will probably derive the result that the statement is not as hastily worded as it was first thought to be.

E. Lester Jones

SCIENTIFIC BOOKS

Physics of the Air. By W. J. Humphreys, C.E., Ph.D., Professor U. S. Weather Bureau, Philadelphia. Published for the Franklin Institute by J. B. Lippincott Co., 1920.

Professor Humphreys states in his introduction that "it is obvious that an orderly assemblage of all those facts and theories that together might be called the *Physics of the Air,* would be exceedingly helpful to the student of atmospherics."

Of this there can be no doubt, and the author has rendered a great service by thus bringing together and making easily available material that otherwise would have remained scattered through technical magazines, official publications like the *Monthly Weather Review* and journals of organizations like the Royal Meteorological Society.

The volume had its inception in a series of lectures delivered by Dr. Humphreys at the San Diego Aviation School in 1914. These lectures revised and printed from month to month in the *Journal of the Franklin Institute,* 1917, 1918, 1919 and 1920, are now consolidated in one volume.

As late as 1917 our military authorities failed to appreciate the importance of a knowledge of aerography, that is, the structure of the atmosphere. In June of that year a high officer of the Signal Corps, at that time entrusted with aviation, wrote:

> It has frequently happened in the past that men who might otherwise have made good pilots became so alarmed in advance over the subject of "holes in the air" and so impressed with the terrible dangers of aerial navigation, that they never succeeded in gaining the necessary confidence to become good pilots, etc.

This was given as a valid reason for refusing to utilize recent advances in meteorology! And again:

> So little time is available and so great the necessity for extreme haste in preparing aviators for service overseas that there is no opportunity to give more than the elements of meteorology in one or two lectures.

These views are referred to here, simply to show in some measure the amount of official inertia which had to be overcome. After many promising lives had been sacrificed, the need of the fullest knowledge possible was manifest; and before the war ended aerography had come into its own in both army and navy schools of instruction.

Professor Humphreys divides his treatise into four main parts; mechanics and thermodynamics; atmospheric electricity and auroras; atmospheric optics; and factors of climatic control. The author had the great advantage of access to the Weather Bureau Library, and critical readings by his colleagues. Furthermore, the text appeared in type before final publication. The work is unusually free from typographical errors.

There are a few slips, however. On page 49 the symbol for temperature of the isothermal region T might with advantage have been placed in front of the radical, or at least in some way separated more than at present. Again, it would be a gain if instead of saying that the temperature of a black radiator, in this case the earth, was 259° C. absolute, the author had used the more common form 259° A., adding if he thought it necessary, in degrees C. It is desirable in a text-book to avoid confusion, by using consistent notation. The reviewer holds that it is not good form to speak of a given temperature as *259° C. absolute* on one page and on the next page give a diagram expressing the same value in degrees Centigrade, that is, —14° C. One may expect to meet a slip from such loose practise and sure enough it occurs. On pages 75 and 76 it is stated:

> The effective absolute temperature of the earth as a full radiator is approximately 260° C.

Rather a warm condition; but of course the author means that the effective temperature on a certain approximate absolute scale is

260°. There is a scale which might have been advantageously used here, namely the Kelvin-Kilograde scale. True, few are as yet familiar with it; but the colors should always be in advance of the line, not abreast nor yet behind. In an up-to-date scientific book we have the right to expect leadership rather than tolerance.

The airman has got to forget the unscientific, arbitrary scales of his fathers; and stop using inches, minus signs, etc. His range of temperature is from summer day surface values to winter sub-polar readings near the stratosphere; and old-fashioned methods are inadequate.

Pressures are generally given in this book in millimeters of mercury with occasional lapses into inches. In a treatise dated 1920, one might look for pressure values throughout in units of force, that is, dynes or kilodynes per square centimeter.

In the chapter on "Atmospheric Circulation" which is well put, and more clearly explains the mechanics of deflection than most other text-books, it is demonstrated that in the case of a wind with a velocity of 22 meters per second, there will be a modification of velocity, depending upon whether the wind is blowing east or west; that is, a given mass weighs less going east than going west. A note might have been added giving results of recent gravity determinations at sea on fast-moving (22-knot) destroyers (25-mile-per-hour vessels); in which it was definitely ascertained that the barometric pressure changed 0.1 kilobar (0.075 mm.) when the course was reversed. Going east with the earth the centripetal force is greater than when steaming west. All this is of importance in connection with fast-moving airships.[1]

The discussion of change of velocity with latitude, deflective effect of the earth's rotation, relative values of centrifugal and rotational components, and gradient winds, is thorough and well expressed. Of course, the explanation of friction acting as the effective damping factor against high rotational winds is no longer tenable; and there is not sufficient emphasis laid on the fact that the high rotative values are hypothetical, not real so far as mobile air is involved.

Chapter XI., on "Winds Adverse to Aviation," explains the so-called "holes in the air," "bumps," "dunts," etc. There is not a mathematical symbol in the whole chapter. The different phenomena are explained in straightforward, simple language. However, there is much yet to be learned in connection with favorable and adverse conditions; and we await some Maury who will do with the logs of airships what the old Commodore did with the logs of the clippers of his day.

Chapter XIV. contains many photographs of cloud forms, but neither here nor in the first chapter where many instruments are given, is mention made of a nephoscope. Fair credit for cloud work done at Blue Hill Observatory is not given; nor is mention made of Professor Bigelow's International Cloud Report.

Chapter XV., on "The Thunderstorm" has 105 pages, and yet is not included in Part II., dealing with Atmospheric Electricity and Auroras, which has only 18 pages.

Part III., on "Atmospheric Optics," has 129 pages and is based largely on the well-known Pernter-Exner "Meteorologische Optik" and Mascart's "Traité d'Optique."

Part IV., 74 pages, deals with factors of climatic control, that is, in the author's words, a discussion of the physics of climate and not of its geographic distribution. The chief factors considered are latitude, brightness of the moon and planets, solar constant, solar distance, obliquity of ecliptic, perihelion phase, extent and composition of the atmosphere, vulcanism, sun spots, land elevation, land and water distribution, atmospheric circulation, ocean circulation, and surface covering.

Elaborate tables of gradient wind velocities are given in the appendix. We notice a few minor typographical errors. On page 136, latitude 10°, the change of direction is 2°.61 not 261, and the heading needs revising on page 162, m.m. should be mm.; on page 221, figure 31 should be 32; and on page 227, figure

[1] See SCIENCE, February 6, 1920; also January 9, 1920.

57, the lengend should give the elevation of the station. ALEXANDER MCADIE

REPORT OF THE COMMITTEE ON NOMENCLATURE OF THE BOTANICAL SOCIETY OF AMERICA

AT the Baltimore meeting of the Botanical Society of America (1918), the Committee on Generic Types presented a set of rules for fixing the types of genera. The report was published in SCIENCE (49: 333–336. 1919). At the same meeting the committee was enlarged to nine members and made a standing committee on botanical nomenclature, with authority to prepare a code of nomenclature. The standing committee consists of LeRoy Abrams, N. L. Britton, E. A. Burtt, A. W. Evans, J. M. Greenman, A. S. Hitchcock, M. A. Howe, C. L. Shear and Witmer Stone. The actual work of elaborating a code was done chiefly by a subcommittee consisting of J. C. Arthur, J. H. Barnhart, R. S. Breed, N. L. Britton, O. F. Cook, F. V. Coville, A. W. Evans, B. Fink, A. S. Hitchcock, M. A. Howe, F. H. Knowlton, P. L. Ricker, C. L. Shear and H. C. Skeels. The following code was presented by the committee:

A TYPE-BASIS CODE OF BOTANICAL NOMENCLATURE

PRINCIPLES

1. The primary object of formal nomenclature in systematic biology is to secure stability, uniformity, and convenience in the designation of plants and animals.

2. Botanical nomenclature is treated as beginning with the general application of binomial names to plants (Linnæus' "Species Plantarum," 1753).

3. Priority of publication is a fundamental principle of botanical nomenclature. Two groups of the same category can not bear the same name.

Note a.—This principle applies primarily to genera and species.

Note b.—Previous use of a name in zoology does not preclude its use in botany; but the proposal of such a name should be avoided.

4. The application of names is determined by means of nomenclatural types.

Note.—A generic name is always so applied as to include its type species; a specific name is always so applied as to include its type specimen.

Rules and Recommendations

Section 1. Publication of Names

Article 1. A specific name is published when it has been printed and distributed with a description, or with a reference to a previously published description.

Note.—A recognizable figure may be the equivalent of a description in the literature of paleobotany and diatoms.

(*a*) In the transfer of a species from one genus to another, the original specific name is retained, unless the resulting binomial has been previously published.

Recommendations: Botanists will do well, in publishing:

1. In describing parasitic fungi to indicate the host and to designate the name of the host by its scientific Latin name.

2. To give the etymology of all new generic names.

Article 2. A generic name is published when it has been printed and distributed

(*a*) With a generic or specific description (or a recognizable figure, see Art. 1, note) and a binomial specific name,

(*b*) With a generic and specific name and the citation of a previously published description,

(*c*) With a definite reference to at least one previously published binomial.

Note a.—A name is not published by its citation in synonymy, nor by incidental mention. Such a name may be taken up but not to replace one already properly published.

Note b.—Of names published in the same work and at the same time, those having precedence of position are to be regarded as having priority.

Recommendation: Botanists will do well, in publishing, to give the etymology of specific names when their meaning is not obvious.