sad experience with vortex-ring cannons for driving away hail. Russia has enjoyed the gratuitous services of Demtschinsky and his predictions based upon the moon.

In general, it would seem that weather prediction and long-range forecasts are so greatly desired that everyone is willing to give a man a fair show. The wonder is that the indefinite utterances of these oracles can be accepted as forecasts, or that their flat failure when they do become definite should not have consigned them to oblivion. Recall, for instance, the sad work of Falb, who in 1895 predicted terrible earthquakes and storms, possibly indicating the approaching end of the world, thereby frightening the whole of Spanish America, so that no work could be done for weeks and the whole community was thrown into a hopeless state of panic. Recall the prediction made about 1880 of an awful storm that would scourge the Gulf and South Atlantic States. Many of the intelligent inhabitants and nine-tenths of the less intelligent were frightened by the prediction, and allowed it to entirely alter their ordinary lives and business.

Who was it that in 1901 started a newspaper paragraph, purporting to come from some responsible person, predicting a hurricane for the coast of New Jersey on a certain date? So great was the anxiety that it was necessary for the Secretary of Agriculture to issue a counteracting telegram showing that the original was certainly a fake. A community even of the most intelligent, cool-headed people is likely to be carried off its feet by enthusiasm for some hero or by a mania for some financial scheme, or to be stampeded by fright. Emotions are contagious, and it is necessary for a community to protect itself against injurious popular movements, just as it would protect itself against injurious contagious diseases. Freedom of individual action is the ideal on which we have built up our republic; but when that freedom of action threatens the existence of the republic it must be restrained, moderately, if you will, and wisely, but still sufficiently to protect the public from danger. We would not for a moment countenance the publication of numerous nautical almanacs differing considerably in the prediction of the exact positions of the sun, moon, and stars, because we know that only one of these can be right, and that the others would certainly lead to errors in navigation that would endanger the lives of thousands of persons. The community does not allow either druggists or physicians to operate without first giving satisfactory evidence that they are competent to handle the drugs that they deal in. Every State has its laws relative to the licensing of steam engineers, since a steam engine in incompetent hands would be a menace to the lives of many.

Wherever the life and property of the citizens are at stake, the Government of the people, by the people, and for the people must necessarily look after their interests, and the time must soon come when a general law shall forbid the publication of weather predictions and storm warnings, especially those of a sensational character, by any others than properly licensed persons.

LIGHTNING STROKES IN THE OPEN FIELD.

It is commonly supposed that lightning strikes only elevated objects. In fact, on page 478 of the MONTHLY WEATHER REVIEW for October, 1902, Prof. John Trowbridge of Cambridge, Mass., shows how difficult, if not impossible, it is for lightning to strike down upon a smooth plane surface of water. Of course, the waves of the ocean and the irregularities on what is called a plane surface of land may occasionally be struck by lightning, and two cases of this kind have lately come to our notice.

In July, 1899, Mr. Morton Henry, on a farm near New Bethlehem, Pa., was in an open field, without trees near by, having only the horses, the plow, and a boy at hand. He and the boy sheltered themselves under the shoulders of the horses during a light shower from an insignificant looking cloud. The horses were killed instantly and the men rendered unconscious.

On July 10, 1903, Mr. Sylvanus Summers, and his son Clinton Summers, were loading hay on their farm seven miles northeast of Canton, Ohio. The sky was somewhat threatening and light thunder was heard in the distance. There was no local rain, the storm was apparently far away, the sun was shining through rifts in the clouds, the hay wagon was passing between two small piles of hay, when the lightning struck it, killing the horses and Mr. Clinton Summers and prostrating the others. The hay did not catch fire, and there were only slight burns on the horses, but Mr. Summers's clothing was ignited in several places. No thunder of any consequence was heard after that belonging to this particular stroke, and no rain fell at this locality, although it rained shortly afterwards about a mile farther north.

These are cases against which it is impracticable to provide, since no one cares to wear a wire cage, such as electricians recommend as a perfect protection for houses and powder magazines. We must accept them as corresponding to the legal term "an act of God," or an "inevitable necessity occurring by reason of the operations of nature unmixed with human agency or human neglect."

THE CLIMATE OF MANILA.

The following extract from an article by Mr. William E. Curtis, formerly Chief of the Bureau of Central American Republics, and now residing in Manila, is taken from the Washington Evening Star of June 4, 1904. It graphically expresses the convictions of the Editor, based on his own short experience in the Tropics, and is in harmony with the writings of the best authors on the subject. The meteorological elements of climatology, especially heat and moisture, constitute a source of discomfort, but only in rare cases one of danger or disease. The majority of individuals are so constituted that by a proper attention to diet they may successfully become acclimated. It does not seem proper to attribute to the climate of any place the diseases that are due to neglect, carelessness, living germs, and other nonmeteorological causes.

Mr. Curtis's article points out the numerous local sources of disease, foul water, bad sewerage, poor quarantine, ignorance and carelessness of newcomers; but all these are foreign to the climate proper, about which he makes the following remarks:

The climate of Manila is no worse than that of Florida or New Orleans, Galveston, or any other of the Gulf ports of the United States. Its bad reputation is chiefly due to stories by those who did not know how to take care of themselves, and, being exposed to hardships, fatigue, and bad weather, being careless in their habits and ignorant of the dangers of the tropical sun and impure water, suffered from sickness, which they attributed to the climate instead of their own neglect.

It may be asserted truthfully that no tropical islands in the world enjoy a better climate than the Philippines, and if they were situated within a week or ten days' voyage of New York they would soon become a popular winter resort for pleasure seekers and a sanatorium for invalids. From the middle of November until the middle of March the atmosphere is delightful, and to those who like a semitropical climate like that of Florida it is unexcelled.

In the middle of the day the sun is hot, and those who are unaccustomed to it must wear pith helmets, carry umbrellas, and take the shady side of the street. Within doors it is always comfortable. A breeze springs up about 11 o'clock in the morning and blows gently all day and into the night. After 4 o'clock in the afternoon the air begins to grow cool, and from that hour until 9 the next morning through the winter months the thermometer will stand between 75 and 80 degrees day after day, with a breeze usually so cool that ladies need to wear a light wrap. During the night you will wake up and pull a blanket over you.

During the summer months, from the middle of March to the 1st of October, the atmosphere is humid and very depressing. Sometimes the air will be so heavy with moisture that it is difficult to breathe, and the pores of the body will flow with perspiration at the slightest exertion. This weather, however, is no more severe and the suffering no greater than that experienced in the towns along the Mississippi and Ohio rivers, in Florida, Texas, and the other Gulf States. Indeed, the temperature in Manila during the summer month after month will average lower than

in any of the States south of the Potomac and the Ohio. The thermometer never goes up to 100° and seldom above 90° even at noonday.

Manila is not subject to extremes like so many of our cities at home. The thermometer will remain about the same month after month, and may not vary 15 degrees in the entire year. This, however, is not favorable to the health or energy of people who are accustomed to sharp changes, and as a rule all who come to Manila complain of lassitude, of lack of energy and drowsiness, for the first nine months, or a year. This enervation continues until they are acclimated. Strangers who have been accustomed to a vigorous and bracing climate lose flesh as well as vitality, and may suffer from intermittent fever during the humid months of the summer. But this is equally true of Texas, Louisiana, and all of the Southern States and tropical countries, where it usually requires two or three years for a person to become acclimated so as to endure the summer heat without physical depression. Some people never become able to endure the humidity of Manila without suffering, and the damp summer climate is particularly severe upon young children, sapping their vitality and thus rendering them more liable to disease. But the winter months in the Philippines are quite favorable to children.

CLIMATE OF THE ISLANDS.

The climate of the Philippines naturally varies according to the latitude and altitude of places. There is a choice of about 1200 miles of the former and 7000 or 8000 feet of the latter. Manila, according to general repute, has the worst climate in the archipelago, but it is no worse than that of other cities at tide water. People who live in them cannot avoid the debilitating influence of the heat and the humidity of the rainy season of the summer, but the highlands of the interior, even within a few miles of the coast, enjoy a cool, invigorating atmosphere, healthful and bracing the entire year, although everywhere one goes it is necessary to protect the head from the direct rays of the sun and to avoid drafts. Inexperienced people expose themselves to fevers by coming in from the blazing sunlight, reeking with perspiration, and sitting down in a breeze to cool off. This is the most frequent cause of illness in all the Philippine Islands and one that is most easily avoided. Americans are accused of recklessness in exposing themselves to the sun and refusing to wear the heavy helmets and carry the umbrellas that other foreigners habitually use.

FUTURE SUMMER CAPITAL.

Within a short distance of Manila, almost within sight of the city, is the mountain town of Baguio, in the adjoining province of Benguet, where it is proposed to build a summer capital and remove all the offices of the government for the four rainy months of the years. Maj. L. W. McKennon, formerly of General Schofield's staff, has been detailed as supervising engineer, and is now engaged in building a town, at the expense of the Government, 4770 feet above the sea level in the midst of a vast forest of pine, where the climate is as healthful as that of the Adirondacks or the Black Hills.

Major McKennon is erecting official residences and office buildings, and several of the officials and employees are erecting bungalows for themselves, so that before the end of the season there will be quite a town. The military authorities intend to build barracks for soldiers, and the Roman Catholic authorities will build rest houses for the recuperation of priests and teachers. The Methodists and Episcopalians have already purchased land for the same purpose, and several members of the mercantile colony of Manila will take advantage of the public sale of lots to secure sites for themselves.

ADVANTAGE OF A SUMMER CAPITAL.

I wrote you from India about the summer capital of that empire; how a century's experience had demonstrated that it was not only economical but otherwise advantageous to remove the entire government from the unhealthy climate of Calcutta during the rainy months of the summer to the town of Simla, in the foothills of the Himalayas, where there is a duplication of the official quarters and residences of the government employees. This has been the work of many years, and it will take many years to fully carry out the same purpose in the Philippines. And no matter what the cost may be the expenditure will be wise and the investment will pay in more respects than one. It will enable the business of the Government to be continued through the entire year without interruption; it will promote health and happiness; it will enable valuable men who can not endure the heat and humidity in the summer to accept official responsibilities in the Philippines; it will take away the necessity of long vacations spent in America; it will reduce the number who are sent home as invalids, as there will be no necessity for long sick leaves for Government employees, and that item alone will save an amount equivalent to a fair interest on the investment; and, what is more important, it will restore and preserve the health of faithful public servants who are devoting their lives to the welfare of this people.

C. A.

AN ITALIAN HAILSTORM IN 1545.

Mr. E. L. Cooley, of Chicago, has kindly communicated to the Chief of Bureau the following account of a hailstorm that occurred in July, 1545, about a day's journey south of Lyons. The description as given by the artist, Benvenuto Cellini, who was then journeying from Paris to Florence, will be found in vol. 2, p. 88, of his autobiography, published in London, 1903:

When we were a day's journey from Lyons, about 22 o'clock,[1] the thunder began to rattle in the sky, though the air was clear as possible. I was a bowshot in front of my companions. After the thunder, so great and terrible a noise was heard in the heavens that, for me, I thought the Day of Judgment was at hand. I stopped for a time, and hail began to fall, without a drop of rain, larger than chalk balls from an airgun. When they fell on me they hurt me greatly. Gradually they became bigger, until they were like balls from a crossbow. My horse was terrified, so I turned him about and galloped as furiously as I could till I found my companions, who had withdrawn into a pine wood in their fright. The hailstones were now as big as lemons. I began to sing a miserere, and while I was thus speaking devoutly to God, there fell one of such a size that it snapped a huge branch of the pine tree under which I had thought myself safe. Another fell on my horse's head and almost knocked it down. Then one hit me, but not directly, else I should have been a dead man. At the same time poor old Lionardo Tedaldi, who was kneeling like me, was struck so hard that he fell on all fours. Then I saw that the branch was no longer a shelter, and that one must do something besides singing misereres. So I began to wrap my garments around my head, and I told Lionardo, who was crying "Jesus, Jesus!" at the top of his voice, that Jesus would help him if he helped himself. It was more trouble to save him than to save myself. The fury of the storm lasted for a considerable time; but it stopped at last, and, all bruised as we were, we got upon our horses as best we could. While we were riding toward a lodging we showed each other our scars and our bruises; but when we had gone a mile we found the marks of much greater damage than we had suffered—indeed, our eyes were met with a scene of ruin which it is impossible to describe. All the trees were stripped and broken, the beasts that had been out in the storm were killed, and many shepherds too, and we saw hailstones so big that you could not have spanned one with your two hands. We thought we had come off well, and owned then that calling on God and repeating the misereres had served us better than if we had only tried to save ourselves by our own strength. So, with thanks to God, we set off for Lyons, reaching it the next day, and there we put up for a time.

The following extract from the reply of the Chief of the Weather Bureau to Mr. Cooley contains good suggestions for all who have opportunity to observe such hail:

Hail that is on an average two inches in diameter is very often reported from heavy storms, and occasionally masses of ice, perhaps agglomerations of hail, are said to reach a size quite as large as those that Cellini could scarcely span with two hands. If it ever should be your luck to be present when such enormous hail occurs, I will beg you to kindly see that a number of measurements are made of the size and weight of a large number of specimens, as also of the general average quantity of ice per square foot lying on the ground, so that we may have more exact data for calculations as to the origin and formation of hail. The internal structure of the hailstone is exceedingly curious, a series of concentric shells of clear ice and snowy ice. By splitting a hailstone in half and quickly making a drawing showing these concentric layers, with such indications of crystalline structure as you may be able to detect, you will add to our knowledge of interesting facts. The most remarkable peculiarity is said to be that, if a hailstone is held under water until it melts, the observer will, at the last moment, notice that the small bubble of air at the center bursts through the last layer of ice and expands to several times its original diameter as it starts to rise to the surface of the water. This indicates that when in the hailstone it was compressed under great pressure. If you can determine even approximately the diameter of the bubble before and after its liberation from the ice, you will give us the means of determining what that pressure was.

If you can split a hailstone into thin layers across the center, and give us photographs of a few of these, we should know more about the internal structure of the hail.

Foreign objects, such as stones, leaves, twigs, nuts, and insects, are often encased within hailstones. Such occurrences should be noted, as they demonstrate very clearly the existence of strong upward currents of air that are supposed to be a necessary concomitant of the formation of hail.

C. A.

[1] In the old Italian system, which still continues in some sections of Italy, the day ends at sunset, and the hours of the new day are counted continuously up to 24 at the following sunset. On this system, therefore, the beginning of each day varied not only with the latitudes, but also from season to season throughout the year. Therefore, in July, near Lyons (latitude 46° N.), 22 hours was probably about 5:30 p. m. local mean time.—ED.