are full of sensational stories relating to the personal relations of the testatrix, her husband, and the responsible officers of the university; the one side attempting to justify the action of the will-breakers by asserting injustice on the opposite side, the other side defending the action of the university authorities. The public are not concerned in that phase of the matter, and the university authorities evidently feel themselves unaffected by the gossip of the newspapers. Mr. Sage, a year ago, began the erection of a great library building to be given the university as a memorial of the originally intending giver if the suit should be lost, or to be paid for by her bequest should the university hold its own in the case. He gives also $300,000 as an endowment, the income to be applied solely to the purchase of books. Most colleges would be considered fortunate if given so much, even failing to obtain a $2,000,000 library. Practically the university gains: it loses a million which it never possessed; but it gains a positive quantity in the half million and over, which is now actually passing into its possession. It is the impression of some of its best-informed friends that it will untimately actually gain through awakened sympathy and interest, and the gifts likely to be the practical expression of that interest and sympathy, more than the amount now seemingly so unfortunately lost. It is very certain, also, that some of this scattered property will come directly back to the university by the action of the receivers of what they regard as unfairly acquired property.

This affair seems to have no effect on the plans of the university authorities. They will begin the next year with an enlarged teaching force, new and distinguished professors in the faculty, a $10,000 equipment in illustrations of the work of classical instruction, a new chemical laboratory to accommodate six hundred, a physical laboratory of double the space now occupied, new workshops doubling the present area and capable of handling six hundred Sibley College men, new mechanical laboratory arrangements of nearly proportional extent, a new foundery and new forge large enough to meet a similar growth, and engines (experimental and other), boilers of 600 horse-power, and dynamos more numerous and powerful in the aggregate than can be found elsewhere in the world.

All this looks very much as if Cornell University and the Sibley College of Mechanical and Electrical Engineering were likely to survive for a time still.

HEALTH MATTERS.

Another Forty Days' Fast.

SIGNOR SUCCI, who is gaining the reputation of being a "hunger virtuoso," completed in May a fast of forty days in London. The medical journals of that city credit him with the genuine performance of the feat. Signor Succi has done no more than our own Tanner, but he has been subjected to a more careful physiological study, and he has shown that a forty-days' fast is possible to more than one human being. During the last days of his fast, Succi lost about half a pound a day, his temperature remained normal, but his pulse was more than ordinarily rapid. The lesson of Signor Succi's experiment, says the *Medical Record*, is one that has often been taught before, and it is that people eat too much, and, in this country at least, drink too little. More diseases come from excessive and intemperate feeding than from alcohol, for wrong feeding is the basis of gouty, rheumatic, diabetic, and obese diatheses, as well as of an infinite number of gastro-intestinal ills.

Excision of Local Pulmonary Tuberculosis.

At the recent congress of the German Society for Surgery, Professor Tillmanns exhibited a man of about thirty years, from whom he had removed a tubercular deposit involving a portion of the left lung, pleura, and thorax. After the operation the lung contracted in such a manner that by a second operation the remaining tubercular area was completely removed. The wound was covered with cutaneous flaps and healed completely, and the patient is now able to work. As the operation was performed about two years ago, the cure may be regarded as permanent. Tillmanns thinks that the surgical treatment of pulmonary tuberculosis is proper if the disease is localized, but that in most cases two operations will be required,—the first to expose the affected part in order to bring about atrophy and contraction; the second to remove the disease.

LETTERS TO THE EDITOR.

*** Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

The editor will be glad to publish any queries consonant with the character of the journal.

On request, twenty copies of the number containing his communication will be furnished free to any correspondent.

Practical Applications of Meteorology.

IN the United States the making of weather predictions has been the chief use of meteorological observations for so long a time, that few persons have taken the trouble to consider the manifold applications of this class of data. In order to bring this matter to the notice of those who are interested in, but not informed on, this practically very important question, I have given below, in a roughly systematic manner, some few of the many points which should be taken into consideration in the framing of any future plans for extending the usefulness of meteorology in our country. In order to show with any considerable degree of fulness the exact relation of meteorology to practical life, it would be necessary to devote the space allowed for a magazine article to each one of the separate headings which I have assumed as conveniently and appropriately marking the subdivisions of the whole subject; so that, in the present paper, only a few lines can be devoted to each topic. This is mentioned in order to explain the omission of many points which could be readily suggested as being of equal importance with those mentioned.

1. AGRICULTURE.—We have but to note the gradual change in the character of plant-life with the increase of latitude or altitude, in order to see what an all-important factor climate is, in marking the limits of individual plant-growth. Some plants require a preponderance of heat, others of moisture, and still others of sunlight, in order to bring them to maturity. Civilized nations have long since ceased relying on indigenous plants; but, in order to transplant successfully from one country to another, it is necessary to know something of the climates of the two countries. Meteorologists are constantly extending their network of observing-stations, and are thus reducing the areas the climates of which are unknown. When the agricultural physicists shall have determined the climatic constants of all our useful plants, it will be possible to foretell the successful, or the probability of successful, cultivation of any of these plants, when we know the latitude, longitude, and altitude above sea-level, of the place of planting.

We need better systems of estimating the condition of plant-growth during the period from sprouting to ripening (or harvesting). Reliable estimates of this kind would be a valuable criterion for market prices of produce. The usefulness of storm predictions, frost warnings, and cold-wave predictions, is so well established that we only take space to say that the non-fulfilment of the latter causes great loss to farmers who slaughter their own animals.

2. COMMERCE.—In dictating what can or shall not be grown in any particular country, climate controls indirectly the nature of the articles carried from one country to another. Merchants will not send articles intended for a hot climate to a cold climate, and *vice versa*. Still, a great many sailing-vessels are employed in trade, and their navigators pay the strictest attention to the laws of winds which have been discovered to hold good for various quarters of the globe. This knowledge often makes a saving of months in a long voyage. Storm-predictions are of special importance to our coast shipping and to fishermen; but the recent inquiries instituted by the German Government show that storms must be predicted considerably in advance to render such forecasting of real use. In shipping perishable produce it is of great importance to know whether damaging weather is likely to occur during the transit, frosts being the principal danger which the shipper must guard against. A meteorological record extending

over a number of years is also necessary to show what precautions must be taken to prevent serious interruption of traffic; the record of snow-storms being most desirable along railroad routes, and of ice periods and low water on the water-ways.

3. MANUFACTURES AND ARTS.—The unremitting labor necessary for the successful operation of manufactories is best obtained in the colder climates. The arts of a nation are, many of them, regulated by the nature of the climate. Water-power, while it is dependent on the slope of the land and other local peculiarities for the head of water, is principally influenced by the amount and regularity of rainfall, conditions which are favorable to alternate floods and draughts being especially unfavorable to use of water-power. Many articles will not stand the removal from one country to another having a different climate, an instance being the cracking of picture-frames brought to our country from the moister European lands; and such instruments as the zither, we are told, cannot be successfully brought to America. The manufacture of some articles requires an excess or deficiency of moisture, as in the case of some textile fabrics. The still unharnessed wind-power will play an important part in our manufactures when its force can be conveniently and economically transposed into electrical energy. Few persons are aware that a wind-wheel twenty feet in diameter, exposed at a moderate elevation above the ground, will furnish on the average one horse-power throughout the year, taking the average of our country east of the Rocky Mountains.

4. INSURANCE.—The increasing application of the principles of science to insurance adjustment must include meteorological data, when this begins to be carefully considered in this connection. Frequent remarks in the late insurance journals show that some meteorological events can no longer be excluded from the computation of risks, and even new fields are being entered upon. The recently established tornado insurance will doubtless be extended to include all storms; but the damages by floods are usually so dependent on local peculiarities, that such insurance can hardly be said to have a scientific basis. Unhealthy climates, and regions of scourges, which usually have marked climatic features, should not be included with healthier countries in any general rate of premium for life insurance. In marine insurance it is possible to take into account the probability of storms, not only for various seas and at different seasons of the year, but also for any sailing course between two ports on any particular sea. In fire insurance the high temperatures, and especially heated terms, and the amounts and frequency of rainfall, must be considered. Nor can we neglect the wind distribution as regards average velocity, and the relative frequency of high winds, and especially the sudden rise of winds which may start smouldering fires which are temporarily unattended.

5. MEDICINE.—Climate as applied to the treatment of disease has generally been studied in a desultory manner, although some general rules have been formulated which are accepted by the medical profession. In most cases, however, there is a wide difference of opinion as to what climatic factors are the most potent as a means of curing or preventing certain diseases; and we find physicians of the highest attainments recommending such extremes as to show that individual opinion in such matters has not yet given way to generally accepted results obtained by the careful study of statistics.

Each one of the climatic elements plays a special *rôle* in the combined effect produced on mankind, and it is these separate effects which must be studied more closely. We know that great daily ranges of temperature, or rapid changes from day to day, are to be avoided in certain diseases, and yet for our own country little data are accessible concerning the latter of these conditions. In recommending long journeys (for instance, from New England to California), how few physicians take into account the hygrometric and barometric conditions to be encountered *en route!* Observations on moisture, relative amounts of sunshine and cloudiness, ozone, and winds, are also necessary for determining the desirability of a place of residence for invalids.

6. MISCELLANEOUS ECONOMIC QUESTIONS.—Under this heading we may put a great many kinds of work in which meteorological data may be very useful. All subjects connected with drainage require a knowledge of amount and frequency of rainfall. Railroad routes, especially where local traffic is to be the main source of income, are not laid out without a careful study of the climates of the countries through which they are to pass. Many engineering undertakings are directly affected by the climatic elements; as, for instance, the effects of winds on bridges. The first question to be answered in connection with the reclamation of our Western arid lands, which interests us so much at present, is, "What is the climate of the country to be reclaimed?" While our politicians are wrangling over the question of protection and free trade, few of them have recognized the bearing of climate on the question. While the use of the winds in aerial navigation is not of practical importance just at present, yet we have but to recall their universal use as power in the flat countries of Europe to show their possible application on our great plains, where a velocity is found almost equal to that on the seacoasts. Climate should be carefully considered in questions of emigration, for the immigrant will usually succeed best in a country having a climate similar to that which he left as an emigrant.

FRANK WALDO.

Cincinnati, O., May 23.

Temperature in Storms and High Areas.

I AM strongly of the opinion that Professor Davis has found a veritable "mare's nest" in his presentation of this subject in last week's *Science*. He is certainly nearly three years behind the times; for this whole matter has been thoroughly ventilated, and the palpable errors into which Dr. Hann has fallen have been already pointed out (see the *American Meteorological Journal*, October, 1887; March, 1888; July, 1889: and the *Scientific American Supplement*, June 15, 1889). The ordinary theory is, that in our storms the air, up to about ten thousand feet, is abnormally heated, and this causes an ascending current of moist, warm air, which has its moisture condensed through the cold of expansion; and that the latent heat set free serves to warm up the air, and thus to produce a rarefaction, which serves to accelerate the ascending current. This acceleration in the air-current causes a more rapid condensation, in turn a greater rarefaction, and so on till our most violent tornadoes are evolved. It is difficult to see why the latent heat of condensation does not exactly balance the cooling by expansion, but I leave that point for others to explain. Dr. Hann himself has made a most elaborate computation of this increased heat in a storm, in which he has shown that up to sixteen thousand feet the average temperature in a vertical direction may be about 50°, while in a high area it must be only 30° (see *Austrian Meteorological Journal*, 1874, p. 321). Professor Ferrel of our own country has written hundreds of pages in which the essential point is that there is an ascending current of moist heated air in our storms. In all his theories he has followed most closely the theoretical results deduced by Hann. All this, and I may say the pet theories of a dozen other authorities, are brushed away with a single stroke of the pen: they vanish as an ethereal essence into thin air, out of which we may say they were reasoned on exceedingly unsubstantial grounds.

These would seem most important conclusions, and should not be put forth without incontestable facts to establish them. Let us inquire into the nature of this evidence. 1st, Dr. Hann's observations are all made in the Alps, a region two thousand miles to the south-east of the average track of storms, also a region fifteen hundred miles from the nearly permanent winter high area in Siberia. Surely we are not to consider that it is possible to get an idea of the distribution of temperature in the centres of our storms and high areas under these conditions. The pressure undoubtedly rises and falls in the Alps; but the storms that cross there are in the nature of secondaries, and there is no opportunity to study real storms. No one ought to think that a study of temperature in the border of a storm and five hundred or a thousand miles from its centre, can give the central conditions. 2d, It would be a great mistake to study simply a fall or rise in pressure on a mountain as the passage of a storm or high area. One of the greatest falls in pressure on Pic du Midi, in France, accompanied a high area, and was caused by the intense cold. This