NOTES AND EXTRACTS.

SECOND RUSSIAN CONGRESS ON CLIMATOLOGY.

A letter from General Rykatcheff, director of the Nicolas Central Physical Observatory at St. Petersburg, announces that the second Russian congress on climatology, hydrology, and balnealogy, in commemoration of Peter the Great, will meet this year, from September 14 to 20 (new style), at Piatigorsk (German, Pjatigorsk). This place is north of the Caucasus Mountains and about 1400 meters or about 4500 feet above sea level; it is a little to the south of the main line of railroad leading to the Russian port of Petrovsk, on the Caspian Sea, and is about 90 kilometers northwest from the summit of Elbrus, whose altitude is 5631 meters, or over 18,000 feet, and whose snow-clad summit can ordinarily be seen. Its latitude is 44° north, longitude 43° 30′ east. General Rykatcheff gives the following interesting information:

One section of this congress will be devoted to climatology. The program for this section will consist of the following questions:

1. Comparison of the climates of different Russian climatological stations with those of corresponding stations in foreign countries.
2. Climates of mountains.
3. Influence of forests on climate.
4. Changes of climate caused by the works of man.
5. Comparison of the climate of a city with that of its suburbs.
6. Determination of the quantity of dust and of the number of microbes in the air of different localities and at different altitudes.
7. Isolation at different altitudes.
8. Organization of meteorological stations at watering places and climatic stations.

Various questions relative to climato-therapy will also be discussed.

It is desired to make the members of the congress acquainted with the works of Russian and also of foreign scientists relative to these questions. I therefore take the liberty of requesting you to communicate with the managers of watering places and climatic stations in your country and to suggest to them that they send descriptions of the places under their management and the works of climatology relative thereto. These publications will have a particular interest to members of the congress in view of the fact that watering places are much frequented by our countrymen. If any person should desire to present a note relative to questions on the program, in French, German, or English, it will be gratefully received.

You are requested to address letters and publications to the Nicolas Central Physical Observatory at St. Petersburg, "for the Congress of Climatology."

WEATHER CYCLES AND FARMERS' ALMANACS.

A correspondent writes from Ruxton, Md., as follows:

The fact has come under my observation that a great many, especially among farmers and country people, place a good deal of confidence in the predictions of these so-called "weather prophets," whose vivid imaginations are portrayed in the pages of nearly all cheap almanacs.

It is true that a few prognosticators appear to base their forecasts on astronomical phenomena. If there is any question at all as to whether their researches might be an aid to the science of meteorology, it would not seem best to interfere.

It does not seem right, however, that these "weather prophets" should be allowed to publish such worthless predictions, which are not only in direct opposition to the work of the Weather Bureau, but by their widespread circulation through the country prove an actual injury to the less intelligent masses of our population. They are harmful to the farmer, because he depends in his business on weather forecasts which only by mere chance may come true, while the people in general are kept in ignorance and superstition, contrary to the advancement of an enlightened age.

In the vicinity of a large city, where the daily newspapers and fore-

casts of the Weather Bureau are more commonly seen, there is less reference made to the almanac, but it is certainly true that among the more remote districts (though by no means confined to them) these useless pages are continually referred to and depended upon. Unfortunately, the people seem to be more impressed with the occurrences when the forecasts come true than they are with the many cases of failure. As a result there is a continual faith and dependence placed in predictions which are commonly founded on no more scientific basis than the imaginative powers of the "prophet."

I feel sure that any action taken to prevent such enterprises will prove an important aid in effecting a still greater scope and efficiency in the work of the Weather Bureau.

We are encouraged to believe that the weather forecasts of the ordinary farmers' almanacs are not greatly relied upon, and that those who have considerable moneyed interests at stake are daily guided in their transactions by the published forecasts of the Weather Bureau. At least this is what we must infer from the numerous expressions of satisfaction that are received whenever any great atmospheric crisis passes by. Although in the majority of cases the predictions of the almanacs do not command entire confidence, yet, as our correspondent states, the mere fact that they are regarded with interest, lenience, and even respect by so many persons suffices to show how little the spirit of modern meteorology has as yet replaced the ancient belief in long-range weather forecasts. Perpetual motion, squaring the circle, transmutation of metals, and many other errors are banished from men's minds, but planetary influences, fortune telling, and lotteries still have their devotees.

We fully recognize the value of the work of those long-range forecasters who are comparing early weather records with those of the present day and are searching for cycles, chronological periods, or geographical relations, by means of which the weather at distant places or distant times may possibly be foreseen. They have a tedious work before them and will, we fear, reap very unsatisfactory results. We would not deter any honest investigation of this empirical sort by students who have neither taste nor ability for any other work, for it certainly is possible that we may be mistaken in our forebodings, and that good results may flow from their researches. But we think that there are much brighter prospects for those who are able to attack the problems of meteorology with the weapons that have been fashioned by skillful mathematicians and mechanicians.

The brilliant success of Schwabe, who observed the sun spots year after year until, he was able in 1851 to announce that there was a periodicity in their frequency, followed, as it very soon was, by the discovery of a parallel period in the disturbances of the magnetic needle or, what is the same thing, in the earth's magnetic field, has led numerous students to search for similar parallel periods in various meteorological phenomena, although no one knows why the spottedness of the sun should thus affect the earth's atmosphere. Of course, the hypothesis that it does so, may be accepted as a working hypothesis and may serve to keep meteorologists on the qui vive, but we think it necessary to caution our readers against spending much time in search of sun-spot weather periods. They have thus far proven very elusive.

In a famous article on the meteorology of the future, by J. Norman Lockyer, published in the seventh volume of Nature, that distinguished author says:

> Surely in meteorology, as in astronomy, the thing to hunt down is a cycle * * * and if found, then, * * * lay hold of it, study it, record it, and see what it means. If there is no cycle, then, despair for a time, if you will, but yet plant firmly your science on a physical basis, and having got such a basis as this wait for results. * * * I said "the thing to hunt down is a cycle." Now, it may be asked, is there anywhere on earth a weather cycle? But anyone who asks this question will at once answer it himself; the question would certainly suggest the trade winds and monsoons, which are short period cycles. But is there anything more than this?

Following the above quotation, Mr. Lockyer (now Sir Norman Lockyer) gave some interesting details with regard to the history of the discovery of an 11-year period in the Ceylon rainfall and of Meldrum's 11-year periodicity of cyclones and rainfall in the Indian Ocean, Cape Colony, and Australia. After stating the analogy between the sun-spot periods in meteorology and the Saros period of the ancient astronomers, he said:

> As the astronomers of old were profoundly ignorant of the true cause of the Saros period, so the meteorologists of the present day are profoundly ignorant of the true nature of the connection between the sun and the earth. What, therefore, is necessary in order to discover the true nature of this nexus? Two things are necessary, and they are these: In the first place, we must obtain an accurate knowledge of the currents of the sun, and secondly, we must obtain an accurate knowledge of the currents of the earth. The former of these demands the united efforts of photography and spectrumanalysis, and the second of these demands the pursuit of meteorology as a physical science and *not* as a mere collection of weather statistics.

The above article appearing in Nature for December, 1872, has been followed by a long series of investigations in solar physics, in meteorology and in the relation between these two. On reviewing the work of this third of a century, we are impressed with the conviction that although we now know more about the sun and our atmosphere, yet we do not know much more about the connection between the two. It seems to me unlikely that we shall ever find any simple cycles in atmospheric phenomena or any simple relations between solar and atmospheric phenomena. So far as concerns pressure and wind, temperature and rainfall, I think that if the sun's radiation were absolutely uniform as to quality and quantity, there would still result the ordinary areas of high and low pressure, the winds, and other phenomena about as we now have them. The rapid rotation of the earth combined with the mountains and other irregularities on its surface, must produce most of the highs and lows and both the steady and variable winds. The continents, oceans, and aqueous vapor, introduce the most important irregularities into the motions of the atmosphere. If there are any variations in the quantity and quality of solar radiation that produce appreciable effects in our atmosphere, they are so slight as to be only demonstrable after the most laborious investigation; so far as I can see these variations have not as yet been shown to have any meteorological importance. They may be curious and interesting; they may be important with regard to solar physics, but they do not constitute an important chapter in dynamic meteorology and the whole subject is very properly dismissed in a page or two of Professor Hann's recent treatise on meteorology. The conservative article by Mr. C. G. Abbot in the MONTHLY WEATHER REVIEW for April, 1902, fully confirms the above conclusion. Of course, it is quite possible that great variations in the solar radiation may have taken place in past ages and produced great changes in climates at those times, but at the present time, and since the days of Galileo, meteorologists must treat the solar radiation as uniform and must study the mechanics of an atmosphere on a rough round surface under a uniform solar radiation. It is only after we have solved the mathematical difficulties involved in this latter problem that we shall be prepared to study with success the influence of the variations of the solar radiation.

It is all well enough for those whose tastes incline toward experimental physics to investigate the peculiarities of the solar radiation with the spectroscope, bolograph, and other modern physical apparatus, but the meteorologist must study the far more difficult fundamental mechanical problems that still await solution at the hands of the mathematicians. It can easily be shown that the interaction of atmosphere and earth must produce numerous quasi-periodic phenomena, which die out after a few repetitions, only to be started up again when favorable conditions subsequently occur. These periods are

mechanically analogous to the whirls that may be seen floating down stream in any deep and rapid river or to the standing waves behind the stones in a shallow river or to the spots of steady and unsteady flow of water through a long tube. All these periodicities originate within the atmosphere and are due to its internal mechanical conditions, not to the influence of external conditions, such as periodicity in solar radiation.

All the measurements made with the pyrheliometer or actinometer during a century past unite in showing appreciable variations in the quantity of heat received from the sun. But in no case have we been able to show that the variations take place at the sun itself. On the contrary, they have most plausibly been traceable back to variations in the gases, moisture, and dust of our own atmosphere. If there are general variations in the temperature or rainfall or pressure on different portions of the earth's surface, we must attribute these to what is going on on the earth's surface, not on the sun's surface. During the interval between August, 1902, and March, 1903, reports have come from several portions of the world indicating peculiar local conditions; thus, for instance, both Henri Dufour, in Switzerland, and H. H. Kimball, at Asheville, N. C., report an apparent diminution in the solar radiation as measured by the best actinometers. This may easily be accounted for by the presence of an extra quantity of moisture or haze or even volcanic gases in the atmosphere above their stations. Such changes in the atmospheric constituents may be due to changes in the general circulation of the atmosphere in the respective portions of the globe. But the latter changes must be accompanied by special phenomena in other parts of the globe. Accordingly we find quite anomalous winter conditions, namely, a mild winter and a cold spring over the United States and Canada, a long-continued drought in Australia, heavy ice and storms in the North Atlantic, unusual snows and cold weather in Austria and Germany, great typhoons in the Pacific, and so on for other regions. This whole series of atmospheric phenomena is connected together; an unusual event in one region brings corresponding phenomena in another, while, for aught we know, the atmosphere as a whole may preserve the same average temperature, moisture, and motion. We must seek for the initial disturbance in our atmosphere and on our earth. We need not go far away to study the sun and its possible variability of radiation or the moon and its tidal influence until we have mastered the intricacies of our terrestrial conditions. It is not wise to devote much time to the study of the minute atmospheric variations that may possibly result from possible variations in external influences while the great variations—the droughts and floods, the monsoons and storms inherent to all atmospheric processes—are still awaiting profound study. Solar physics and molecular physics certainly have important applications to meteorology, but the mechanics of the atmosphere is the important study for the meteorologist, and we earnestly invite the young American students of science to undertake this important subject.

CHAVANNE'S TEMPERATURE AND RAINFALL IN ARGENTINA.

We have already, in the MONTHLY WEATHER REVIEW for June, 1902, page 315, referred to the great work being done by Mr. Walter G. Davis for the whole of Argentina. He has published many volumes of climatological data and also an elaborate general climatological report in the first volume of the Second Official National Census. Lately he began the publication, for the Argentine Department of Agriculture, of a daily weather map, which may be considered as a national extension of the daily map of Buenos Ayres published for the last ten years by the Observatory of La Plata.

We recently received from Dr. Josef Chavanne an important memoir on the temperature and rainfall of Argentina, which lately appeared in the first volume of the Publications of the German Academic Association at Buenos Ayres. Dr. Chavanne has been known for many years as a prominent student of meteorology and geography. He was born in Gratz in 1846 and traveled extensively in America and Africa; his previous memoirs have been published by the geographical, meteorological, and other societies in Vienna. It was with great pleasure that we welcomed this memoir on the climate of Argentina, as indicating the addition of another trained climatologist to the able men who have, for some years, been located in that republic. But, while compiling this notice of his latest work, we have been pained to learn, by a letter from Madame Chavanne that her husband died on December 7, 1902, the very day on which his memoir was received in Washington.

Dr. Chavanne begins his memoir by emphasizing the ease with which European emigrants adapt themselves to the climate of Argentina, which can now be studied in detail by means of the records of about 400 stations and especially since the topographic maps of the republic now possess a sufficient degree of accuracy. Chavanne notes that previous studies have often led to erroneous conclusions because the data related to different years at different stations. He has, therefore, reduced all of his rainfall records to the fundamental 40-year period, 1861–1900, and his temperature records to the fundamental 45-year period, 1856–1900. For the purpose of comparison with the stations in Chili, he reduces the latter to the 30-year period, 1861–1890; but the other foreign stations are reduced to the same fundamental period, 1856–1900, as that adopted for Argentina. The temperature and rainfall for the year and the four seasons, as well as the ranges of temperature, the anomalies of temperature and the characteristic of the vegetation covering the surface, are also shown in charts, so that we have a decided addition to our knowledge of the relation between climate and vegetation.

Chavanne's climatic charts of Argentina extend from latitude 22° southward to 55°, and partially include the western or Chilian coast. He considers the climate to be not only primarily influenced by the sunshine but to have an additional annual period depending upon the alternating prevalence of the warm Brazilian and the cool Falkland currents on the east coast, the increasing elevation as we go westward up to the Andes, the prevalence of the cold Peru current on the coast of Chili, and the variable characteristics of the surface, as modified by vegetation.

This complex of climatological factors brings about a subdivision of the Argentine territory into five general climatic subregions, three of which should be again subdivided into two. These nine regions are as follows:

1. Northern coast, a subtropical climate having mean daily temperatures above 20° C. (68° Fahr.) for from five to seven months and above 10° C. (50° Fahr.) for the rest of the year.

2. Southern coast, temperate climate; mean daily temperatures above 10° C. during eight to twelve months.

3. Northern interior, subtropical climate; temperature above 20° C. during five to eight months and the rest above 10° C.

4. Southern interior, temperate climate; temperatures above 10° C. during eight to twelve months.

5. The region of the steppes and the so-called local zondas, subtropical climate; temperatures above 20° C. during five to seven months, the rest above 10° C., but having a temperate or even a cold climate at locations whose altitudes exceed 1500 meters.

6. The northern Andean region, having a temperate climate at altitudes of 1300-3600 meters, with temperatures above 10° C. during eight to twelve months, but having a subtropical climate for localities below 1300 meters.

7. The southern Andean region, having a temperate climate up to altitudes of 1800 meters with temperatures above 10 C°