" and "communication," as Metcalfe expresses it (page 25). Indication consists in describing information in a particular physical form, with word clues for the limited purposes of retrieval. Fortunately, it is not necessary to communicate the information itself in order to perform retrieval successfully.

There is a big difference, linguistically and logically, between providing references to documents where there is a high probability that the answer will be found and providing actual answers to a question. One difference is that the latter requires full sentence structure while the former does not. If this difference between indication and communication was generally understood by documentalists, it would not have been necessary for the logician Yehoshua Bar-Hillel to deliver a homily on the subject [Y. Bar-Hillel, "A Logician's reaction to recent theorizing on information search systems," *Am. Document.* **8**, 103 (1957)]. This article may seem to be a negative contribution, but then clarity and con-

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