will certainly give an indication of a lunar tide, but extremely feeble; it will only be found at the equatorial stations and disappears entirely in the middle latitudes. At Batavia the maximum pressure occurs a half-hour or an hour after the upper and lower passages of the moon over the meridian; the minimum occurs from six to seven lunar hours after the maximum; the total extent of the variation is only 0.11 millimeter, which corresponds to a column of water of about 1.5 millimeter [or one seven-thousandth part of the standard average atmospheric pressure.—ED.]

The insignificance of the diurnal lunar variation of pressure indicates that this must also be true of the variation corresponding to the revolution of the moon around the earth, that is to say, to the phases of the moon. In Batavia the pressure is the feeblest at the time of new moon and most powerful shortly after the period of full moon; the total extent of this oscillation does not reach 0 2 millimeter. The diurnal rotation and the synodic revolution of the moon therefore cause tides in the atmosphere as well as in the oceans, but the atmospheric tides are so extremely feeble that they scarcely exceed the limit of accuracy of the barometric observations.

The study of the influence of the synodic revolution, or of the phases of the moon, upon other meteorological phenomena produces results which are absolutely contradictory, and which have been discussed in detail by Arago and, more recently, by Van Bebber. We shall, therefore, limit ourselves to summarizing briefly the conclusions arrived at by them.

The temperature, the cloudiness, and storms do not show any periodicity in relation to that of the phases of the moon. In Germany north and northeast winds seem most frequent in the period of the last quarter of the moon and most rare in the first quarter; the southwest winds show an inverse variation. But this law has not been verified in any other countries.

At Paris and in Germany the maximum number of rainy days occurs between the first quarter and the full moon; the minimum number between the last quarter and the new moon. The relation of the maximum to the minimum is 1.26 at Paris and 1.21 in Germany. It would, therefore, at first sight seem that there is here a true law and that the prospects for rain are greater by a fourth or a fifth after the first quarter than after the last. But even this would be too slight a difference to be made use of for a serious forecast. Besides, this law does not hold good for the south of France. At Orange, for example, the minimum of days with rain occurs between the full moon and the last quarter and at Montpellier in the first quarter. If there is any relation between the phases of the moon and the rainfall, this relation is, therefore, very complex and variable from one region to another.

The study of the changes of the weather has produced still less convincing results. In discussing the observations made at Padua in the last century, Toaldo found that, according to the popular belief, the weather is much more variable at the time of new moon than at the other lunar periods. But convinced in advance of the existence of the influence that he wished to demonstrate, Toaldo attributed to the action of the new moon the changes in the weather occurring one or two days either before or after; whereas for the rest of the lunar period each day was considered separately. If now rigorous computations be made, giving to each day the same value, there will no longer be found any trace of the influence of the phases of the moon on the changes of the weather. During the past few years the study of the influence of the moon has been again taken up in a manner apparently more scientific. In the first place, all idea has been abandoned of finding any relations between the meteorological phenomena and the phases of the moon; that is to say, the synodic revolution which represents only the relative positions of the earth, the moon, and the sun. Then the anomalistic revolution was studied, which corresponds better to the respective real positions of the earth and the moon. But, above all, the position of the moon in declination has been compared, not with any special local meteorological phenomenon, such as temperature, rainfall, changes of the weather, etc., but with the distribution of pressure over the surface of the globe as a whole. The fundamental idea of these researches is that the movements of the moon in declination may lead to general displacements of the air, or a balancing between the tropical regions and the higher latitudes, and thus cause periodical changes, such, for example, as in the boundary of the trade winds and in the law of change of pressure with latitude. We should then understand that a movement of a zone of high pressures, for example, might cause fine weather on one side of the zone and at the same time foul weather on the other side, and that these variations, which at first sight seem contradictory, might nevertheless be due to one and the same cause. These studies are, however, of too recent date and still too undeveloped to have already given results that may be considered as sufficiently conclusive and general. It is, however, interesting to mention them here, since by continuing to work in the same lines we may, perhaps, succeed in discovering the true relations between the moon and the phenomena of the weather, since the earlier researches have not brought about any positive conclusion. On the whole, in the present state of our knowledge, it can not be affirmed that the moon does exert any influence upon the weather, but at the same time it should not be denied that this influence may possibly exist. In any case, it would show itself by complex phenomena, such as the displacement of the zones of high and low pressure, and might cause very different results in different regions.

In concluding the examination of the various opinions in regard to the influence of the moon, it may be well to say a word on the opinions concerning the *lune rousse, or harvest moon*. This name has been given to the lunar period which, beginning in April, has its full moon either in the second half of that month or in the month of May; if there are two new moons in April it is with the second that the harvest moon begins. Agriculturists declare that often at that time, when the sky is clear and the moon shines brightly during the night, the tender buds are frozen and turn red even although the temperature of the air does not fall below freezing; nothing of this nature occurs if the moon remains hidden behind the clouds. The explanation of this phenomena is very simple and the moon has no part in it. When the sky is clear and the atmosphere dry and transparent (this is the time when the moon shines most brightly) the temperature of the bodies subjected to the nocturnal radiation falls far below the temperature of the air. If, during the day, the temperature has not been very high the nocturnal radiation may then chill the plants below freezing and they will freeze although the air remain at a higher temperature; on the other hand the plants will not be frozen if there are clouds to diminish the radiation. The conditions that lead to these freezings are therefore a clear sky and a relatively low temperature during the day. At the end of May or June the mean temperature is generally too high to allow us to fear these freezes although they do occur sometimes. Before the commencement of the harvest moon, that is to say, at the end of March or the beginning of April, the temperature is lower than during the harvest moon itself; the conditions are therefore much more favorable for freezing by radiation; but as the vegetation has not yet begun these freezes do not cause any damage and do not attract any attention. We have here to do with a very simple phenomenon in which the moon plays no other part than merely to indicate by its brilliancy when the sky is pure and transparent.

In the countries in the south of France, where the vegetation is more advanced than in the center and the north, the critical period of vegetation is no longer during the harvest moon but during the lunar period which precedes it.

THE RED DUST OF MARCH, 1901.

In connection with the remarkable dust storm that prevailed over a large part of Europe between the 10th and 13th of March, Monsieur M. Barac, director of the petroleum refinery at Fiume has made an examination of the dust and we quote the following from his report.

The chemical analysis of the dust gave the following results:

	Per cent.
Silicic acid ($Si\,O_2$)	49.49
Oxide of iron ($Fe_2\,O_3$)	9.96
Clay ($Al_2\,O_3$)	12.10
Oxide of manganese ($Mn_3\,O_4$)	1.99
Oxide of calcium ($Ca\,O$)	11.46
Oxide of magnesium ($Mg\,O$)	0.40
Carbonic acid ($C\,O_2$)	8.96
Organic substance	5.48
Traces of sodium, sulphuric acid, hydrochloric acid and loss	0.16
Total	100.00

The microscopic examination, under a power of 640, shows that the mass was composed principally of colorless, mixed with a small portion of colored, irregular fragments of crystals and particles of minerals together with the skeletons of micro-organisms and small particles of soot. Small quantities of well-formed, sharp-edged rhombohedric carbonate of lime, quartz prisms, and cubes of chloride of sodium, and the lime as well as the quartz crystals showed the phenomena of chromatic polarisation.

In regard to the diameters of the particles, the smallest were 0.001 millimeter, the average 0.017 millimeter, while the maximum size of the fragments of crystals was 0.051 millimeter, and that of the structureless mineral particles 0.113 millimeter.

If we compare these results with those published by A. E. Nordenskiold, Zeit. Oest. Gesell. für Meteorologie, relative to the dust that fell May 30, 1892, in Sweden, we are led to conclude that the dust of 1901 belongs to the same class as the

so-called trade wind dusts which blow from Africa over the Atlantic Ocean. The total quantity of the dust that fell on March 11 averaged 260 grams to 1,400 square meters in Fiume.

The effect of this dust floating in the atmosphere was to produce a reddish haze and to diminish the amount of insolation at the earth's surface thereby doubtless increasing the temperature of the air in the upper strata. The general color of the dust when dry and collected in quantity is a bright reddish brown; a sample of it presented by Monsieur Barac is deposited in the Library of the Weather Bureau.

THE MILWAUKEE, WIS., CONVENTION OF WEATHER BUREAU OFFICIALS.

At the conclusion of the Milwaukee Convention we are filled with the conviction that the triennial convention has come to stay. This was the second general convention preceded by seven or eight meetings of the more restricted character, and has demonstrated beyond all peradventure that nothing gives such a stimulus to development of new ideas, the removal of doubts and troubles, the incentive to better work; nothing so firmly cements the bonds of friendship or the highest esprit du corps as these few days of personal intercourse between the Chief and his representatives throughout the country. In a few remarks made by our distinguished Voluntary Observer Rev. Father Odenbach, S. J., of Cleveland, Ohio, he expressed with great earnestness the impression made upon himself by his intercourse with those present by saying that he was convinced that so far as he knew there was but one other organization in the world, namely, that to which he himself had the honor of belonging, that could compare with the Weather Bureau in intelligence, discipline, and devotion. To his mind there could be no doubt of continued success, and the final overcoming of every difficulty, scientific and practical, so long as we maintain our present high standard in these three directions.

Nothing could exceed the perfection and convenience of the arrangements made to accommodate the convention and facilitate work, and as for the hospitality and the entertainment that were offered to the members and their wives when their time was not occupied in the work incident to the meeting, it was both elegant and lavish.

On the opening day of the session a clear sky and an easterly wind set forth to perfection the beauty of Milwaukee and the adjacent lake. From the windows of the Convention Hall, as one listened to the speakers, the eye was frequently tempted to glance through the banquet hall of the Hotel Pfister and rest upon the sparkling sapphire of the distant water. We hope that at some time or other every official of the Weather Bureau may have the opportunity to feast upon the beauties of Milwaukee and her lake.

As every thing that was said and done has been fully recorded by the skillful pen of Mr. R. M. Reese, and will be published in Mr. Berry's final report, it will be unnecessary for the Editor at the present time to dwell upon the details of the meeting. Every one expresses delight at the strong stand taken by the Chief in his opening address and subsequent remarks in favor of increased attention to special scientific work, more profound investigations, more perfect meteorological laboratory, more thorough instructions in preliminary physics and mechanics. The papers read by Professors Bigelow and McAdie, and by Messrs. Fulton, Schultz, Glass, and Fassig gave a special pleasure in their support of the urgent need of higher scientific work, whose importance was insisted on by every member of the convention. There appeared to be a wide diversity of opinion as to whether meteorology should be introduced as a special study into the public schools, owing to the present crowded condition of the curriculum, but there was no doubt but that the lower grades of public schools really demanded the study of the clouds, the weather, the thermometer, and other simple matters as being appropriate branches of the so-called study of nature. These are items of knowledge that should be familiar to every citizen, and they are items picked up by the children very easily without adding a moment to the time devoted to the study of books. They are taught as object lessons by what may be called kindergarten methods. The advantages to be derived from giving systematic popular lectures to farmers' institutes and other such gatherings were specially dwelt upon by Messrs. J. Warren Smith, E. W. McGann, and J. S. Hazen. Of course to be a good lecturer one must have a clear voice and distinct utterance or articulation, and those who give the most attention to vocal culture will undoubtedly succeed best as lecturers and represent the Bureau most efficiently for the public. Problems of climate in its connection with diseases, vegetation, and all forms of animal life were presented by a number of papers, and the general impression left upon the audience was that, notwithstanding their complexity these must eventually yield to the persevering studies of well trained specialists. Under the heading of Forecasts, ten minutes was especially assigned to Mr. Harvey M. Watts, of the Philadelphia Press, who gave us a most valuable and stirring address on the many points in reference to which improvements can be made in the work of the Bureau and its relations to the daily press. The address was marked by all of the energy, incisiveness, and earnestness of which Mr. Watts is such a master, and was received with unbounded applause and a hearty vote of thanks from every member.

There was not as much time to give to the general discussion as was universally desired, and, as this want of time is likely to be always a hindrance, the Editor heard several state that it might be better to have it known beforehand that initial ten minute papers, followed by one or two well prepared five minute papers, would be expected to cover the subject. But, undoubtedly, the majority desire a freer voluntary discussion, and many expressed the sentiment that the second and third prepared papers could be omitted, and that the whole subject covered by any initial paper should be immediately thrown open to general discussion to be followed in each case by a vote expressive of the general opinion of the convention on the merits of the question.

The seventh section, or the session of August 29, was occupied by remarks from numerous representatives of extensive mercantile interests. Of these the Editor was most deeply impressed by the address of Mr. A. W. Machen of the United States Postoffice Department in charge of the rural free delivery service. Mr. Machen's graphic picture of the inception and rapid growth of that service was quite fascinating. It lies, of course, with the Secretary of Agriculture and the Chief of the Weather Bureau to utilize this new service to the fullest extent in the spread of the morning weather forecast among the rural population. However, it appears that we have not been able to keep up with its rapid growth, and that a large increase in our annual appropriation will be necessary if we make full use of these new opportunities.

The convention regretted very much the absence of Mr. John W. Smith, of Boston, J. R. Sage, of Des Moines, and Prof. R. F. Stupart, of Toronto, but was gratified to listen to Mr. H. H. Clayton, representing the Blue Hill Observatory. It was also especially favored by the presence of the Secretary of Agriculture, whose every word inspired us anew with that devotion to agricultural interests that actuates his every thought and act.

A lively interest was shown in the revelations brought out