Department of Education. According to Northern News Service, the Geophysical Institute at Tromsö will act as a weather-forecasting and aurora observatory, and Professor Krogness will have the assistance of Professor Vegard and of other scientific men working in the north, including Mr. Soot-Ryen, who has made valuable researches into the fauna of the coasts of northern Norway. The committee's aim is to forward cooperative work between the different scientific institutions of Tromsö and the north.

UNIVERSITY AND EDUCATIONAL NOTES

A CONTRACT with representatives of the Italian government has been signed by Mr. George Eastman by which he has agreed to build and equip a dental dispensary in Rome to cost $1,000,000. It will be similar to the Rochester Dispensary and the Eastman Dental Clinic of London.

W. W. COOK, of New York City, has made a gift of $200,000 to the University of Michigan for the support of lectures on American institutions.

DR. ALLEN K. KRAUSE, formerly associate professor of medicine at the Johns Hopkins University, who has recently been made director of the Desert Sanatorium and Institute for Research, has been appointed clinical professor of medicine at Stanford University. While Dr. Krause will make his headquarters at Tucson, Arizona, he will be in San Francisco at certain times during the year to participate in the teaching at Stanford.

QUENTIN D. SINGEWALD, assistant professor of geology at the Colorado School of Mines, has been appointed assistant professor of geology at the University of Rochester.

DR. KARL E. MASON has been promoted to an assistant professorship of anatomy at Vanderbilt University.

SEVERAL new instructors will join the faculty of the Pennsylvania State College next fall to work in connection with the legislative appropriation of $50,000 for oil and gas research at the college, to teach a new course in oil and gas production and to assist in teacher-training work throughout the state. These include Clark F. Barb, of the Colorado School of Mines, appointed associate professor of petroleum research, and M. R. Fenskee, of the Massachusetts Institute of Technology, who will become assistant professor in chemical engineering; Paul G. Shelley, of the University of Oklahoma, and E. F. Williams, graduate assistant in mineralogy, and Herbert J. Stack, of Columbia University.

THE following appointments that have recently been made in foreign faculties of medicine are recorded in *The British Medical Journal:* Dr. Marcel Labbé, professor of general pathology and therapeutics at Paris, has succeeded the late Professor Widal in the chair of clinical medicine; Dr. M. Wertheimer, of Berlin, has succeeded Professor Schumann in the chair of psychology at Frankfurt; Dr. Hermann Siemens, of Munich, has been appointed professor of dermatology at Leyden, and Professor Steurer has succeeded Professor Körner as director of the oto-rhinolaryngological clinic at Rostock.

H. T. TIZARD, permanent secretary of the Department of Scientific and Industrial Research, has been appointed rector of the Imperial College of Science and Technology as from the beginning of September in succession to Sir Thomas Holland, who has been appointed principal of the University of Edinburgh.

DISCUSSION

SHALER ON THE FOSSIL BRACHIOPODS OF THE OHIO VALLEY

IN the *Memoirs* of the Kentucky Geological Survey, Vol. I, there is a paper by the late N. S. Shaler, "On the Fossil Brachiopods of the Ohio Valley." This paper consists of p. [2] I–IV, 3–44, Plates I–VII, with descriptions facing the plates. The date and place of publication are not given on the title-page of this paper in the volume, but an author's separate on cover and title-page bears the name of the University Press, Cambridge, and the date 1876. Shaler's text consists of a general account of certain brachiopods of the region. The last twenty-one pages are made up of tables with very detailed measurements as prepared by A. R. Crandall. The bearing of these measurements is not obvious. The tables and illustrations are only briefly mentioned (p. II, III, 12) in Shaler's text. On page 10 are recorded "*Platystrophia lynx* n. sp., *Plectambonites sericea* n. sp." It is not clear why these should be listed as new species. One was described by Eichwald, in 1830, as *Terebratula lynx,* and later by him, 1840, referred to *Spirifer lynx.* The other was described by Sowerby, in 1839, as *Leptaena sericea.*

N. S. Shaler was at that time (1876) director of the Kentucky Geological Survey and for a long term of years professor of paleontology in Harvard University. The brachiopod paper here considered was Shaler's principal contribution to paleontology. He, however, published: 1865, "List of Brachiopoda from the Island of Anticosti Sent by the Museum in Exchange," 10 pp.; 1888, with August F. Foerste, "Pre-

liminary Description of North Attleborough Fossils," 15 pp., 2 pl., and 1889, "On the Occurrence of Fossils of the Cretaceous Age on the Island of Martha's Vineyard," 9 pp., 1 pl. Shaler's main publications were on geology or various literary subjects.

The object of this note is to call attention to a curious bibliographical occurrence in certain copies of the Brachiopod memoir cited. In eight copies examined, including two author's separates, there are seven plates, which is the number stated on the title-page. The same number exist in a copy in the library of the U. S. Geological Survey, as I am informed by the librarian, Miss Julia L. V. McCord. Again, seven plates are recorded by Dr. Willard Rouse Jillson in his bibliography of publications of the Kentucky Geological Survey as given in his "Geological Research in Kentucky," *Kentucky Geol. Surv.*, series 6, 15: 45 and 138, 1923.

In the geological library of the British Museum a copy of this memoir has eight plates, the eighth numbered VIII, but without a description. In a recent visit at the British Museum I saw this copy and told my friend, Charles Davies Sherborn, Esq., that I would try to get him information about this eighth plate. Dr. Willard Rouse Jillson, director of the Kentucky Geological Survey, writes me that their copy has an eighth plate, without description. Miss Julia L. V. McCord, noted above, kindly interested herself and wrote me that Dr. E. O. Ulrich, of the U. S. Geological Survey, possesses a copy of this paper in which also there is an eighth plate. She kindly sent me two photographs of this plate, one of which has been sent to the British Museum and the other placed in the library of the Museum of Comparative Zoology, in Cambridge. The eighth plate bears the title: "Ky. Geol. Survey. Plate VIII," and at the bottom: "E. Bierstadt's Albertype, New York." This title is in the similar extra plate in the British Museum copy, and in the other plates of the paper. In fact, Mr. Sherborn writes me that the photograph sent him "is precisely the same" as the plate in their copy. On this Plate VIII are shown twenty-five figures of the interior of the valves of *Orthis occidentalis* Hall = *Hebertella occidentalis* (Hall).

What is the meaning of this extra eighth plate in the three copies noted? I think that without reasonable doubt it is the first plate of a proposed Part II of Shaler's paper, "On the Fossil Brachiopods of the Ohio Valley," which plate must have been printed and was inadvertently bound in with the plates from Shaler's paper from Vol. I. It should be noted that this paper, in Vol. I, is not recorded as Part I. An announcement of a "Part II" was published as recorded in the following, but the paper never appeared. Miss McCord wrote me that Dr. R. S. Bassler thinks the view expressed in regard to this extra Plate VIII is probably correct, and I am glad to have his confirmatory opinion.

In the Preface of Vol. I of the *Memoirs* of the Kentucky Geol. Surv., p. iv, it is stated:

> The second volume will contain memoirs concerning the following subjects:
>
> I. "On the Prehistoric Remains of Kentucky." Part II. By Lucian [Lucien] Carr and N. S. Shaler. Map and Plates.
>
> II. "On the Fossil Corals of Kentucky." Part I. [By] N. S. Shaler.
>
> III. "On the Cavern Animals of Kentucky." By A. S. Packard, F. A. [F. G.] Sanborn, and others. 4 Plates.
>
> IV. "On the Fossil Brachiopods of the Ohio Valley," Part II. By N. S. Shaler. Maps, 8 Plates.
>
> V. "On the Cavern-Dwelling Races of Kentucky." By F. W. Putnam. 6 Plates.
>
> VI. "History of the Investigation of Cavern Animals." By H. A. Hagen.
>
> VII. "On the Dynamic Geology of Kentucky." By N. S. Shaler. Maps and Plates.
>
> The second volume is to be issued in 1877.

Of the second volume of *Memoirs* of the Kentucky Survey a paper was published entitled "The Mounds of the Mississippi Valley Historically Considered," by Lucien Carr [1883, pp. 1–107, no illustrations]. No date or number is given on the title-page of this paper, but a copy in the library of the Museum of Comparative Zoology is dated as received, September 25, 1883. In Dr. Jillson's bibliography noted above, p. 55, he refers to this paper of Lucien Carr's as "Part I" of Vol. II. He is evidently doubtful of the date of publication, for he says: "Latest reference given is 1881," which occurs on page 106. A more definite evidence of the date of publication of this paper of Mr. Carr's is the fact that it was republished in the Annual Report of the Board of Regents of the Smithsonian Institution to July, 1891, Washington, 1893. In this publication, page 503, it records the paper on the "Mounds of the Mississippi Valley" as from *Mem. Kentucky Geol. Surv.*, Vol. II, 1883. This may be accepted as a definite date of publication.

Dr. Jillson in his bibliography, page 55, says of Vol. II of the *Memoirs* of the Kentucky Survey that it was never completed, and he records no other paper than that of Lucien Carr's above considered. Jillson further says that various titles have been ascribed to it, but without any real authority.

In the libraries of the Museum of Comparative Zoology, the Boston Society of Natural History and the British Museum, however, there is a second paper that was published in Vol. II of the Kentucky Survey. The title-page of this paper reads: "Memoirs Geological Survey of Kentucky. N. S. Shaler, Di-

rector, Vol. II, Part VIII. On the Collection of Cavern Insects. By Elzéar Abeille de Perrin, University Press, Cambridge, 1877." This apparently rare paper consists of pages 1 to 14, without illustrations. Though numbered VIII, it was evidently published, 1877, before Lucien Carr's paper, which Jillson calls number I, but which was not published until 1883.

These two papers, Lucien Carr's, No. I, and Abeille de Perrin's, No. VIII, as far as I can ascertain, were the only ones ever published in Vol. II of the *Memoirs* of the Kentucky Survey. The same conclusion is expressed by Adelaide R. Haase, on page 305 of "Index of Economic Material in Documents of the States of the United States," Kentucky, 1792–1904, Publication 85, Carnegie Institution of Washington, 1910. I would further say that apparently none of the seven papers announced for Vol. II of the Kentucky Survey as above listed was ever published, at least as there recorded.

ROBERT TRACY JACKSON
MUSEUM OF COMPARATIVE ZOOLOGY,
CAMBRIDGE, MASSACHUSETTS

IONS AND ELECTRICAL CURRENTS IN THE UPPER ATMOSPHERE

IN a paper to be communicated to the American Physical Society it is assumed that the ionization in the upper atmosphere is caused by the ultra-violet light of the sun and that the ion and electron densities at noon at the equator are those required by the theory of wireless wave propagation. From the laws of recombination of the ions and the diffusion and drift of the ions in the earth's magnetic and gravitational fields the distribution of the ions over the earth is worked out. This distribution turns out to be that required by the diamagnetic theory of the solar diurnal variation of the earth's magnetism. The gravitational drift currents are found to flow mainly along the parallels of latitude in the following way: on the daylight hemisphere (1) a current sheet flowing eastward in the levels above 150 km which at the sunrise and sunset longitudes divides into two sheets; (2) one of these flows westward on the day side of the earth underneath (1) in the levels below 150 km, and (3) the other sheet continues eastward in the upper levels around on the night side of the earth. The current is mainly between the fortieth parallels of latitude, north and south, and falls to lower values at the higher latitudes. The total currents in the three sheets are about 10^7, 8×10^6 and 2×10^6 amperes, respectively. The east and west daytime current sheets subtract from each other leaving in effect an eastward current of about 2×10^6 amperes flowing around the earth all the time. This causes a magnetic field agreeing in magnitude and type with that obtained by Bauer in his 1922 analysis of the magnetic field of the earth of external origin.

As a result of the drift currents, the sunset longitude of the earth is at a potential of several hundred volts above that of the sunrise longitude. This electric field combined with the earth's magnetic field causes the ions and electrons on the night side of the earth to drift upward with velocities of order 10^2 cm sec^{-1}. The ions and electrons move into regions of lower pressure and therefore do not recombine as fast as they otherwise would. This removes a difficulty from an earlier calculation which yielded too great a night-time rate of disappearance of the free charges. The upward drift of the ionization causes a rise of the Kennelly-Heaviside layer which is, partially at least, compensated by the fall due to the cooling and contraction of the atmosphere at night, and is complicated by the diffusion of the ions. It is difficult to say how much of the night-time rise of the layer observed in experiments with wireless rays may be genuine rise and how much may be an apparent rise due to delayed group velocities, or to other causes.

E. O. HULBURT
WASHINGTON, D. C.
NAVAL RESEARCH LABORATORY,

MUYBRIDGE ANIMAL PICTURES

PROBABLY there are a good many individuals who for historic, scientific or for artistic purposes would be glad to secure samples of the Muybridge Locomotion Plates published under the auspices of the University of Pennsylvania in 1887. The complete work comprised 781 plates; each plate contains from twelve to thirty-six individual pictures, that is, from one to three series representing as many different photographic angles. A series represents some act of motor coordination, such as taking a step, jumping, striking with a hammer, etc. Recently the writer discovered that the remainders of these plates are in the hands of the Commercial Museum, 34th Street, Philadelphia. Not all the plates are represented in these remainders, but probably there are copies of some 350 or 400 of the subjects. These include men, women and children, nude and draped, and a very large animal series. In the latter the action portrayed is usually that of locomotion. The plates are in excellent condition, having remained in their original wrappers during the forty years of storage. On these plates the pictures are larger and present more detail than in the bound volumes of pictures which were issued by Muybridge. The Muybridge plates are still preeminent in the field which they cover and are of great value for their faithful representation of both