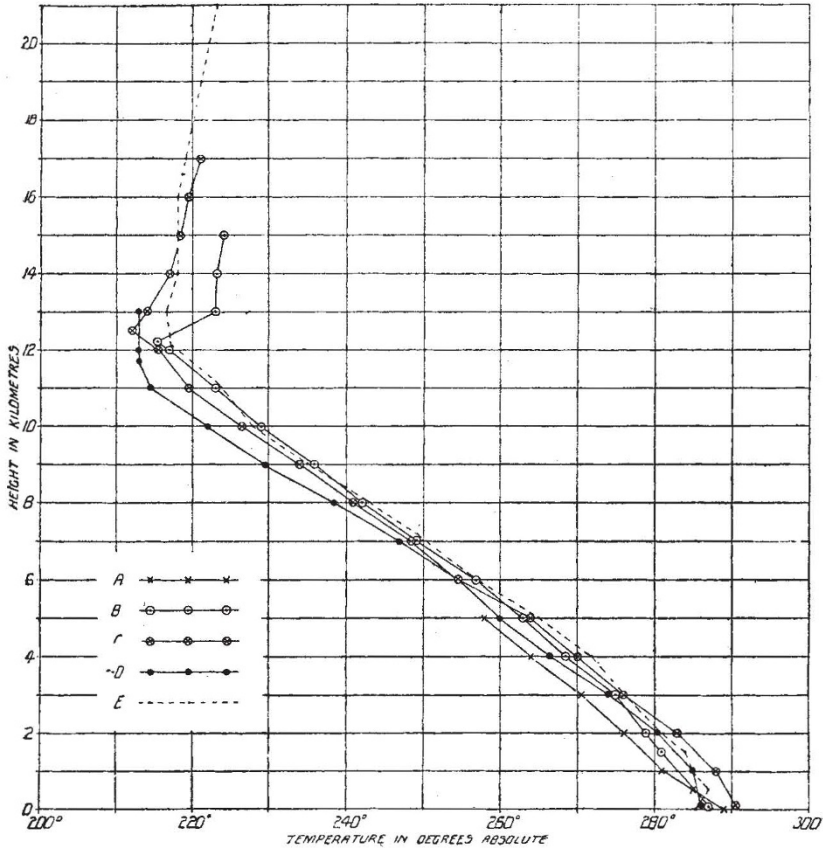


INVESTIGATION OF THE UPPER ATMOSPHERE.¹

THE results of the observations at Barbados, referred to in last year's report, have been discussed by Mr. Cave in a paper read before the Royal Meteorological Society and published in its Quarterly Journal. A further

RESULTS OF BALLOON ASCENTS. IRELAND 1910 1911.



supply of balloons and hydrogen has been sent to Prof. D'Albuquerque in order that he may continue the observations. Some difficulty has been experienced owing to the deterioration of rubber balloons in the climate of Barbados.

part of the northern hemisphere, arrangements similar to those described in last year's report were made for securing successful ascents in the British Isles, telegraphic forecasts being sent each day by the Meteorological Office to the observers. Altogether thirty-one balloons were liberated, of which nineteen were recovered and sixteen gave records of temperature to heights exceeding 10 km.

Of the latter, five were sent up from Crinan, Scotland, five from Pyrton Hill, Oxfordshire, three from Manchester, two from Ditcham Park, Petersfield, and one from Oughterard, Ireland.

The British Association grant was allocated partly to ascents made by Captain Ley at Oughterard, latitude 53° 25' N., longitude 9° 20' W., in the west of Ireland, and partly to ascents made from Mungret College, Limerick. At Oughterard six registering balloons were sent up, and two of these were recovered. The results are shown in the diagram, A and B.

At the March meeting of the committee it was suggested that the authorities of Mungret College, Limerick, who had given evidence of keen interest in meteorological work, might be willing to liberate balloons during the international week. Such a course would avoid the recurrent expense involved in special journeys to Ireland for the ascents, and would permit of more frequent ascents being made. The college authorities expressed their willingness to fall in with the suggestion, and Mr. W. H. Dines undertook to provide instruments and balloons for preliminary ascents in connection with the short international series in June this year, and to send over someone to give necessary instructions in the preparation for the ascents.

Three balloons were liberated on this occasion, and two of them were recovered and gave records of temperature, in one case up to 17 km. The results are shown in the diagram, C, D. A balloon was

also liberated from Mungret College in July, and the result is shown under E.

At the request of the joint committee, the International Commission courteously postponed the week for inter-

Results obtained from Ascents of Registering Balloons in Ireland.

	AUGUST, 1910		JUNE, 1911		JULY, 1911
	A Oughterard, August 8, 8.10 p.m.	B Oughterard, August 11, 7 a.m.	C Limerick, June 8, 7 a.m.	D Limerick, June 9, 7.10 a.m.	E Limerick, July 6, 7.10 a.m.
Max. height	5.0 km.	15.0 km.	17.0 km.	13.0 km.	21.0 km.
Minimum temperature ...	—	216° A (at 12.2 km.)	212° A (at 12.5 km.)	213° A (from 11.7 to 13 km.)	216° A (at 12.7 km.)
Place of fall	Clear Island, Co. Mayo	Moyvare, Westmeath	Kildysart	Buttevant	Cooleeney
Distance	? 50 km.	83 km.	31 km.	48 km.	56 km.
Direction *	? 0°	80°	280°	185°	68°
H _C , T _C	—	12 km., 217° A	12.5 km., 212°, 216° A	11.7 km., 213° A	12.7 km., 216° A

Notes—B. The heights above 8 km. are rather doubtful, as the original calibration marks relating to the pressure are uncertain, and the instrument was returned badly damaged. C. Wind E.N.E., light. Faint cirrus. D. Wind N.E., force 3. Cumulus, no high clouds. A rather different type of instrument was used, and the double record may be in part due to lag. E. Calm, cloudy, cirrus moving slowly from W.

* Direction 0°=N, 90°=E.

During the week August 7-13, 1910, for which international balloon ascents had been arranged over a large

national ascents this year from September 4-9 to September 11-16, in order to permit of those taking part in the ascents attending the meeting of the association at Portsmouth. Arrangements have been made for further ascents from Mungret College during that week. (Since this report

¹ From the tenth report of a committee presented at the Portsmouth meeting of the British Association, Dr. W. N. Shaw (chairman), Mr. E. Gold (secretary).

was presented the ascents have taken place. Six balloons were liberated, and five of these have been recovered.

It is desirable that observations of pilot balloons should be obtained in Ireland in addition to the records from registering balloons, and the committee recommend re-appointment, with a grant of 50*l.*, to permit of this extension of the work. A special theodolite, costing about 30*l.*, is necessary for the observations. The additional outlay on balloons and hydrogen for the pilot-balloon observations would be comparatively small.

In the table temperature is expressed in degrees centigrade above the absolute zero -273° on the ordinary scale. H_c is the height and T the temperature at which temperature begins to be practically constant in a vertical direction.

A SCIENTIFIC MISCELLANY.

THE Smithsonian report for the year 1910 has just been published by the institution. Besides the report of the regents and the secretary, the volume contains, as usual, a "general appendix," consisting this year of thirty-four papers of popular interest on various branches of science, also biographies of a number of prominent scientific men who have recently died. Some of the papers are original, while others are reprinted from foreign and domestic scientific and technical periodicals. All the articles are selected with the view of furnishing the latest accurate information on topics which are believed to be of interest to a wide circle.

Aviation.

A review of modern progress in aviation is ably recorded by the late Mr. Octave Chanute. His paper covers the principal advances made in aviation, beginning with the experiments of Hiram Maxim in 1894, and including Langley's experiments (1896-1903), the author's own investigations, the work of the Wrights, Dumont, de Lagrange, Farman, Blériot, Bell, Curtiss, and others, bringing the subject down to the close of the year 1909.

Reclamation of Arid Lands.

Mr. F. H. Newell, director of the Reclamation Service, sets forth the recent progress in the reclamation of the arid lands in the Western States. The work of reclamation includes all the Western States and territories, where nearly 10,000 families are being supplied with water. Through this great undertaking the waste waters of the West are being conserved, destructive floods prevented, apparently valueless lands converted into productive farms, and thousands of families settled in newly opened territory, where they are maintaining homes on reclaimed land. Besides engineering, with its business and financial problems, the article deals with many other subjects, such as the character of settlers, the size of farms, crops, &c., and the individual projects which together furnish water for about 1,000,000 acres, nearly one-half of which is already settled.

Electric Power from the Mississippi.

A kindred topic is the great electric power plant at Keokuk, Iowa, with its 4278-foot concrete dam across the Mississippi River between Keokuk, Iowa, and Hamilton, Ill. This subject is treated by Mr. Chester M. Clark in a well-illustrated article entitled "Electric Power from the Mississippi River." The paper shows the development of the largest single hydro-electric plant in existence through the construction of what is undoubtedly the greatest bank-to-bank dam in the world.

Papers on Physics, Chemistry, and Astrophysics.

Under the heading of physics there is an account, by Mr. T. Thorne Baker, of experiments and researches in the telegraphy of photographs, transmitted by both the wire and the wireless systems; Prof. Jean Becquerel, professor at the Museum of Natural History of Paris, has permitted the translation of his valuable paper on modern ideas on the constitution of matter, comparing the old theories of matter with the newer views recently confirmed by experiments; and Mr. R. A. Millikan has abridged his treatise on "The Isolation of an Ion," which deals with the exact measurement of an elemental electrical charge and several analogous problems.

Dr. Charles E. Munroe, professor of chemistry at George Washington University, and a well-known authority on explosives, has written an interesting paper on the modern developments in methods of testing explosives.

Mr. C. G. Abbot, director of the Astrophysical Observatory of the Smithsonian Institution, contributes an article on the recently developed subject of astrophysics, which is a study of celestial physics, but pertains principally to the heat and other physical properties of the sun. The paper relates to the solar constant of radiation, a topic on which Mr. Abbot is well informed, having pursued studies in that direction for nearly sixteen years at the Smithsonian Observatory in Washington, and on Mount Whitney and Mount Wilson, California. In this article the author deals with the problem of measuring the amount of solar heat received by the earth and that lost in transit to it. The subject of astrophysics is further treated by Messrs. Curtiss, Deslandres, and Bosler in three articles.

What Constitutes the Earth?

Under the title "What is Terra Firma?" Mr. Bailey Willis, of the U.S. Geological Survey, attacks the old, yet modern, problem of the construction and balance of our globe in a review of current research in isostasy. In the discussion of this puzzling question Mr. Willis advances the theory that the foundation of all the continents is composed of solid rock which is self-crushed to a depth of about 120 kilometres, but rendered sufficiently rigid by pressure to maintain its form during prolonged geological periods with but slight change.

The Future Habitability of the Earth.

In line with the construction and condition of the globe, another author, Prof. T. C. Chamberlin, brings up the further vital question "The Future Habitability of the Earth" in an article in which he reviews the past, and considers the future, of the world as a dwelling-place for the human race. Many branches of science enter into the discussion; but upon geology, physics, chemistry, astronomy, and astrophysics rests the burden of the arguments. Prof. Chamberlin thinks that the earth will remain habitable for tens of millions of years, but concedes that the close approach of a celestial body to the sun would probably result in the disruption of the solar system and bring disaster to the earth. He further states, in regard to the future possibilities of scientific research, that "when moral purpose and research come to be the pre-eminent characteristics of our race by voluntary adoption and by the selective action of the survival of the fittest, and when these most potent attributes join in an unflagging endeavour to compass the highest development and the greatest perpetuity of the race, the true era of humanity will really have been begun."

Botany and Forestry.

Several papers come under the head of botany, among them an interesting sketch of the sacred ear-flower of the Aztecs, a plant the identity of which has been a mystery for years, and only recently rediscovered by the author, Mr. W. E. Safford, of the Bureau of Plant Industry. This little flower, resembling the human ear, has a remarkable history, and dates back to the early explorations of Mexico. It was first described in 1569 by Padre Bernardino de Sahagun, who states that it was much used owing to its delicious fragrance and its flavour when used as a spice. Despite the formidable name (*Xochinacaztli*) which it bears, the author suggests its cultivation on account of its unusual fragrance and pleasant spicy flavour.

Mr. Henry S. Graves, chief of the Forest Service, contributes a well-illustrated and original article on forest preservation, in which he carefully considers all points in the great problem, making many things clear which have long been obscure.

Medicine and Medical Researches.

Those interested in medical research and allied subjects will find matter of concern in the following papers:—manifested life of tissues outside of the organism, by Mr. Alexis Carrel and Mr. Montrose T. Burrows; epidemiology of tuberculosis, by Prof. Robert Koch; the significance of the pulse-rate in vertebrate animals, by Dr. Florence Buchanan; and sanitation on farms, by Dr. Allen W. Freeman.