the recent reciprocity treaty put the commercial relations between the two countries on a basis which makes economic annexation inevitable. Furthermore, every leading British possession in the West Indies has for some years been seeking reciprocal trade treaties with the United States, as a means of economic salvation. The fact is that the American tropics find their natural market for raw materials in the United States. We must find enlarged markets in these as yet undeveloped peoples. Step by step both the pressure from within and the course of events from without are drawing us out into relations with transoceanic countries which already make it necessary to look to the maintenance of communication with the different continents by sea.

At last then we are numbered among the great powers which have borne the burden of the world's colonization. We are there primarily because of the inequality in the degree of economic development, comparing tropical communities with our own. The relation of the more highly developed countries of the temperate zone to the comparatively undeveloped peoples of the tropics is one of the greatest of problems arising out of maritime expansion. The experience of most countries has resulted in one form or another of political dependence on the part of the natives; this political dependence with its varied institutions has its basis generally in an economic dependence or rather interdependence. Among these economic relations are invariably lines of communication and commerce by sea between the foreign country and the dependent territories. Great Britain requires control of the Mediterranean by reason of her relations with Egypt, India and Australia. One can not understand the history of modern peoples without taking into account this relation of the white races to the tropical peoples. With all of its dark pages, there are many proofs of the truth that the greed for gain has been subordinated to dictates of humanity, in dealing with these wards of the northern races. The missionary spirit has helped to temper the ferocity of mammon, and sooner or later insisted on the abolition of slavery throughout the entire region of conquest. There has been a moral expansion running parallel with the political and the economic expansion. Development of purchasing power rather than wasteful exploration of the population has come at last to govern tropical policy.

JOHN FRANKLIN CROWELL,
Secretary.

THE SAINT PETERSBURG CONFERENCE ON THE EXPLORATION OF THE ATMOSPHERE.

AS some readers of SCIENCE may remember, the International Meteorological Congress which met at Paris in 1896 appointed a committee to further the exploration of the free air, then already in progress in Europe by means of balloons, and at Blue Hill in this country with kites. The committee bears the somewhat ambiguous name: 'International Committee for Scientific Aeronautics,' and has had for its president Professor Hergesell, director of the meteorological service of Alsace-Lorraine. Originally consisting of eight members, it now numbers about fifty, representing eleven European countries and the United States, for, although our national Weather Bureau has not had a representative on the committee, the writer attended the meetings that were held at Strassburg in 1898, at Paris in 1900 and at Berlin in 1902, and has endeavored to advance the objects of the committee in the United States.

The fourth meeting, appointed for last autumn at St. Petersburg, was regarded as of exceptional importance and, according-

ly, the invitations issued by the Imperial Academy of Sciences brought together, from ten countries, seventeen members of the committee besides about sixty other meteorologists and aeronauts, the latter both civil and military. At the head of the local committee of arrangements was General Rykatchef, director of the Central Physical Observatory, and to him the success of the meeting is chiefly due, for, although the war with Japan had reached an acute stage, it was not allowed to alter the scientific and social program. The first session was held in the palace of the Academy of Sciences on August 29 (new style), when the order of business was adopted, and the same afternoon the conference was formally opened by the Grand Duke Constantine Constantinowitch, president of the Academy, who brought the greetings of the Czar. General Rykatchef then explained the arrangements that had been made for the meeting and Professor Hergesell reported on the work that had been accomplished since the committee had met two years before.

The following day the scientific meetings were begun, these being open to members of the conference, and, with the exception of two days devoted to excursions, they continued until September 3. There were sessions both morning and afternoon which were presided over successively by two members of the committee, and the questions considered came under the following heads: Organization of international observations, special investigations, instruments and technical matters, resolutions. As regards the first, it was deemed essential that each country should possess a special organization for the exploration of the atmosphere and that the results should be published regularly. During the past three years the cost of publishing such observations in monthly volumes has amounted to $10,000, and this has been borne entirely by the meteorological service of Alsace-Lorraine. It is now proposed that the various countries participating in the exploration of the atmosphere shall contribute $1,000 or $1,200 annually, receiving in exchange copies of the publication, and this proposition is to be transmitted through diplomatic channels to the countries represented at the conference.

With respect to the international ascensions of kites and balloons which, for several years, have taken place on the first Thursday of each month, it was decided to continue this practise, but, in order to study the successive diurnal changes, there will be, in addition, ascensions on three consecutive days during April and August, 1905, the dates during the latter month including the day of the total solar eclipse, August 30, when an ascent of a manned balloon was promised at Burgos, by the Spanish representative, Colonel Vivez y Vich. It was also decided that the balloons should be despatched in each country at the hour which corresponded to its daily synoptic weather-map. A statement of the number of *ballons-sondes* lost in Europe showed that this did not exceed four per cent. of those liberated. The committee recommended that observations of cloud-drift should be made at the time of each balloon ascension, in order to determine the motion of the upper currents, and in these observations the nomenclature of the clouds ought to correspond exactly with the international classification. For this purpose a new edition of the 'International Cloud Atlas,' which is now out of print, will be issued.

Dr. Assmann, director of the aeronautical observatory of the Prussian Meteorological Institute, described the new observatory to be erected in large grounds, thirty-five miles southeast of Berlin, because at the existing

observatory, in the suburbs of that city, the trailing kite-wires constitute a danger to life and property. The new establishment will be in every respect a model one, where balloon and kite ascensions are to be made several times a day, a motor-boat on a lake permitting the kites to be flown even in calm weather, and, in this way, it is expected that practically continuous meteorological records will be obtained in the free air. As an indication of what had already been done in this respect, Dr. Assmann exhibited a chart, encircling the hall, on which were plotted the isotherms at different heights above Berlin, obtained from the ascensions of kites and captive balloons made daily for more than a year. From them Dr. Berson showed that the wind-direction shifted to the right-hand with increasing altitude. To complete an account of the aeronautical establishments in Germany for atmospheric soundings, Professor Köppen described the kite-station of the Deutsche Seewarte, in Hamburg, where kite-flights are made every day that the wind conditions allow, the observations being published the same day, with those obtained simultaneously above Berlin, in the weather-bulletin issued by the Seewarte. Professor Palazzo, director of the Italian Meteorological Office, recounted what was being done in Italy to explore the free air, including the recent use of *ballons-sondes,* and General Rykatchef explained the development of the aeronautical section of the Constantine Observatory at Pawlowsk, which was later visited by the members of the conference. Here kite-flights are made whenever possible, the observations being immediately published in the synoptic weather-report of the Central Physical Observatory. The committee considered that a balloon and kite-station in the southeast of Europe is desirable and expressed the hope that the Roumanian Meteorological Service would cooperate in the international ascensions, and also that a kite-station might be established at Pola, Austria, thereby filling a gap in the distribution of such stations.

Mr. Rotch stated that from the observations obtained with kites at Blue Hill during cyclones and anti-cyclones the former appeared to be the warmer up to a height of at least two miles. *Per contra,* M. Teisserenc de Bort concluded from his observations with *ballons-sondes* in France that the vertical decrease of temperature in cyclones up to six miles was faster than it was in anti-cyclones. This last speaker gave an account of flying kites from a Danish gunboat in the Baltic in 1903, when the record height for kites of more than 19,000 feet was reached, as mentioned in SCIENCE, Vol. XVIII., pages 113–14, and he also described recent experiments on his own steam-yacht in the Mediterranean. The most interesting communication, however, was by the president of the committee and related to the atmospheric soundings with kites that he had just executed on board the steam-yacht of the Prince of Monaco, while cruising in the Mediterranean and in the vicinity of the Canary Islands. It will be remembered that the present writer proposed a more extensive campaign of this nature at the Berlin Aeronautical Congress, and unsuccessfully applied to the Carnegie Institution for a grant of money to equip a steamship to make a series of kite-soundings through the trade-winds and doldrums. Moreover, in 1902 he endeavored to interest the Prince of Monaco in such a scheme, as his colleague, Professor Hergesell, succeeded in doing two years later, and the results of these soundings, which Professor Hergesell announced at St. Petersburg, eminently justified the cooperation. The northeast trade-wind was seen to diminish

and become more easterly at the height of a quarter of a mile, then falling calm, and even though the kites were lifted by the motion of the vessel to a height of nearly three miles, the southwest anti-trade, which is supposed to form the return-current, was not encountered, though it has been reported at a much lower altitude upon the Peak of Teneriffe. The temperature was found to decrease up to a third of a mile in height, where there was an inversion of temperature persisting throughout a thick stratum and then a rapid decrease with increasing height, these changes being analogous to those prevailing within areas of high barometric pressure over the land. The interesting investigations of Professor Hergesell furnish additional evidence of the importance and feasibility of carrying out soundings of the atmosphere across the equator and into the southeast trade-winds. The employment of kites to obtain meteorological observations on steamers pursuing their regular courses, the practicability of which the writer demonstrated on a voyage across the Atlantic in 1901 (see SCIENCE, Vol. XIV., pages 896–7), was discussed and it was reported that two German steamship lines and a Spanish company had agreed provisionally to allow observations with kites to be made on their steamers. In view of the importance of studying the meteorological conditions high above the oceans, the committee requested the meteorological bureaus of the various countries to propose to their maritime agencies that kites be employed on the mail and other subsidized vessels, the results of these negotiations to be reported at the next conference.

Recording instruments for balloons and kites were discussed in detail, but it was considered inexpedient, at the present time, to recommend the adoption of any special type of instrument, though the committee requested that a description of the instrument employed should accompany all published observations. The errors of aneroid barometers, caused by residual elasticity and by temperature, were said to be less with the Bourdon tubes than with the usual cylindrical vacuum-boxes and, consequently, the former are to be preferred for *ballons-sondes*. Very light instruments of French and German construction were exhibited, in which the barometer was a Bourdon tube and the thermometer either a bimetallic bar, bent in circular form, or a German-silver tube inclosed in a polished one. Professor Hergesell showed his instrument for manned balloons, where the necessary ventilation of the thermometers is supplied by an exhaust fan, placed in the thermometer-tube just mentioned, and driven by a storage-battery and Dr. Shaw, secretary of the London Meteorological Office, presented Mr. Dines's simple meteorograph for kites that costs but twelve dollars. An apparatus was shown by the writer for determining on a moving steamer the velocities of the true and apparent wind—which latter only is utilized in kite-flying—the speed and course of the vessel enabling the triangle of forces to be solved. Most of the other apparatus which was brought before the conference related to the balloons or their accessories. The closing session of the conference was a ceremonious one at which Count de La Vaulx, of Paris, and Dr. Berson, of Berlin, gave accounts of the longest balloon voyage, from Paris to Kief, and the highest ascension, to 35,000 feet, executed by them respectively.

As is usual at these international gatherings, the social entertainments and visits to scientific establishments were the most interesting features. The first of these was an informal reception at the Grand Hotel before the conference opened, fol-

lowed the next evening by a sumptuous banquet at the Army and Navy Club, which was attended by the Grand Dukes Constantine and Peter, as well as by many Russian officers and scientific men of high rank. The Imperial Geographical and Technical Societies held a joint session in honor of their foreign guests, which was followed by a supper. After a morning spent at the Pawlowsk Meteorological Observatory, when a *ballon-sonde* and kites were sent up from the aeronautical grounds, the Military Aeronautical Park was visited in the afternoon and here all the apparatus of the balloon corps could be inspected, including that which its commander, Colonel Kowandko, was about to take to the seat of war in Manchuria. Another day was occupied by an excursion into the Gulf of Finland on a small government cruiser. Notwithstanding a gentle wind, the light hemispherical kites of Mr. Kusnetzof were easily raised by the motion of the vessel and proved very stable. A satisfactory demonstration was given of the writer's apparatus to determine the true and apparent wind on board. Salutes were exchanged with the Baltic fleet off Cronstadt, and this was only the second reminder that the country was at war, for no evidence of it was apparent at St. Petersburg. After the close of the conference there was an excursion to the Peterhof palace, and on the following day some of the guests were taken up in military balloons, but, unfortunately, the chief object of the ascension, a comparison of the different types of meteorological instruments, failed on account of unfavorable weather.

From the foregoing it is evident that the proverbial Russian hospitality was limited only by the brief time available. The strongest impression left by this reunion at St. Petersburg is a realization of the earnest and widespread efforts that are being made to investigate the conditions of the high atmosphere, and it may be confidently predicted that still greater progress will have been achieved before the next international conference is convened at Rome in 1906.

A. LAWRENCE ROTCH.
BLUE HILL METEOROLOGICAL OBSERVATORY,
February, 1905.

SCIENTIFIC BOOKS.

Food Inspection and Analysis: For the Use of Public Analysts, Health Officers, Sanitary Chemists and Food Economists. By ALBERT E. LEACH, B.S., Analyst of the Massachusetts State Board of Health. New York, John Wiley and Sons; London, Chapman and Hall, Ltd. Cloth, 10″ x 6¾″. Pp. xiv + 787; 278 figs.

The foregoing title very well describes this book written by one of America's analysts of longest experience in this field of chemistry. It is not a manual of food technology or of food physiology, even to such extent as the treatise of König and Dietrich. One chapter is, indeed, entitled, 'Food, Its Functions, Proximate Constituents and Nutritive Value,' but it is given almost entirely to general definitions and classifications for the main groups of food constituents.

Neither is it a text-book of organic analysis. Little space is given to the general principles of determination for fundamental constituents or to those of the construction and use of such apparatus as the polariscope and microscope. Other special treatises, such as volume three of Wiley's 'Principles and Practise of Agricultural Analysis,' Blyth on 'Foods' and Leffmann and Beam's small book on 'Food Analysis,' devote more attention to these general subjects. They have, however, been sufficiently developed to guide the amateur to the essentials of operation and to give most helpful suggestion to the trained analyst, with special reference to the particular operations involved in this branch of food analysis.

Food inspection, its principles and the precautions necessary in its conduct are ably, though briefly, discussed. The care of samples with reference to their identification when in-