J. V. Harrison has himself found an explanation for the salt glaciers.[3]

O. D. VON ENGELN

CORNELL UNIVERSITY

A SYSTEM FOR SUBJECT REFERENCE FILES FOR SCIENTIFIC LITERATURE

IN the course of a recent investigation, which has necessitated reading a portion of the extensive literature relating to anaerobic bacteria, the authors have devised a simple system for the routine cross-indexing of topics covered in the scientific articles reviewed. It is believed that the system proposed may be applied with benefit for any field of science, either in listing current publications or as a basis upon which may be built a permanent bibliography for a particular field. The system is intended for personal use, and it will probably be found to work best if applied to a limited field, in which its user is himself working.

In setting up the system it is first necessary to outline carefully the field which is to be covered by the bibliography. A portion of the system which we have found useful in our field may be given in detail to more fully explain the key. For illustration, three general divisions of our present file will serve:

A. Source of isolation
- a. Soil
- b. Dairy products
- c. Food products other than b
- d. Intestinal tract or feces
- e. Body other than d
- f. Water
- g. Miscellaneous

E. Products of metabolism (other than toxin, etc.)
- a. Acids
  1. Acetic
  2. Butyric
  3. Lactic
  4. Propionic
  5. Others
- b. Alcohols
  1. Butyl
  2. Ethyl
  3. Isopropyl
  4. Others
- c. Acetone
- d. Intermediates of fermentation
- f. Gases (CO_2, H_2, H_2S, etc.)
- g. Miscellaneous

G. Serological reactions
- a. Agglutination
- b. Precipitation
- c. Complement fixation
- d. Toxin antitoxin
- e. Miscellaneous

The outline key, part of which is shown in Fig. 1, is printed in skeleton of letters and numerals on the lower half of unlined 4″ by 6″ index cards (we have found it useful to provide for expansion of the outline by extra divisions of each section). The right half of the card is lined for notes.

At the time the original article is reviewed a master card is made, giving complete citation of the author or authors, title of the article and reference. Check marks are then made on letters or numerals, which indicate the topics considered. For each section so indicated on the master card a separate card is to be typed with author and title citation; these cards are marked to indicate only the section in which they are to be filed. Notes or short direct statements of results may be added to the appropriate subject card, if desired. Two files are then maintained, an author file of the master cards and a subject file of the cross index cards.

Welch, W. H.
Morbid conditions caused by *Bacillus aerogenes capsulatus*
Johns Hopkins Hosp. Bul. *11*: 185–204, 1900
A abcdefgh G abcdefgh
E abcdefgh
1234567
1234567

FIG. 1. Showing a convenient arrangement of reference and part of the key.

An advantage of the system is that it eliminates the need for routine briefing of articles. For the average paper, a quick reading or only checking of subject-matter is all that is necessary; it is thus possible to cover several papers or even volumes in one evening. It will be found also that the key is unconsciously memorized and that there is little trouble in checking off topics rapidly and accurately, particularly if the field is limited and is of major interest to the bibliographer himself. The system is a time-saving device, for once the master card is prepared and the correct number of subject cards indicated, ordinary stenographic help can be used to copy the reference to the cross cards. If extended to cover in a systematic fashion all the back volumes of journals containing pertinent papers, it becomes a permanent file from which at least two types of questions may be answered in a minimum of time. These are: (1) what topics are covered by a particular paper (the author of which is known), and (2) what articles deal with any one specialized topic? This latter use is possible only through the multiple filing, and that is possible through elimination of abstracting, always tedious and inadequate.

L. S. MCCLUNG
ELIZABETH MCCOY

DEPARTMENT OF AGRICULTURAL BACTERIOLOGY
UNIVERSITY OF WISCONSIN

ELECTRODES COME IN PAIRS

FOR some years there has been evident on the part of physiologists a tendency to call a pair of electrodes an electrode. Perhaps the tide of this gross misuse of physical language has gained so much momentum that nothing can stop it, but every effort should be made to do so if possible.

[3] J. V. Harrison and N. L. Falcon, *Geological Magazine*, 71: 537, December, 1934.

The reasons for this misuse of terms are probably that many who use electrodes for physiological or medical purposes are so untrained in physics and chemistry that they do not know the true meaning of the word, and that frequent use of a device which facilitates the application of a pair of electrodes to a nerve or other tissue, as a single unit, leads them to form the habit of thinking of it in the singular.

These reasons do not justify the practice. The word "electrode" has a definite physical meaning and should be used with respect to that meaning. This use of the singular where the plural is meant is analogous to calling a pair of boots a boot, or a pair of gloves a glove. The difference between a pair of eyeglasses and a monocle should serve to stress the point.

The misuse of the singular can not be excused on the ground that in practice one always uses a pair of electrodes, for there are cases in which an electrode may be applied singly, and the singular is needed to designate such a case. Often a diffuse electrode (usually grounded) is applied to one part of the preparation, while a small localizing electrode is applied to the particular structure being studied. This applies both to stimulation and to leading off of electric responses. If the word "electrode" is habitually used to denote a pair of electrodes, no suitable term is left for the single electrode. In short, the use of a word with a definite physical meaning in an improper sense opens the way to endless confusion, and should be heartily condemned.

ALEXANDER FORBES

HARVARD MEDICAL SCHOOL

THE NATIONAL ACADEMY OF SCIENCES.[1] II

Transformations of differential elements: EDWARD KASNER. The simplest type of differential element is a lineal element (x, y, y') defined as a point with an associated direction. General element transformations, studied by the author, carry a curve, not into a curve, but into a *series* of ∞^1 elements, not in united position. A simple example of a series is a *turbine*, obtained from the elements of a circle by applying a turn T (through a fixed angle) or a slide S (through a fixed distance). All turns and slides generate a 3-parameter group G_3. This is a subgroup of the general group G_{15} which converts turbines into turbines. We next study general isogonal series and equitangential series obtained by applying T and S to general curves. The largest group converting isogonal series into such is shown to be the product of the conformal group and the turn group. The dual theorem gives the product of the equilong group and slide group. Transformation theories are obtained for velocity and natural families in dynamics and also for the dual types. The general transformation of normal congruences has application to optics. Finally, the osculating turbines of general series are studied, giving a wide generalization of the classic theory of evolutes which had its origin in Huyghens's wave theory.

Analysis of 18,000 proper motions derived at the Leander McCormick Observatory: P. VAN DE KAMP and A. N. VYSSOTSKY (introduced by S. A. Mitchell). Proper motions of 18,000 stars between magnitudes 7½ and 14 have been derived photographically in 341 regions. These regions, forming a sample of about one half of one per cent. of the total area of the sky, are representatively distributed north of Declination $-30°$. The motions have been made absolute by means of the motions of 574 bright stars kindly furnished by the Dudley Observatory in advance of publication. In addition, spectra for 5,200 of these faint stars were secured at the Harvard College Observatory. The more important results are: (1) Corrections to Newcomb's precession constants were found with high precision, due to the large number of faint stars with small motions which constitute an almost ideal "fixed" reference system. (2) The direction to the center of the rotation of the galaxy and the constants of the differential galactic rotation were found practically identical with corresponding figures previously derived by various investigators from the motions of the bright stars. Thus, it is shown that the phenomenon of galactic rotation is not limited to restricted groups of high luminosity stars, but is shared by the general population of the galaxy. The galactic longitude of the center was found to be 321°, in the constellation of Scorpius. (3) The position of the Solar Apex, at right ascension, 19.0 hours and declination, $+36°$, was found to differ by 15° from the Apex derived with respect to the bright stars. This is thought to indicate a higher percentage of high velocity stars among the apparently faint stars. The results given under (1) (2) and (3) were obtained from one simultaneous solution for the 8 unknowns involved; they are therefore independent of any outside data, except the system of the new "Boss" catalogue. (4) In general, the secular parallaxes are somewhat larger in northern galactic latitudes than in the corresponding southern latitudes, the smallest parallaxes being found not in the Milky Way as might be expected but about 15° away from it, north and south. Furthermore, the parallaxes of the groups of fainter stars in the Milky Way are much larger than had previously been supposed. These all indicate heavy obscuration near the plane of the Milky Way. The results given under (3) and (4) were confirmed in a general way from a discussion of the proper motions in right ascension of some 9,000 faint stars used in parallax determinations at the Allegheny, Johannesburg and McCormick Observatories. (5) A study of the ellipsoidal distribution of motions revealed a clear dependence of the position of the Vertex on absolute magnitude. Thus the stars of large proper motion (predominantly

[1] Continued from page 426.