

genous compounds are carried out in the green leaf and aided by sunlight. Rain-water collected for a considerable time contains no nitrites, all having been oxidized to nitrates; but if exposed to bright sunlight or ultra-violet light for a few hours a strong reaction for nitrites is always obtained.

There is no hydrogen peroxide or ozone in air at surface level. The fresh odor in open air, commonly referred to as "ozone," is probably nitrogen trioxide, which at high dilutions has the odor of ozone. The oxides of nitrogen are probably formed by the action of sunlight, rich in ultra-violet rays, in upper regions of the atmosphere upon air and aqueous vapor.

#### CENTENNIAL OF METEOROLOGICAL STATION AT THE GRAND SAINT-BERNARD.<sup>1</sup>

By R. GAUTIER.

[Abstract of paper presented to Swiss Society of Geophysics, etc., Zurich, Sept. 11, 1917.]

On the occasion of the centennial of the installation of a meteorological station at the Hospice of the Grand Saint-Bernard by Marc-Auguste Pictet, September 15, 1817, the director of the Observatory of Geneva, Mons. R. Gautier, proposed to the general assembly of the Société Helvétique des Sciences Naturelles that there be transmitted to the canons of the Grand Saint-Bernard, a memorial bearing a large number of signatures of members of the society.

In this connection Mons. Gautier made some remarks concerning the installation, and the gradual improvement of the station in 1829 by Auguste de la Rive, afterward several renewals by Émile Plantamour in 1883, by Émile Gautier, and finally in 1900, 1903, 1916, and 1917, by himself.

In 1900 the station was transferred from the old building to the new one, and since that time the observing hours—which had been following the changes in effect at the Geneva Observatory—have been fixed at the three official terms for all the Swiss meteorological réseau.

Interesting climatological results are given in Ch. Bühner's note "Le Climat du Grand St.-Bernard" (Lausanne, 1911), and in the splendid monograph "Das Klima der Schweiz" by Maurer & Bilwiller. There is in preparation at the Geneva Observatory, a work on the whole 100 years of observations.

#### TIME-ZONES AT SEA.

[From the report of the Council of the Royal Society of Great Britain, as abstracted in Nature, London, Dec. 6, 1917, p. 275.]

The possibility of introducing a more convenient system of timekeeping at sea has lately been under consideration, both in Great Britain and in France. The conclusions reached at a conference under the chairmanship of the Hydrographer to the Admiralty, in which representatives of scientific societies took part, are included in the report of the council. The most practical method of obtaining uniformity is considered to be the establishment, outside territorial waters, of zones corresponding with the hourly zones on land. It is proposed that the zone extending from  $7\frac{1}{2}^{\circ}$  east to  $7\frac{1}{2}^{\circ}$  west of Greenwich should be the zero zone, and that the other zones west

and east should be respectively described as *plus* or *minus*, with an indication of the actual correction required for reduction to Greenwich time and date. On this system "+12" would be the half-zone east of the "date line" and "-12" the half-zone west. Any alteration of the time of clocks in ships should always be one hour, but the instant of making the change need not necessarily be that of passing to a new zone. In the case of self-recording meteorological instruments, which it would be difficult to adjust for changing zone time, Greenwich time is considered most convenient, but ship's time should be used for the regular observations. If the proposed zone times be generally adopted, it is recommended that the receipt and dispatch of telegraphic and other messages should for the immediate future be recorded in zone time; but, eventually, it would be most convenient for such purposes to adopt Greenwich time throughout the world.<sup>1</sup>

#### Baron Dairoku Kikuchi, 1855-1917.

By Dr. T. C. MENDENHALL.

[Dated: Ravenna, Ohio, Jan. 14, 1918.]

Baron Dairoku Kikuchi, one of Japan's most distinguished educators and men of science, whose death occurred in August last, was so well known in America, not only through his published works but also personally, that something more than a formal obituary note will doubtless be welcomed by readers of the MONTHLY WEATHER REVIEW.

Dr. Baron Dairoku Kikuchi, privy councilor, president of the Imperial Academy, honorary professor of the Imperial University at Tokyo and also of the Imperial University at Kyoto, was born on March 17, 1855, in the city of Yedo, now Tokyo. Both his father and grandfather were noted scholars in their day, especially in the, to them, greatly restricted area of human knowledge known to the Japanese as "Western learning."

The system of heirship by adoption and change of name, so long in use in Japan, gives rise to much confusion among foreigners regarding relationship and many men of science in Europe and America who have known and admired both Kikuchi, minister of education, mathematician and author of many works, and Mitsukuri, eminent zoologist and writer of international reputation, have not known or suspected that they were brothers. Kikuchi's father was Shuhei Mitsukuri, who had been adopted by Gempo Mitsukuri as his heir. He had belonged to the house of Kikuchi, and to this name his son Dairoku succeeded when it was vacated by his father. Dr. Kakichi Mitsukuri, the distinguished naturalist, was a younger brother and bore the name of the father.

In his early boyhood Kikuchi was famed for his precocity, and it is said that at the age of 9 years he was "a teacher of others." In 1866 the old Shogunate Government sent to England a number of promising young men, who were to absorb the best, if possible, of that Western learning and culture which was already pounding heavily at the closed portals of Japan. Many of these afterward rose to distinction and the youngest of them all was Dairoku Kikuchi, 11 years of age. In two years he returned to his native land, when again, at the mature (?) age of 13 years, he engaged in teaching. At the same time he was a most industrious student, and two years later he was ordered back to Europe to complete his studies. In the University of London, and afterward at Cambridge, he distinguished himself. He was one of the "wranglers" of the latter, of the year 1877, a group of

<sup>1</sup> R. Gautier (Genève). Le Centenaire du Grand St-Bernard. Arch. des sci. phys. et nat., Genève, 15. Nov. 1917, 44: 361.

men several of whom afterward achieved fame, including Sir Charles Parsons, inventor of the steam turbine which has well-nigh revolutionized both the theory and practice of prime motors. In the same year he returned home to receive the appointment of professor of mathematics in the institution in which he had as a boy studied and taught, and which was rapidly developing into the Imperial University of Japan. His success in this important position was assured from the start. To do special work in his department he attracted some of the most brilliant of his young fellow-countrymen, who afterward shared with him in the labors and rewards incident to the phenomenally rapid evolution of public education in Japan. In addition to his accomplishments as a mathematician Kikuchi soon gave evidence of a rare fitness for "affairs" of an administrative and directive nature, which greatly enlarged his sphere of usefulness, as is shown in the following list of some of the more important posts to which he was called, the duties of which he discharged with great credit to himself and lasting profit to his country.

Professor of mathematics at the Imperial University, 1877-1898; Dean of Science College of the same, 1881-1893; president of the same, 1898-1901; president of the Imperial University at Kyoto, 1908-1912; Director of the Bureau of Special Education in the Department of Education (Imperial Government), 1897; Vice minister of Education, 1897-1898; Minister of Education, 1901-1903; in the Imperial Diet as Crown member of the House of Peers, 1890-1912, resigning when he was a made a Privy Councillor which he continued to be up to his death; member of the Imperial Academy since 1889, and president from 1909 until his death, having been elected three times in succession. Only a few months before the end came he had been appointed the first director of the newly created National Physico-Chemical Institute.

During his long career—which in spite of his premature death covered a period of 40 years—he was frequently called upon to serve his country abroad as its representative on scientific commissions and among learned bodies. In 1884 he came to the United States as delegate to the International Prime Meridian and Universal Time Congress held at Washington, and on his way home through Europe he remained some time in Germany, making a thorough study of the educational institutions and systems of that country. In 1907 he represented the Japanese Imperial Academy at the General Meeting of the International Association of Academies at Vienna; but his most important work during that year was the delivery, in English, of a course of lectures on Japanese education at the University of London. These lectures, somewhat revised, were afterward published in a single large volume by John Murray, London. In his boyhood Kikuchi had acquired a rare mastery of the English tongue and this, with a critical knowledge of his own language, enabled him to produce in this volume a storehouse of information regarding the history, development, and scheme of education in Japan, in which the most exacting student of that subject is not likely to find anything lacking. In its pages much light is thrown on many principles and practices of the Japanese which have hitherto been obscure to people of other nations; and perhaps in no other volume can one get so good an understanding of that marvelous "naissance" of a great nation during the life of a single generation, that continues to be a mystery to many thoughtful people. The universal interest in the subject is evidenced by the fact that on the occasion of a second visit to this country, in 1909, he found audiences in many of our principal cities

eager to hear him on one phase or another of the same topic.

At home, in addition to the work incident to the more formal appointments enumerated above, Kikuchi's services were always in demand as a member of numerous committees for the study of scientific or educational problems, and his opinion always carried great weight.

The establishment of the very important Earthquake Investigation Committee was secured by him while a member of the House of Peers. He was one of the originators of the Tokyo Mathematical Society, which was founded in 1877, shortly after his return from Cambridge. It was the pioneer of the many learned societies that have since been created in Japan and at his suggestion it became, in 1884, The Tokyo Mathematico-physical Society. At an early period he became interested in the mathematics of the old Japanese school and his original investigations were practically confined to a critical examination of their methods and results. His numerous activities in other directions left him little leisure for this work, but in his spare hours he accumulated a mass of information of which, unfortunately, only a part reached publication before his death. But it was a labor of love, and in choosing this as the material upon which to exercise his powers of mathematical research he exhibited a fine patriotism, preferring to demonstrate that his intellectual ancestors were not lacking in the "divine afflatus" of mathematics (which had been denied them by many foreigners) rather than to seek fame and reputation for himself.

In the same unselfish way he devoted much time, at the request of the Imperial Department of Education, to the preparation of a textbook on elementary geometry for use in the secondary schools of Japan. This work involved technical difficulties quite unknown to the western author, many of which, indeed, can not be easily explained. Some of them grew out of the ordinary practice in Japan of writing in vertical lines from top to bottom, the lines succeeding each other from right to left. Kikuchi had the courage to cut this Gordian knot by substituting the European fashion of writing in horizontal lines from left to right, a practice which has since been universally followed in mathematical publications.

Loaded with honors and charged with duties of the greatest importance and responsibility, he died suddenly, from a stroke of apoplexy, at his seaside villa at Chigasaki on the morning of August 19, 1917. His funeral took place in accordance with Shinto rites on August 23, and his remains, after being cremated, were interred in the Yanaka Cemetery.

He was created a baron in 1902 in recognition of his invaluable services in the cause of education in Japan and for his share in the Anglo-Japanese alliance which was brought about while he was in the cabinet.

My own acquaintance and intimate relations with Baron Kikuchi began 40 years ago, soon after his return from England, with his mathematical honors, to become a professor in the University at Tokyo.

He had ardently identified himself with his associate and close friend, Prof. Toyama, and others of a small group of "the youngest and best" of Japanese scholars and publicists, in the establishment of a sort of "lyceum" or lecture platform, principally for the benefit of civil and military officers whose occupations and years prevented their becoming students in the university and whose ignorance of European languages stood in the way of their making use of libraries and collections of books in which "western learning" was stored. The scheme was not looked on favorably at first by the Government, the

fear being that doctrines too radical for the time might be preached from this forum, but when the real object of the young men interested was fully understood restrictions were removed. It was the first enterprise of its kind in the history of Japan and was so successful that after a few years it was able to acquire a building or hall of its own, constituting an event of real importance in the evolution of this rapidly changing nation. The audiences were large and enthusiastic from the start and specially eager to learn of the discoveries in science and their practical applications in Europe and America. It was my good fortune to be invited to give several courses of lectures to these men, sometimes in a large theater and sometimes in a large Buddhist temple from which the "gods" and other insignia of worship had been temporarily removed.

Those using other than the Japanese language must necessarily have an interpreter, and when I stood before one of these audiences for the purpose of explaining some of the more recent advances in physical science and their applications, it was the boyish-looking professor of mathematics who stood at my side to render my words intelligible to them. The difficulty of this task will be recognized when it is remembered that at that time the Japanese vocabulary included practically no equivalents for the numerous technical and scientific terms necessarily made use of in such discourses.

Since then, by the indefatigable and wisely directed labors of native scholars, the language has been so enriched that this difficulty no longer exists. Then, however, the task of explaining the meaning of these terms fell upon the interpreter, and because of his training in the exact sciences at Cambridge and his excellent and ready knowledge of both tongues, it is doubtless true that no other person in the world could have done it so well.

The acquaintance thus begun quickly ripened into a close friendship, which stood the test of years and distance and ended only with his death.

Kikuchi made a somewhat prolonged visit in the United States in 1884 as delegate to the International Time Congress, making friends of all whom he met; another in 1909, already referred to; and a third, planned for the winter of 1917-18, was prevented by his death.

Due perhaps to his having mingled with them at an early age and during his most receptive years, his association with foreigners always seemed somewhat easier and less formal than is the case with many of his countrymen, among whom one may often note a sort of unconscious aloofness or reticence in their relations with other races. He possessed a keen sense of humor, which, however, is by no means uncommon among the "intellectuals" of the Land of the Rising Sun. There was about him a charm of manner and refinement of conduct that endeared him to all who had the good fortune to know him intimately. Whatever trace of race prejudice one might have retained through inheritance or otherwise, it was never called up by Kikuchi's presence. Indeed, he was a type of "scholar and gentleman worthy of any race or time."

To show the esteem in which he was held among his own people I can do no better than to quote from a tribute, published soon after his death, by one of his favorite pupils in the early years of his teaching (and one of mine during the same period), Dr. R. Fujisawa, later his successor as professor of mathematics in the Imperial University, to whom I am greatly indebted for information relating to Baron Kikuchi's earlier life. He says:

It has fallen to the lot of very few men of learning to preside over the progress of education and the advancement of knowledge for over

40 years with unflinching sagacity and unbroken success. If "luck" can be said to have aided him at all, it was to be found in the happy coincidence that his talent and disposition so well harmonized with the time and surroundings in which he lived. Kikuchi's name will go down in Japanese history, and it will be remembered of him that although he attained the highest honors his country could bestow on one who emerged from the often-neglected circle of scientific men, he remained from first to last the same genial, modest, courteous man, the same warm-hearted and unchanging friend, the same loyal and devoted servant of his sovereign and his country.

The late Prof. Abbe was among the warm friends and admirers of Baron Kikuchi and maintained a correspondence with him up to about 1911. The acquaintance probably began in 1875, when Prof. Abbe was in active correspondence with a number of leading Japanese and urging the establishment of a national centralized weather service which should coordinate and centralize the sporadic and independently managed Japanese observatories of that day. When Baron Kikuchi visited the United States and Washington in 1884, he was naturally among the guests at the home in I Street where Prof. Abbe was entertaining other delegates to the International Prime Meridian Congress, in whose activities he was taking a leading part. This opportunity for personal acquaintance was always one of the happiest memories of those days, and the mutual esteem then developed steadily increased. It seems altogether appropriate that the above memorial by Dr. Mendenhall should appear on the pages of the REVIEW instituted by Prof. Abbe. — C. A., jr.

#### *Rollin Arthur Harris, Ph. D., 1863-1918.*

Dr. R. A. Harris, who died suddenly on the streets of Washington, D. C., January 20, 1918, was one of the world's authorities on the laws and motions of terrestrial oceanic tides and had been a mathematician in the Tidal Section of the United States Coast and Geodetic Survey since 1890. He had also contributed to the perfecting of the Coast Survey's tide-predicting machine.

Harris was born in Randolph, N. Y., April 18, 1863. He took his undergraduate degree from Cornell University in 1885 and his Ph. D. in 1888, afterwards spending a year at Clark University, Worcester, Mass. The obvious relationship between tides oceanic and tides atmospheric, as well as Harris's powers of mathematical analysis, secured and kept for him the liveliest interest and appreciation on the part of Prof. Cleveland Abbe. Harris was persuaded to contribute several papers to the pages of the MONTHLY WEATHER REVIEW, and they are listed below.

A partial explanation of some of the principal ocean tides. (Read before the National Academy of Sciences, Apr. 19, 1900.) MONTHLY WEATHER REVIEW, March, 1900, 28: 103-108 and map.

Note on the oscillation period of Lake Erie. MONTHLY WEATHER REVIEW, June, 1902, 30: 312 and fig.

The semidiurnal tides in the northern part of the Indian Ocean. MONTHLY WEATHER REVIEW, March, 1903, 31: 127-133 and 5 figs.

Early knowledge of the tides at Panama. MONTHLY WEATHER REVIEW, February, 1906, 34: 80-81.

Deflecting force due to the earth's rotation. MONTHLY WEATHER REVIEW, October, 1908, 36: 327-328.

Dr. Harris also prepared an extended critical review of the last edition of Krümmel-Boguslawski: *Handbuch der Ozeanographie*, which the REVIEW was unable to publish. The critique eventually appeared elsewhere.

Joining the Coast and Geodetic Survey in mourning the loss of an extremely modest but able and illustrious colleague, the Weather Bureau particularly regrets this loss of a helpful and sympathetic friend to the advancement of the higher meteorology.—C. A., jr.