SCIENTIFIC BOOKS

Aus meinem Lieben. Von Emil Fischer. Verlag von Julius Springer, Berlin. 201 pages. 3 figs. Price $2 (about).

Fischer wrote this biographical sketch while recuperating from the "flu." "Geschrieben in dem Unglücksjahre 1918," he writes; and this sentence gives us an idea of what Germany's downfall meant to Germany's greatest chemist. The sketch is an incomplete autobiography; he died in the midst of writing it; but it gives us a very intimate and, to me, fascinating picture of one of the great ones in our field. Not much is said of the chemistry of the sugars, fats and purines, but very much is said of the laboratories in which the chemistry of these substances was elucidated, and very much more is said of the men, aside from Fischer, who were active in these laboratories. With this book in our hands we need not cross the ocean to know all about Munich, Strassburg, Erlangen, Würzburg and Berlin. Noteworthy pen pictures of Fischer's intimates, such as Baeyer and Victor Meyer, are also given us.

Two paragraphs in the book that are of peculiar interest to Americans must receive comment here. We shall make a free translation of both these paragraphs:

"One day an American professor of physiology made his appearance. A rich man had entrusted some money to him with the object of founding a university in Worcester, U. S. A. The professor had the rather romantic notion of filling an entire ship with European professors, assistants, apparatus, chemicals, etc., and bringing the ship and baggage to America. He opened his conversation with me by asking me whether I would be willing to accompany him to America, there to become one of the professors at the new institution. I was too amazed to reply, and thought the whole thing a huge joke until he very carefully and very earnestly outlined his entire plan to me. He proved to be a worthy gentleman, and had much of interest to tell me.

"Soon after this an American lady, 'Miss Helene Abott,' appeared on the scene. A personal attendant who accompanied her proved to be a negress. The lady wanted to enroll as a student, and was quite astounded to find that women were not admitted to the courses. I showed her around the laboratory and introduced her to the younger men, Knorr, Wislicenus and Tafel. Her intelligent comment showed that she possessed a sound theoretical background. After her departure the discussion arose among us as to whether we ought to approach the university senate so as to get the necessary permission to allow the girl to work in the laboratory. One or two individuals were very much for her, but it did seem to the rest that the introduction of the female element into the laboratory would disturb the otherwise harmonious surroundings. Since the majority ruled against her, I wrote her to that effect. Her letter in reply was courteous, but it did not lack energy. She commented rather severely upon the backwardness of Germany in preventing women from getting a higher education."

The book is a treasure "for those who like that kind of thing." Can he call himself a chemist who does not?

BENJAMIN HARROW

NOTES ON METEOROLOGY AND CLIMATOLOGY

A NEW AEROLOGICAL SUMMARY

FOR many years, the free air has been recognized as the abode of many interesting phenomena, and much information has been gained concerning the distribution of the meteorological elements above the earth's surface. But, in the United States, with the two exceptions of the Blue Hill Observatory, associated with Harvard College, and the Mount Weather Observatory, maintained for about seven years by the United States Weather Bureau, there had been only sporadic efforts at upper-air investigation previous to the World War.

Free-air data stand in close relation to aeronautical activities, but their usefulness is by no means so restricted. The relation between surface weather and conditions in the free air is one that is coming to be recognized by the weather forecaster to an increasing degree, although the lack of aerological stations is a serious obstacle to a comprehensive correlative knowledge of these conditions. It is necessary, therefore, to extend, as rapidly as possible, the network of aerological stations in the

United States, and to summarize and publish the accumulated data at such intervals as seem convenient. In this way, we need not sit idly awaiting that golden day when we may trace upon the daily chart the coursing of the air streams above our country, but may study the results of observations thus far obtained.

The Aerological Division of the Weather Bureau, Mr. W. R. Gregg in charge, has recently summarized and published the results of observations at the several kite stations of the Weather Bureau, under the title "An Aerological Survey of the United States, Part I. Results of observations by means of kites."[1]

In addition to the summarizing of data, a useful contribution has been made in the portion dealing with the "standard atmosphere." The "standard atmosphere" is a term which has come into general use among aeronautical engineers and artillerists, and denotes the general or average condition of the atmosphere with respect to temperature, pressure, and density, to as great heights as are employed in the several fields. As far as aviation is concerned, there is a relatively large amount of data available for the maximum height at which flying is likely to occur, but the great maximum ordinates employed in ballistics require a knowledge of conditions to much greater heights.

It is true that at no time does the standard atmosphere exist, but it does afford at all times a standard from which the departures will be quite small. Several plans have been offered in various countries to satisfy the need for such an average atmosphere, as, for example, the "isothermal atmosphere." But, owing to the dependence of atmospheric pressure and density upon the vertical distribution of temperature, and the importance of the temperature factor in power production calculations with reference to air-craft engines, as well as in the design of air-craft instruments, it has been thought best to base the standard atmosphere upon the standard lapse rate of temperature.

Up to 10 kilometers, Toussaint's formula,

$$T = 15 - 0.0065Z,$$

in which T is the temperature in degrees, Centigrade, and Z the altitude in meters, holds for the mean annual values, and is very satisfactory, providing, as Mr. Gregg says, "one set is deemed sufficient for use throughout the year." This formula has been adopted in France, Italy and England. Where values are needed for both winter and summer, new tables have been provided which will be more satisfactory than Toussaint's formula.

It happens that the aeronautical research stations and artillery proving grounds of the army and navy are all within three degrees of latitude 40° N. Moreover, three of the Weather Bureau kite stations are equally close to this parallel, and from these three stations, means have been computed up to five kilometers. Above five kilometers, sounding balloon data obtained at St. Louis (1904-1907) and at Fort Omaha (1911 and 1914) have been used. From the base of the stratosphere (about twelve kilometers) up to twenty kilometers, the greatest altitude considered, a constant temperature of —55° C. has been used. The pressures for the various levels were then computed by means of the hypsometric formula, making proper allowance for the water vapor content of the air and the variation of gravity with altitude and latitude.

The discussion of the standard atmosphere appears in both the *Aerological Survey* and in Report No. 147 of the National Advisory Committee for Aeronautics,[2] the latter being in

[1] *Monthly Weather Review Supplement No. 20.* Copies of this *Supplement* may be obtained from the superintendent of documents, Government Printing Office, Washington, D. C., at 25 cents each. Mr. Gregg has made a very full abstract of this work and published it in the *Monthly Weather Review* for May, 1922. Reprints of this abstract may be obtained gratis upon application to the chief of the Weather Bureau, Washington, D. C. It is believed that this abstract will satisfy the needs of all those who have an academic or popular interest in the work. Many of the charts are reproduced, but the tables are omitted and the discussion of the standard atmosphere is very much condensed.

[2] Gregg, Willis Ray: "Standard Atmosphere." 11 pp., 4 figs., 6 tables. Copies may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., at five cents each.

somewhat greater detail than the former. These publications bring together the best data available approximately representative of latitude 40° in central and eastern United States; they carry the values to altitudes that are much higher than aviation will ever need, and which will only be exceeded by the ordinates of the most extraordinary trajectories in artillery practice.

Turning again to the *Survey*, we find that the information is conveyed largely by charts and tables. The former present the matter as a whole, showing the vertical and geographical distribution of the several meteorological elements over the entire central and eastern United States. The latter are more precise, and are so conveniently arranged that the basic computational material for innumerable aerological studies may be found there awaiting the student. The text is brief, but clear and cogent, and calls attention to the significant features of the "survey."

The summary is based not only upon the kite stations of the Weather Bureau at present operating (Due West, S. C., excepted, since this station has been in operation only about a year and a half) but also upon the records of the Blue Hill Observatory and the Mount Weather Observatory. Thus data from eight aerological stations fairly well distributed, whose records vary from about two to seven years, have formed the basis of the survey.

The author shows that the values based upon a five-year record do not vary to any significant extent from those based upon a three-year record. As one might expect, the differences between the averages of the three and five-year record

> . . . are greatest at or near the surface, where they amount in a few cases to 2° C., in temperature, 1 mb. in barometric pressure and vapor pressure, and 10 per cent. in relative humidity. Differences in density are in no case significant. The seasonal means of all elements naturally show better agreement than the monthly means, and the annual means for the shorter and longer period are almost identical. It is thus evident that for the determination of *normal* values, particularly those for the months, a longer series of observations is necessary than that upon which the present summary is based.

Nevertheless, it is deemed satisfactory, for practical purposes, to regard the present means as normals. The author explains further that a longer record is necessary for the northern than for the southern stations, for the winter than for the summer (owing to the greater variability at the colder stations and in the colder season), and at lower than at higher altitudes above the surface. Thus, while 20 to 40 years are desirable lengths of record for surface data, a much shorter period is necessary for the upper levels.

To attempt to present in abstract the many striking and interesting features of the numerous diagrams would be impossible, owing to the concise presentation in the original. The large field of information is indicated by the following topics selected from the legends: Seasonal average temperatures, relative humidities, vapor pressures, for each station from the surface to about five kilometers; geographical distribution of mean summer and winter and annual barometric pressures, temperatures, relative humidity, vapor pressure, density and resultant winds; means seasonal wind velocities and the percentage frequency of different wind directions. All of these data extend from the surface to levels three to five kilometers above sea-level.

The study of aerological data is two-fold, embracing average conditions and current data. This publication from the Aerological Division of the Weather Bureau forms an admirable contribution to the former field. Such contributions form a setting for the study of current data. But, in spite of the resounding challenge of the upper air to the forecaster, the adequate and complete application of current aerological data must await the extension and amplification of the aerological *réseau*.

C. LEROY MEISINGER

WASHINGTON, D. C.

SPECIAL ARTICLES

DEFICIENCY OF ATMOSPHERIC DUST IN COAL

IN connection with studies in eolian sedimentation the writer recently has become interested in an apparent discrepancy among (1) the rate of deposition of atmospheric dust, (2)