

(editor's note: This paper was transcribed from a handwritten cursive copy with various difficulties. For a perfect rendition, the reader might wish to consult the original, itself a copy, in the volume entitled *Literary Club Papers I*, 1885 – 1886 Oct 3, '85 to May 29, '86) The original is very badly faded.

A Local Weather Bureau

The first local weather Bureau in this country was started in Cincinnati under Professor Abbe, in 1869. It was supported by contributions from the associated pork-Packers and from the Chamber of Commerce. Professor Abbe was summoned to Washington shortly afterwards, but not, however until he had demonstrated the practical value of local weather forecasts.

Few persons realized the importance of a Government Signal Service with many stations scattered over a wide expanse of country when it was first advocated by this same Prof. Abbe only 16 years ago. Know one will now deny the value of that branch of the Government, will belittle the strides it has steadily made since its inception and organization or attempt to take away from Prof. Abbe one iota of the honor justly due him.

Signal Corps are now a necessity, not only to this, but to all other great nations, and an international system of exchange has already been established whereby simultaneous observations over a good part of the globe are placed in the hands of the heads of the service in various countries.

So much importance has been attached to this branch that several governments established a group of circumpolar stations in the far North, Arctic lands, entirely surrounding the north polar regions, and all situated in the land of perpetual snow. It has been deemed of so much value that several governments have dispatched special, independent expeditions to penetrate the icy seas about the North Pole in order to add to the science of meteorology. Not content with observations at the earth's surface they have even sought to explore the upper regions of the air by means of balloons, in the same cause.

Not only has this service been extended at home until signal stations are far more numerous now and they were ten years ago, and are constantly increasing. All this has helped to perfect and develop its efficiency. The corps of observers which itself, was more or less crude and uneducated in the beginning, is being steadily enlarged, but no longer from crude material. Their examinations are now much harder and stricter, their candidates mostly graduates from college and even these are put through a course of

practical and theoretical instruction in a special training school. These new additions to the corps are usually found in secondary places where the older observers are in charge so that the assistants are often better qualified by training and education than the headman himself.

From this trained, organized corps of observers much more is to be expected in the future than what we have had in the past. While the corps of observers as a whole has become better, the forecasts do not seem to have become more perfect in proportion. The probabilities, as they were at first called, vary in the percent of verification from 80 to 95. Indications succeeded probabilities and still the per cent of verification is not materially improved. The men who forecast the weather for the U.S. Signal Service have so much to predict that it seems quite marvelous they succeed so often. With large areas to cover and with more or less general and confused predictions to announce in order to cover such a large geographical area, e.g. as the Ohio or upper Mississippi Valley with their varied weather at widely separated portions. It is no wonder that to those who are uninitiated or unacquainted with the real facts, these indications look decidedly shot-gunny, in fact like a little of every thing, in order to be sure not to miss it.

The fact that the Signal Service needs more observers, more stations, more frequent localized weather forecasts, less ambiguous in language, and with more means of diffusing this knowledge, has long been recognized and felt. Various States have recognized these deficiencies, and have already put in operation State meteorological bureaus, in order to supplement the Government Service and reach as large a portion of the community as can be reached with frequent brief, definite forecasts. The Ohio Bureau sends forth daily signals on a large number of railways from their head office at Columbus. The signals are large and readily seen at a distance, simple and attractive, so that they reach a large part of the farming community along the lines of the roads.

While this means of rapidly diffusing weather forecasts is not without its defects, it is much better than nothing at all, and worthy of encouragement. The per cent of verification for October 1885 was for weather, 89, temperature 96. It will be observed that the Bureau only attempts to signal two conditions, weather and temperature, and that such special things as tornadoes, thunderstorms, high winds, hot and cold waves are totally unprovided for. Before proceeding to relate the facts, which seem to render a local weather Bureau necessary at Cincinnati, it may be well to cast a glance

at the subject of storms or storm centers.

The atmosphere which surrounds the earth, extending to an infinite height, often however called 50 miles, is, in reality a great sea of air most of which lies within 5 miles nearest the earth's surface. This aerial sea is subject to changes more or less closely resembling the waves of the ocean, and for the purpose of easy comprehension of the subject, may be considered as being affected in exactly the same manner.

The fluid air however is so much lighter and so much more easily affected, that the difference of the waves and size is enormous, e.g. You may imagine a wave of air whose crest is a thousand miles from the crest of the wave which preceded it, and 500 miles from the deepest part of the trough between them. The weight of the air from the crest of the wave on either side of the earth's surface would naturally be more than that between the trough and the earth. The higher the crest the greater the weight and the lower the trough the less the weight.

But you will ask it once, "How can you recognize these waves? The air is transparent and you cannot see them, and even if they were not transparent they are not occurring above you and at a great distance from you?" The reply is that we register the weight of the air at the earth's surface. When we find it is very heavy we know that the crest of the wave is above us, and when it is very light a trough of between waves. The barometer is the instrument which merely tells the weight of the air. Under the crest of a wave it would read high under the trough it would read low; and between crests and troughs it would read in a regular graded scale from High to Low. The barometer rises and falls as these waves pass. When it falls the atmosphere is weighing less and less, a trough or low area of pressure is approaching; consequently a falling barometer indicates that we are passing from the crest of a wave to a trough. Conversely, a rising barometer indicates that we are passing from a trough of low to a crest of high.

The importance of these two expressions "falling" and "rising" barometer will be appreciated further along. By simultaneous observations at a great number of widely separated stations, the readings of the barometer or barometric pressure, as it is sometimes called, definitely determines the weight of the air over the region observed, and after the manner just described tells of the existence of waves, the positions of crests, troughs, and intermediate parts over that area, as well as their distance apart, their relative

heights and the steepness of the intervening portions. The amount of moisture in the atmosphere, the temperature of the air, the weight and direction of the wind at all stations are determined at the same time the barometer is recorded, so that when a wave is recognized, it is known at once whether it is hot, cold, wet or dry.

It is usually found that there is some small area where the lowest pressure occurs. It is found to be more or less circular, as a rule, surrounded by stations where the weight of the air above is the same. A map of the country is usually taken, the small central area determined, and the stations where the weight of the air is equal or united with heavy lines called isobars (or lines where the barometric pressure, the weight of the air above, is the same). By carefully determining a large number of isobars it is found that the crest of high and troughs of low are not usually long unbroken waves like those we so often find in the sea, but they are areas which are more or less circular the areas of low barometer being something like funnels, and those of high barometer something like cones. It is further found that the direction of the wind along the isobars is a circular one about the areas of high or low. The direction in the northern hemisphere is like the movement in the hands of a watch in the low.

Air which becomes heated and charged with moisture does not weigh so much as cold dry air, so that low areas represent air charged with moisture from which precipitation is likely to occur, and consequently are called storm areas or storm centers. Storm centers appear in some edge, or develop in some region of the country, and pass over it in a direction North or East, the direction varying a little according to the season of the year. Occasionally they arise in the northwest or elsewhere, and pursue erratic paths, generally however their sweep is, as has been stated North of East.

The diameter of the storm areas varies from a few hundreds to more than 1000 miles, and their size, number, and position are subject to constant change. Areas of the high on the other hand usually begin in the West, Northwest, or North, and flow in the direction south of the East so that the general paths of these areas of high and low barometer usually cross each other. The readings of the barometer which are taken at the same moment of Washington mean time at all the stations 3 times daily, give the rate and direction of these moving areas. Areas of high cones of air tend to flow into and fill up the funnel-shaped low depressions and equalize the pressure so that there is a constant change going on, being an effort at equalization.

Areas of low are followed or chased across the country, by areas of high which are trying to get into them and fill them up or the areas of low are deflected to one or the other side as they meet resistance in high areas in front of them. It is the determination of the exact courses these various areas take which determine in large measure the forecast, so that it is of the utmost importance that the movements of the storm-centers be watched, and their rate of forward movement known, as well as the relative positions of all other areas.

Forecasts are guesses at the direction and rate of these areas, based on experience and what has occurred many times before under similar conditions. A high cold wave is reported from the North West, a warm, low area is approaching from the south. The questions are, what will be the directions which each will take? Where will they meet, and where is the line where the cold air will become warm up so much that it will not be felt? And how much warming will occur before it reaches us? The answers to such questions must be found in the accumulated experiences of the past, and they are now so many as to be laid down in rules, broad to be sure, but based on the experience and scientific research of the last 15 years.

These areas often pass over very long tracks in a very short time, and often in different direction from that usually followed. When they do this, flat failures of forecasts are likely to occur. A storm center appears central in the South-West at midnight. The question for us is: Will it pass to the south or the north of Cincinnati? Experience with similar conditions before us would lead us to think that it was going to take the north of us, and forecasts are made accordingly. In an hour or two an area of high flows in from the north, and the storm center is deflected to the south of us. Predictions based on the indication that it would go to the north of us and made at midnight would fail while those of a few hours later, based on their observations would succeed.

No further or stronger argument is needed for frequent predictions. Conditions such as those just mentioned have often occurred right here and caused failure on the part of the Signal Service whereas local predictions made on the same set of observations supplemented by the local observations made a few hours later that the storm center was taking a different course from that usually followed, have succeeded.

There is another point. The Government predictions come from Washington where they are without the advantage of local conditions or specialized experience of years in this locality. Do not construe this as fault-finding with the U.S. Signal Service. Without its observations any good predictions would be impossible; but it is not perfect and it is surely a question whether special, local indications can not be made on the spot by a man trained for that purpose and for that locality, relying partly on local conditions better than one several hundred miles distant at Washington, who has in addition to devote himself to many other localities, and generalize for the whole country. It is merely a further differentiation of labor and one which the enterprise of a morning paper has really demonstrated to be a defect of the service by showing the superiority of local predictions conducted by a competent experienced specialist in that department. The indications from Washington are made at 11 P.M. and are for 32 hours. The simultaneous readings of the stations are made at 7 A.M., 3 P.M., and 9 P.M.. As the various areas already described often move very rapidly and variously, forecasts for the future are the more difficult and more liable to be in error in proportion as they are distant in that future.

As 32 hours covers a rather long time, frequent forecasts made in that period for much shorter space of time would be much more accurate without a doubt, so that there is a splendid opportunity for local bureau to accomplish the following objects.

I. To forecast local weather at frequent intervals during the 24 hours and thereby secure greater accuracy in forecasts. II. To disseminate that knowledge so that it may reach those directly interested at once, and demonstrate its immense practical value in saving thousands of dollars. III. To disseminate it broadly among the unthinking classes by means of a few simple, plain signals, which can be displayed from local signal stations. IV. To organize and equip a local observation corps, for organized work in and original contributions to the local weather conditions and changes. As the signal service has contributed much to the general conditions, many closely crowded local stations would have a like chance to contribute to a better understanding of local changes.

Having for its object greater range of usefulness to the public, and the advance of the science of meteorology, such a bureau would supplement, not antagonize, the Signal Service of the Government, and by seeking in harmony with the existing organizations would aid in encouraging and

developing an interest in, and better appreciation of, a wider diffusion of the subject.

The advantages expected from frequent local predictions have been alluded to already, and the reasons in part given. Time does not permit a fuller consideration of them now.

Such an opening existing for valuable work, it seems strange that such a bureau has not been started. After the death of the old one under Prof. Abbe, it was conceived by Mr. S. S. Bassler who tried two years ago to start the Ohio Valley Meteorological Society, with the objects which have been already alluded to. Unfortunate and sad circumstances prevented the consummation of that object then. This fall the Cincinnati Society of Natural History opened the way for such an undertaking by establishing a department of meteorology. This section in the Society has had innumerable difficulties to contend with since its organization. It has been found impossible to practically operate it without some constitutional amendments, which the long official machinery of the Parent Society will require at least two months from their next meeting to consummate. The local bureau also contemplated the employment of a competent man as Director of forecasts. Mr. Bassler, the enthusiastic weatherman of the Commercial Gazette was anxious to take up the work, but that paper desired to keep the monopoly in him and refused to permit him to do the work. The men in the Signal Corps on the other hand are so strictly guarded by the authorities at Washington that none of them could undertake the work and teach some young man to fill the position. With these two obstacles to overcome a local bureau is for the present cut off at least three months. This will give time for the further organization of the work, perfection of the details of diffusing the forecasts, as well as means for rapidly issuing them as soon as they are made.

The organization, as far as contemplated consists of means to reach three classes of the community. I The tramping multitude, whose only interest in the weather is their own personal comfort and health, will be reached by tri-daily signals at 5, 11 A.M. and 5 P.M. II Those who are interested to a greater degree and who want a more complete and detailed condition of the weather forecasts, will be reached by tri-daily bulletins. III Those whose business interests require reports upon one or more special conditions of the weather, will be reached by telephone whenever such conditions are likely to prevail.

Local signal stations, while not limited to, are designed especially for drug-stores which usually occupy prominent corners in all parts of the city and suburbs. They are nearly all provided with telephones and consequently easily reached. By a code of signals, which is the same as that used by the U.S. Signal Corps, and the Ohio State Bureau with a few added to express special local conditions three indications of the weather will be displayed, viz. Temperature, weather and special. The signals are so few and simple that they would soon be understood and read at a glance. Business houses would print them on the back of their cards to advertise themselves, and scatter them broadcast throughout the city similarly as the fire-alarm cards are distributed at present.

In the denser parts of the city and along the thoroughfares special bulletins with more detailed forecasts something like those of the Commercial Gazette would be distributed. Local signal stations situated in these parts would receive bulletins for display in their windows. Bulletins are more especially designed for places of public resort e.g., libraries, railway stations, hotels, theaters, clubs, brokers' offices, and places like the Chamber of Commerce and the Builders' Exchange. All who are entitled to forecasts would have the privilege of calling upon the director of forecasts for the latest indications at any time.

For many years people have felt that the Signal Service was of value only to commerce on the seas and lakes. They have been very slow to change their minds, and even now always ask: "Of what value is it to us?" Lest some of you should hold wholly or in part these opinions, let me call your attention to a few only of the various industries affected.

The agricultural at present the largest and most important in this country, and upon whose consumption nearly all other industries depend is at present almost entirely at the mercy of the elements. All crops are affected by bad weather, sometimes suffering immense loss which a few hours timely notice would often materially lessen. The influence of rain in the reaping season on wheat, rye, barley, oats, and hay are strong illustrations, while frost upon potatoes, tomatoes, peas, other garden truck, tobacco, cotton, fruits of all kinds, and florists' supplies are equally strong. There is one florist in this city who saved himself many thousands of dollars last fall by timely frost warning from the service. Pork-packers now wait patiently for cold waves to commence killing, if while fruit dealers and coal Men are as anxious about a cold wave as a farmer is about his poor, freezing live-stock when the cold

wave gets there. A timely warning of a cold wave would save thousands of dollars spent in the repair of frozen pipes if widely and rapidly distributed. Masons, builders, contractors, in fact all who have outside work to do are widely affected, while speculators are among the most interested observers of the weather forecasts. And lastly look to that unthinking hoard, who, be they artisans, customers, strangers or what not wend their way along our streets by the thousands every day who never know when to carry an umbrella or put on an overcoat and who, from the lack of the one, or the other often contract a fatal cold could they not learn to rely upon the weather signals so as to protect themselves and thus save many a victim from an invalid's existence or a consumptive's grave.

While this work offers much that is promising, too much cannot be expected at the beginning; time and money are required to protect any system; to complete any organization or to establish the limits of its usefulness.

It is not many years in the future when the patents on the telephone will run out; a reduction in price with improved instruments and a great extension of telephonic service must then occur. The present company with its extensive system will be compelled to add extra inducements to subscribers in order to keep ahead of rival companies.

That local forecasts will be one such inducement, there can be no doubt. We see vast means of centralization of power, fast possibilities for the diffusion of knowledge, and vast range of distribution in the telephone of the near future. We can picture to ourselves the time when it will be found in all the humble farm houses and cottages. We can see the inducement offered that the subscriber can often save by timely weather warning, many times the price asked for the instrument for the whole year, and we can see this fact demonstrated over and over again.

Let me appeal to you in closing in the strongest way for your aid, support, and influence in again bringing this city to the front with a new local weather bureau.

Walter A. Dun