

The Editor would again call attention to the principle laid down by him in discussing this subject in his *Treatise on Meteorological Apparatus and Methods*, viz, that evaporation as measured by any form of apparatus thus far devised corresponds to artificial conditions so far removed from nature that it can at best give only a crude representation of the actual natural evaporation by which moisture is thrown into the atmosphere from the ocean, the lakes, and the land. The true method of treating evaporimeters of all kinds within instrument shelters is to consider them as integrating hygrometers. For such exposures, the total evaporation during an hour, or a day, is a simple result of the temperature, the wind, and the dryness. Knowing the two former and the measured evaporation, we may compute the average dryness. This average dryness is a much more important datum to the meteorologist than is the measured evaporation to the climatologist. Of course, hydraulic and irrigation engineers need to know the loss of water by evaporation, but in nature this is so mixed up with seepage, leakage, and consumption by animals and plants that our meteorological data are of comparatively little importance. For the agricultural engineer the lysimeter and Symon's evaporimeter, six feet square, are essential apparatus, but for the meteorologist an integrating hygrometer, such as the Piche evaporimeter really is, is the important instrument. The meteorologist takes the atmosphere as it is, without necessarily concerning himself as to where the moisture comes from, and then tries to follow the air and vapor in all their kaleidoscopic changes.

#### THE ASSOCIATIONS OF TEACHERS OF PHYSICS AND MATHEMATICS.

Under the leadership of enthusiastic teachers in the universities and colleges, the teachers in normal schools, high schools, and academies are being organized into associations for mutual improvement. Three such associations are known to the Editor, viz, the Eastern Association, meeting usually in New England; the Middle States Association, meeting usually in New York or New Jersey; and the Central Association of Science and Mathematics Teachers, meeting usually in Chicago. Probably others also exist.

In all these associations the teaching of meteorology has received more or less attention and we commend the importance of such associations to the attention of those officials of the Weather Bureau who are interested in education.

The addresses of J. W. Smith, R. DeC. Ward, and William M. Davis before the Eastern Association on Saturday, May 20, 1905, and the addresses of Prof. H. J. Cox and the Editor before the Central Association on November 24, 1904, illustrate the importance of availing ourselves of these opportunities to further the meteorological propaganda.

#### WEATHER BUREAU MEN AS EDUCATORS.

Mr. Alfred F. Sims, Local Forecaster, Albany, N. Y., reports a visit from the class in physical geography of St. Agnes School, to which he gave instruction in the use of Weather Bureau instruments on April 27.

Mr. J. B. Marbury, Local Forecaster, Atlanta, Ga., reports that on June 10 the office of the Weather Bureau was visited by about forty members of the local Young Men's Christian Association to whom he gave a lecture on the work of the Weather Bureau which it is believed will lead to a more general appreciation of the service.

Mr. J. W. Smith, District Forecaster, Boston, Mass., reports that on May 20 he gave an address to the Eastern Association of Physics Teachers, and on the same date he also delivered a lecture to a class from Harvard University, and on June 3 to a class from the Mechanic Arts High School. In each of these ad-

resses he explained the organization, the work, and the beneficial results of the Weather Bureau. The lectures were given at the local Weather Bureau office.

Mr. David Cuthbertson, Local Forecaster, Buffalo, N. Y., reports that during May three classes from the public schools visited the office and received instruction in the rudiments of elementary meteorology.

Professor H. J. Cox, Chicago, Ill., under date of April 28, reports:

A committee, of which I am chairman, consisting of six members of the Geographic Society of Chicago, was recently appointed to prepare a bulletin on the teaching of meteorology, which is to be published by the society. Five members are teachers actively engaged in instruction in meteorology and physiography, among whom are Professor Goode and Mr. Barrows of the University of Chicago. It is believed that the work of the committee will afford great assistance to all engaged in teaching meteorology, and should meet with the cooperation of the Weather Bureau. It is the plan of the committee to supply lantern slides to teachers at actual cost (about \$3 per dozen). The following outline shows the subjects that the committee expects to illustrate, and the person to whom each subject is entrusted:

#### METEOROLOGY.

1. The atmosphere.—General considerations.  
Illustrations of meteorological instruments.—Mr. Cox.
2. Temperature.  
Illustrations: Charts of isotherms and other [charts of] heat distribution.—Miss Smith.
3. Air pressure and circulation.  
Illustrations: Graphs of pressure records and wind records.  
Diagrams for vertical circulation and meridional charts of circulations.—General.  
Graphs of adiabatic vertical temperature gradient, and actual temperature gradient.  
Charts of moonsoons.—Mr. Everly.  
Weather maps of United States, etc.; cyclones, tornadoes, etc.—Mr. Cox, Mr. Goode.  
Pictures of storm destruction, etc.; thunderstorms, etc.—Mr. Cox.
4. Moisture.  
Illustrations: Graphs of moisture range.  
Cloud forms (photographs).  
Graphs of rainfall by months.  
Charts of rainfall distribution.  
Graphs on hail formation.  
Photographs of hail or damage by hail.—Mr. Wilder.  
Snow crystals, and frost scenes.  
Snowscapes; sea ice.  
Charts of humidity and evaporation.—Miss Smith.
5. Optics and electricity.  
Illustrations: Mirage, coronæ, halos, rainbows, etc.; aurora borealis; lightning.—Mr. Barrows.
6. Climate.  
Charts of United States and other regions.—Mr. Goode, Mr. Cox.

Under date of May 19 Professor Cox reports a lecture delivered May 5 before the Press Club of Chicago, and an address on May 12 before the Harmony Guild for the benefit of the charities of that organization. Both lectures were of a popular character and were highly appreciated.

Mr. W. P. Stewart, Assistant Observer, Escanaba, Mich., reports that on June 8 a class in physical geography from the Escanaba High School visited the office and were instructed in the use of instruments and maps, and methods of weather prediction.

Mr. D. S. Landis, Assistant Observer, Fort Worth, Tex., reports that during April two lectures were given to and visits received from scholars in the eighth and ninth grades in the High School.

Mr. B. L. Waldron, Observer, Hannibal, Mo., reports that the Principal with the senior class of the West School visited the Weather Bureau office on May 10 and were given a lecture on the construction and use of instruments, forecasting, and

work of the Weather Bureau. On May 27 another class from the same school visited the office, accompanied by a teacher. The same lecture was repeated, with some additional remarks on so-called long-range forecasters and their work.

Mr. S. W. Glenn, Section Director, Huron, S. Dak., reports that students of the summer school of the Huron College visited the office of the Weather Bureau on June 28 for instruction in the construction and use of the several instruments, and the work of the Bureau. The class was large and evinced much interest in the instruction. A portion of the class made another visit on July 20 for instruction of a more detailed character than was possible when the full class was present. The instructor on this occasion dealt largely with the formation, development, and progress of storms.

Mr. J. L. Bartlett, Observer, Madison, Wis., is announced in the catalogue of the University of Wisconsin (pages 176, 177) as lecturer on meteorology and offers the following courses:

1. *Elementary meteorology.*—The properties and phenomena of the earth's atmosphere, including barometric pressure, temperature, precipitation, fog, dew, frost, clouds, the general circulation of the atmosphere, and general and local storms. Explanation of the meteorological apparatus in use at the Weather Bureau office, and instruction in its use. Instruction and practise work in taking and recording weather observations, in preparing weather maps, and in the use of the weather maps in making forecasts and warnings. First semester; three times a week.

2. *Advanced meteorology and climatology.*—The climatic elements; solar or physical climate; physical climate, including continental, marine, and mountain climates; snow line and glaciers, mountain and valley winds, foehn, sirocco, bora, and mistral; mountains as climatic barriers; geological and secular changes of climate; periodic variations of climate; especial attention will be given to the study of the climate of the United States. Second semester; three times a week.

It will be seen that this course of lectures fairly covers the field of the ordinary text-books by Davis, Hann, Ward, and Waldo. But of course there is abundant opportunity for the instructor to introduce original ideas and methods such as will be expected from the instructors in such a famous and progressive university as that of Wisconsin.

Among the faculty at this university we notice the names of several who are well-known to the Weather Bureau, among them Mr. A. L. Colton, Instructor in Physics, formerly private secretary to Prof. M. W. Harrington; Mr. A. S. Flint, Astronomer, formerly aide at the U. S. Naval Observatory; Dr. C. E. Mendenhall, Associate Professor of Physics, son of Prof. T. C. Mendenhall, formerly of the Weather Bureau, and for a long time Chief of the U. S. Coast and Geodetic Survey. The University of Wisconsin is rapidly assuming a prominent position in the matter of post-graduate instruction.

Mr. T. S. Outram, Local Forecaster, Minneapolis, Minn., reports a visit on May 12 and May 17, from the classes of the Central High School. The pupils were shown how the reports from the different stations are received and entered on Map A, how forecasts are made and how the maps are prepared for printing, how the records of the different instruments are made and compiled, what the instruments are and how they are mounted, etc. Questions of the teacher and pupils were answered.

At this school the class in physical geography is being taught a good deal of practical meteorology and the pupils are constantly being instructed regarding the difference between the forecasts of unprincipled or ignorant guessers of the weather conditions of the distant future and the forecasts of those following the lines of accepted science.

Mr. Dewey A. Seeley, Observer, Peoria, Ill., located at the Meteorological Observatory of the Bradley Polytechnic Institute, reports that lectures have been given by him as follows: April 21, before the Young Men's Christian Association, May

5, before the Bradley Polytechnic, May 10, before the Men's Club of St. Paul's Episcopal Church, May 31, before the pupils of the public schools, June 16, in connection with the "Open Night" at the Bradley Polytechnic. In addition to the above the students of the institute have been instructed from time to time at the office in sections of about twenty each. At the public lectures from 200 to 500 persons have generally been present.

Mr. C. F. von Herrmann, Section Director, Raleigh, N. C., reports as follows:

I entered upon my second year as instructor in meteorology at the Agricultural and Mechanical College, West Raleigh, N. C., on January 16, 1905. Owing to the disinclination of the college authorities to purchase the required number of text-books for the larger class instructed this year, the course given by me was changed, and does not now include recitations from a text-book. Instead of this, a course of twelve lectures has been prepared, which covers the field of meteorology fairly well. The lectures comprise:

1. The atmosphere; its origin, evolution, and arrangement.
2. The physical properties of the atmosphere; sources of heat.
3. The temperature of the atmosphere.
4. The temperature of the atmosphere (continued).
5. The pressure of the air.
6. Moisture, and its condensation into cloud, etc.
7. The various forms of precipitation.
8. Winds.
9. General circulation of the atmosphere.
10. Cyclones and anticyclones.
11. Weather and local storms.
12. The work of the Weather Bureau.

The senior class in agriculture takes the course in meteorology.

The lecture hour is Thursdays from 3 to 4 p. m. Of the course outlined the first four lectures have been delivered. In order to show the nature of the course, I inclose rough drafts of the first four lectures, together with the diagrams, notes, etc., used in connection therewith. As delivered, however, the lectures have been modified in the direction of a more elementary presentation of the subject. My indebtedness to Hann's *Lehrbuch der Meteorologie* is plain.

Finding it difficult to prepare, by the chalk plate process, accurate copies of certain required charts—as, for instance, the isobars and winds for the globe, January, July, and the year, and others which are very much needed—I adopted the method of making photographic copies. I find this method too expensive and troublesome, where it is necessary to give each member of the class a copy. In future I shall have to endeavor to make chalk plate copies of the most important charts, so that a sufficient supply may be printed.

I would suggest that the central office could save those officials who are acting as instructors in colleges much labor by providing certain much-needed charts, the isothermal and isobaric charts for the globe, charts showing the distribution of precipitation, cloud pictures, and the like. Rather than have these charts on a large scale for wall display, they might be printed small, about the size of an octavo page, and furnished to instructors in sufficient quantities to enable a copy to be given to each student, forming a valuable nucleus for other notes taken during the course.

With regard to the four lectures referred to above by Mr. von Herrmann a commendatory letter was written by the Chief of Bureau in which he said:

You are hereby commended for the preparation of these papers. They show that their author possesses both literary and scientific talent of a high order. This commendation will be noted on your official record.

Mr. Edward H. Bowie, Local Forecaster, St. Louis, Mo., reports that Mr. L. H. Daingerfield, Observer, explained the instrumental equipment, weather map, and process of map making to a class of about forty teachers employed in the St. Louis schools but now attending the Summer Normal School.

Mr. Ford A. Carpenter, Observer, San Diego, Cal., reports an address before the San Diego Academy of Science June 10 on "San Diego weather during the season of 1904-5." On the 25th of May he delivered the last of his course of lectures on meteorology at the San Diego State Normal School.

Mr. W. H. Alexander, Observer, Taylor, Tex., having been

stationed at Taylor, Tex., in order to deliver lectures at the University of Texas, located at Austin, which is about 30 miles southwest of Taylor, reports:

I have called upon President Prather of the University of Texas. As Mr. Alexander Deussen is now giving three lessons a week in elementary meteorology it appears most feasible to let the present arrangement stand for the remainder of this college session and for me to arrange to deliver a few lectures to the students as a whole on the U. S. Weather Bureau and its work. It is believed that such lectures would be helpful as matters of general information and would serve to bring the course in meteorology more prominently before the student body.

Mr. W. S. Belden, Section Director, Vicksburg, Miss., reports that during May and June he delivered a series of five lectures before the junior and senior classes of St. Francis Xavier's Academy on the following subjects:

- (1) Temperature and pressure of the atmosphere.
- (2) Winds and moisture of the atmosphere.
- (3) Atmospheric optics.
- (4) Cyclones, anticyclones, hurricanes, and tornadoes.
- (5) The weather map and weather forecasting.

The lectures were freely interspersed with experiments and illustrations.

#### THE NEW EDITION OF HANN'S METEOROLOGY.

The great demand for the Lehrbuch published by Hann in 1900-1901 has given occasion for the preparation and publication of a second edition, of which the first five parts have already been published by C. H. Tauchnitz, in Leipsic, Germany. So far as we have noticed, the illustrations and charts of the second edition do not differ materially from those of the first; indeed there was little occasion for a change in this respect, except in regard to the results of the more recent observations of hail and clouds, or the international work with kites and balloons in the free atmosphere. On the other hand the text shows everywhere the revising hand of the author, introducing innumerable changes in order that it may represent the latest additions to our knowledge. The historical development of observational meteorology has been given so fully in the first edition, and especially in the standard Lehrbuch by E. E. Schmidt (Jena, 1860) that Hann has rightly appreciated the fact that the great need of the present moment is a clear statement of the physics and mechanics of the atmosphere, that is to say, the problems of heat, moisture, and motion, and the rationale of the never-ending complexity of our atmospheric phenomena. Although Hann has made statistical climatology such a prominent part of his life work as to have revolutionized our knowledge of the subject, yet he has been able to devote equal attention to the underlying philosophy, and step by step has built up a systematic theory or in some cases has completed the structure that others had begun. His second edition differs from the first by the omission of many bibliographical notes in fine print and by the use of larger type for the main body of the text, it is therefore much less wearisome to the eye and it is easier to follow the trains of thought. If the preceding edition was an encyclopedia or a compilation of all that the author had read during his preceding forty years of activity, the new edition on the other hand is a digest of the present condition of our knowledge, and, therefore, especially adapted to the use of students in universities and of teachers who give special attention to meteorology.

The English speaking public has often asked for an English edition of the original German work; in fact the Editor undertook this work with a brave heart, but after a few weeks realized that we could find no publisher for it, and that in fact those who are able to use such a translation are probably also well enough acquainted with the German language to prefer the original. But as regards the present edition, which will embrace about 600 pages as compared with the 800 of the previous edition, there can be no doubt but that an English

translation will be welcomed by students and teachers throughout the world. It is greatly to be hoped that by assigning each chapter to some competent student for translation the German publisher may secure the most prompt publication possible, so that this work may exercise throughout England, America, and their colonies the good influence that it is bound to exert among the German speaking peoples.

So far as published the new edition consists of an introduction of 24 pages; Book I, pages 25-125, five chapters on the temperature of the solid and fluid portions of the earth's surface and of its atmosphere; Book II, pages 126-156, four chapters on atmospheric pressure and its variability; Book III, pages 157-275, four chapters on the aqueous vapor of the atmosphere; Book IV, pages 276-362, five chapters on the movements of the atmosphere or dynamic meteorology. Book V, the disturbances of the atmosphere, or the daily weather, storms, cyclones, etc., brings us to the last page, 432, of the fifth part. This corresponds closely to page 542 of the first edition and shows approximately the ratio of condensation in the two editions. Evidently the omitted bibliographic notes in fine print have often been replaced by additions of new material. At this rate one more part will bring us to the end of the volume, at something more than 600 pages.

As the price of the new edition, unbound, will amount to about eighteen marks or \$4.50 when complete, it will be quite within the means of every college library and enthusiastic teacher. Either Stechert or Lemcke and Büchner, the well-known importers in New York, N. Y., will obtain copies at the shortest notice. But, as above said, an English edition is imperative. No one can ask that another with the genius of Hann shall repeat the great labor that he has performed for the science to which his life is devoted. Rarely has any branch of science presented a similar instance of 50 years of continuous devotion of every energy of one person to the herculean task of bringing order out of chaos; throwing the light of reason upon the art of observing and studying one special line of natural phenomena. Most meteorologists, so-called, have divided their attention between that subject and some other branch of science, but Hann has from the beginning devoted himself to meteorology alone.

#### CONTRIBUTIONS TO THE PHYSICS OF THE FREE ATMOSPHERE.

The great extension that has been given to the use of balloons and kites in aerial research is well known to all readers of the MONTHLY WEATHER REVIEW. The work of Abercromby with the kite balloon in 1885 and 1887, Teisserenc de Bort with sounding balloons about 1887, the Weather Bureau and the Blue Hill Observatory with kites about 1894, has led this subject to be taken up by almost every nation of Europe, and it is seen to be the most important branch of atmospheric investigation. By voluntary agreement on the part of individuals and national weather bureaus certain dates have been agreed upon for simultaneous ascensions and the results of this work have been published in greatest detail at the expense of the German Government in a series of volumes known as "Veröffentlichungen," or the "Publications of the International Commission for Scientific Research by means of Balloons, Kites, Mountain Stations, and Cloud Observations." Four volumes of this character have been published for the years 1899-1903, but as it did not seem proper that Germany should bear the whole expense of the international work it has been agreed that beginning with the work of 1904 the publication shall be at the joint expense of all nations and individuals that are willing to contribute to it. Accordingly contributions and subscriptions may be sent to Prof. H. Hergesell, Strassburg, Germany, as president of the international committee.

A publication distinct from the preceding was initiated in 1904 under the title of "Beiträge," or "Contributions to the