THE BRÜCKNER PERIOD OF RAINFALL AT RIO DE JANEIRO

A RECENT study of rainfall at Rio de Janeiro, summarized in the *Meteorologische Zeitschrift* for January, 1907, shows that a thirty-five-year periodicity seems to prevail there. It is interesting to observe the increasing number of cases of periodicity in climatic averages which fall in line with the Brückner period. An important difference between the original work by Brückner and these later investigations is, however, this: that Brückner started on his quest without prejudice in favor of any particular period, while the more recent students of the same subject have naturally been prejudiced by the conclusions reached by the author of the now famous 'Klimaschwankungen seit 1700.'

METEOROLOGICAL PHENOMENA OF VOLCANIC ERUPTIONS

THE inflowing air currents towards volcanoes which are in active eruption, and the local whirlwinds which are sometimes generated in these currents, have been described by several writers. During the last eruption of Vesuvius (April, 1906), as pointed out by W. H. Hobbs (*Journ. Geol.*, 1906, 636–655) the windows of some houses were broken on the side away from the mountain. This is explained as having been due to the strength of the air currents which were moving towards the volcano.

TREE-PLANTING FOR SNOW-BREAKS

TREE-PLANTING has been begun along the western lines of the Canadian Pacific Railway. Over one hundred miles of trees are to be planted between Calgary and Winnipeg for snow-breaks. Experiments are to be made with tamarack for use as ties, and plantings of jack pine and tamarack are to be started at Medicine Hat in this connection.

NOTE

THE general title under which these 'Notes' have been printed since 1896 is changed with the present number of SCIENCE from *Current Notes on Meteorology* to *Current Notes on Meteorology and Climatology*. The latter title expresses more clearly the scope of the subjects which are here included, and gives deserved prominence to the geographical aspects of meteorology which are properly embraced in the term climatology.

R. DEC. WARD
HARVARD UNIVERSITY

PHOTOGRAPHS OF FAINT STARS[1]

THE number of facts now being accumulated by means of photographs of the stars is enormous. Unfortunately, only a small portion of these facts is now available, and therefore of any use to science. This applies particularly to the faint stars. Many photographs are taken by professional and amateur astronomers, which are followed carefully during long exposures with telescopes having large apertures. In some cases, several hundred thousand stars appear upon a single plate. Unfortunately, no record has been published of many of these photographs, and therefore no use can be made of them. It is the object of the plan described below to remedy this difficulty.

The Harvard collection of photographs in part supplies this need, for stars of the thirteenth magnitude and brighter. On the average, this collection contains images of all the stars of the fifth magnitude and brighter on over a thousand nights. The number of these stars is about two thousand, the photographs are distributed throughout the last twenty years, and cover all parts of the sky. For stars of the twelfth magnitude, which can be taken with a lens of one-inch aperture and an exposure of one hour, the number is reduced to five hundred. This includes the stars in the Harvard Map of the sky, about two million in number. There are about five million stars of the thirteenth magnitude and brighter. They appear on plates taken with eight-inch doublets, and having exposures of ten minutes. About two hundred images of each of these are contained in the Harvard collection. For fainter stars, the number of images falls off very rapidly. Stars of the

[1] Harvard College Observatory, Circular 123.

fourteenth magnitude would appear on plates, having exposures of ten minutes, taken with the twenty-four-inch Bruce telescope, and on plates, having exposures of an hour, taken with the eight-inch telescopes. The average number of times the whole sky is thus covered does not exceed three or four. A large part of the southern sky is covered by plates having an exposure of an hour or more, taken with the twenty-four-inch Bruce telescope. One hundred and sixty regions, covering a tenth of the sky, have exposures of four hours. While, therefore, material exists for studying the variability of stars of the thirteenth magnitude or brighter, but few images can be found of stars much fainter than this limit, except in special regions like the Nebula of Orion. This limit could probably be extended nearly two magnitudes, if the following plan could be carried out. For the present it seems best to confine this work to photographs having an exposure of half an hour or more, and taken with doublets whose aperture is six inches or more. Photographs taken with large reflectors or single lenses may take fainter stars, but in general they relate to special regions and except in the charts of the Astrographic Congress do not cover large parts of the sky. The latter great work will of course, eventually, furnish one or two images of all stars of the fourteenth magnitude, and brighter.

Information is frequently desired regarding very faint stars. For instance, evidence of the previous existence of a new star; of a star now missing; the position of an asteroid; the magnitude at minimum of a faint variable; early position of a faint star suspected of proper motion. Three questions suggest themselves. Where are the principal collections of photographs showing faint stars, and what is their character and extent? Does a photograph exist which is likely to contain the required information? Is this photograph accessible, so that the information desired can be secured from it? Satisfactory answers to these questions can generally be obtained for stars brighter than the thirteenth magnitude, but not for fainter stars. Astronomers having collections of photographs showing such faint stars are urged to publish the material required to answer these questions, or to send the information needed to this observatory. The principal facts desired are given below:

1. A description of the instrument, stating its location; form of lens; maker; aperture; focal length, or scale of photograph, that is, number of seconds of arc to the millimeter; size of plate, or region covered; diameter of circle over which stars as faint as the fourteenth magnitude are shown; kind of plate used; name of observer.

2. A list of photographs, which should include the number designating each plate; the time of the center of the exposure (found by adding half the duration of the exposure to the time of beginning), expressed either in Julian Days and thousandths following Greenwich Mean Noon, or in calendar days, hours and minutes; the right ascension and declination for 1900 of the center of the plate; the time of exposure in minutes; the quality on a scale of 5, 5 denoting that the images are circular and that no serious defect appears upon the plate, 4 that the images are nearly circular so that their positions can be accurately measured, 3 that faint stars are shown so that the relative brightness can be accurately estimated, even if the images are not circular.

3. A statement whether the owner is willing to examine and if necessary measure his photographs to furnish any desired information; to lend them under suitable restrictions, so that copies may be made; to furnish contact prints at cost.

It is the policy of the Harvard Observatory to make the material it has collected as widely useful as possible. Accordingly, preparations are being made to publish the facts asked for in Nos. 1 and 2. For many years the observatory has offered to furnish copies of its photographs at cost to whoever might desire them. If this policy is adopted at other observatories, a purchase of large numbers of photographs of faint stars is contemplated here. The observatory will take charge, temporarily or permanently, of good photographs for which the

owners have no further use, and will render them accessible to astronomers by the methods described above.

EDWARD C. PICKERING

January 19, 1907

THE SEISMOLOGICAL SOCIETY OF AMERICA

THE Seismological Society of America was incorporated under the laws of the state of California on February 13, with a board of directors as follows: George Davidson, president; Andrew C. Lawson, 1st vice-president; T. J. J. See, 2nd vice-president; Alex. G. McAdie, 3rd vice-president; J. N. Le Conte, treasurer; Geo. D. Louderback, secretary; Chas. Burckhalter, W. W. Compbell, C. Derleth, Jr., G. K. Gilbert, A. O. Leuschner, J. S. Ricard.

A letter has been issued, which says: In October 1891 there occurred in Japan what is now historically known as the Mino-Owari Earthquake. Over 7,000 people were killed, 17,000 injured, and 20,000 buildings destroyed. This disaster so impressed the people of Japan that a national movement resulted in the formation of a large general society for the study of earthquake phenomena. An earthquake investigation committee was appointed by the emperor. This committee has already published fifty volumes in Japanese and over twenty in foreign languages. Seventy-five stations have been provided with seismographs and over 1,500 stations report. As a result, Japan is now the foremost nation in activity of earthquake investigation and in devising and applying scientific methods of protection.

The earthquake of April 18, 1906, has brought home to us also the desirability of organization for similar purposes, with the hope that our labors may ultimately be of value to the people in protecting life and property. It is in this spirit that the Seismological Society has been organized. It aims to collect accurate information concerning the mode of action and effects of earthquakes, to establish and train a corps of reliable observers throughout the country, to disseminate the truth among the people, to inform them of the methods devised in various countries to protect life and property, to supplant any element of terror or helplessness which results from imperfect knowledge by an interest in natural phenomena and a sense of security resulting from familiarity with the facts and the taking of reasonable precautions.

To be of general benefit the society must have a large membership, and the dues ($2.00 per year, life membership $25.00) have been placed low for this purpose. The society will inform its members from time to time as to the progress of its work and hopes in the near future to establish a regular series of publications.

Those who are in sympathy with the objects of the society are requested to communicate their desire for membership by writing to the secretary, Professor George D. Louderback, University of California, Berkeley, Cal.

SCIENTIFIC NOTES AND NEWS

A SPECIAL act of congress, passed on February 27, authorized the president to appoint Lieutenant and Assistant Surgeon James Carroll, U. S. Army, a surgeon with the rank of major, in recognition of his important experimental work on yellow fever. The president at once approved this bill and sent the nomination to the senate, and it was confirmed promptly, so that Dr. Carroll is now a major in the Medical Department of the Army.

DR. FREDERICK REMSEN HUTTON, for thirty years adjunct professor and professor of mechanical engineering at Columbia University and for six years dean of the faculty of applied science, will become professor emeritus on July 1 next. A suitable tablet commemorating Professor Hutton's services will be placed in the mechanical engineering laboratory.

PROFESSOR LE ROY C. COOLEY will retire from the active duties of the chair of physics of Vassar College at the end of this year.

PRINCE ROLAND BONAPARTE has been elected a member of the Paris Academy of Sciences in the room of the late M. Bischoffsheim.

MR. JOHN HAYS HAMMOND has been nominated president of the council of the Amer-