What To Do About the Weather

By DR. E. R. BIEL *

EVERYONE of us, and particularly the men in the golf business and the golfers themselves, is dependent upon the weather's vagaries. Thus, a brief summary of recent and important changes in the methods of weather forecasting and some remarks on climatic research may be of interest.

The first 50 years of official weather forecasting (1870-1920) were dominated by the study of pressure distribution. Forecasters drew isobars, lines connecting places, which, at a given moment, experience the same weight of air. They analyzed the many types of isobars, classified them as "lows", "highs", "wedges", "saddles" etc., and ascribed certain types of weather to certain configurations of isobars.

Lows and Highs Explained

They stated that winds circulate counter-clockwise around Lows and clockwise around Highs, and that winds are the stronger the more crowded the isobars are. They found that Lows represent regions of convergence of air masses and of rising currents, which means the formation of clouds and precipitation. Highs are controlled by settling and diverging masses resulting in cloudlessness and aridity.

It was stated that the Lows or traveling disturbances use habitual paths on their ways eastward. European forecasters numbered these routes like highways. Lows "prefer" seashores and chains of great lakes and the most frequented storm path in this country runs along the Canadian frontier and across the Great Lakes toward Newfoundland.

Other storm routes tend toward the New England States which, thus, are the terminus of scores of disturbances before they start on their trans-Atlantic crossings.

Another important finding refers to the enormous speed of American disturbances, which with an average velocity of about 600 miles per day exceeds by far those encountered over other continents. Atmospheric conditions of certain regions proved to be of particular importance for the North American weather development; the Iceland—and Aleutian Lows and the Azores—and Hawaiian Highs became famous "centers of action".

But all these descriptions of experiences did not yield satisfactory explanations for many phenomena nor did they steadily improve the verification record of forecasts. After the first world war the Norwegian professor Bjerknes suggested a complete change in viewpoints and his system of "air mass analysis" gradually replaced everywhere the old "geometry of isobars." The experiences of the old methods do not by any means lose their importance, but the modern conception of weather is that of clashes between air masses of different geographic origin and of different physical properties. They do not mix; along their sharp fronts disturbances are born and developing. Storms have their individual life history and experience all stages from youth to old age and death. The most important source regions of American air masses are the North Pacific, Canada, the Gulf of Mexico and the Caribbean Sea.

Speed of Travel Important

If the time elapsed between the start from the source region and the arrival in the forecaster's district is short the mass will retain its original properties; if the travel is slow and complicated the mass will arrive in a more or less "neutralized" stage. Passage over oceans, high mountain systems and snow-covered plains basically modifies the original properties, but the forecaster is able to analyze the situation by means of upper air data because the "conservative qualities" are best retained aloft.

Modern weather maps are covered with symbols indicating position of air masses and of the belts of their approaches. Sudden weather changes occur along these frontal battlefields.

Polar Pacific masses dominate along the West Coast. They are carried toward the continent by the prevailing westerlies common to our latitudes; but the passage over the Rocky Mountains modifies them completely. Polar Canadian masses primarily control East America's winter.

*Extract from a lecture offered in "Short Course in Turf Management" at the College of Agriculture of Rutgers University, New Brunswick, N. J.

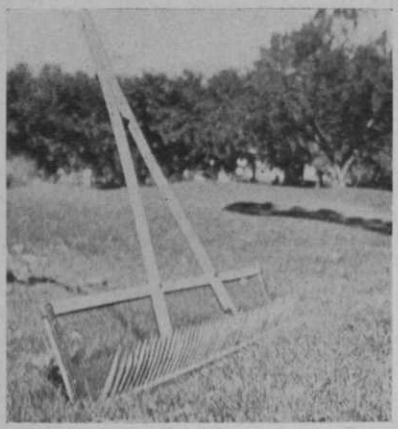
Gulf of Mexico masses are the main contributors toward East America's precipitation as Canadian masses are, because of their low temperature, unable to contain much water vapor, and as Pacific masses lose theirs on the weather side of the Rocky Mountains where they are compelled to climb their slopes. Air mass classes are on a much more gigantic scale in America than in the Old World. There are no West-East running mountain barriers in this country blocking the quick advance of subpolar cold and dry masses traveling southward from Canada or of subtropical warm and damp masses traveling northward from the Gulf of Mexico. As a result terrific storms develop even in the innermost parts of America, while in other continents, plains far from the oceans are mostly characterized by only slight winds. The 80 American tornadoes per annum and the windmills in the very heart of the continent are unique phenomena.

Local weather is explainable only as a part of atmospheric developments of huge dimensions. Scientific forecasts are based upon material covering the entire continent, both oceans and the upper strata. As such information is only available to official networks laymen mostly acquiesce in listening to radio forecasts. The convenience of this public service includes a danger which lies neither in the interest of educated listeners nor in that of meteorology. The public simply accepts the forecast, neither knowing its scientific basis nor wanting to know it.

Undiscussed fact forecasts do not deepen the undertanding of atmospheric phenomena and leave the listeners completely helpless in more difficult cases, when the approaches of disturbances occur quicker or slower than assumed by the

SOLICIT MEMBERS EARLY FOR XMAS GIFT BUSINESS

Already forward-looking pros are planning drives for Christmas gift business. Balls in gift packages, clubs and accessories are to be presented in special advertising pros will send out to members at the start of the Christmas shopping season. From past experience in getting corporation business in golf Christmas gifts, pros have learned this trade should be solicited early in November.



This leaf rake has cut time, effort and costs at the Denver (Colo.) CC. Jim Haines, Denver CC supt., invented it, and it's made in the club shop. Jim's had so many requests for construction information on it he is planning to get blueprints and specifications made to sell to greenkeepers who want to make these rakes for their own courses.

forecaster. The aim ought to be to promote the understanding of the reasons upon which forecasts are based by tuning in to officially discussed forecasts (in the East to WOR at 6:55 A.M.) and by using weather maps. By doing so the local sky will be much more correctly interpreted and the safety of personal forecasts will be basically improved.

Meteorology Field Broad

Most people believe that meteorology and weather forecasting are identical. As a matter of fact meteorology covers a much broader field and the value of weather records goes far beyond this vital, but momentary job.

Observations lose their significance for the forecaster only a few hours after they have been made, nevertheless they are carefully filed for the study of climatic, or average conditions of a region over a period of time. The great majority of observations are not used for forecasting purposes at all. Climatologists map the average distribution of temperature, precipitation, humidity, cloudiness, duration of sunshine, wind velocity, the frequency of thunderstorms and fogs, the duration of the growing season and of snow covers and many other factors of vital importance to human activities. Not satisfied with fact findings they try to reveal the reasons for the existing differences and to utilize them for practical purposes.

The history of many an economic development is the history of adjustment to climatic conditions. Regions within the habitual paths of traveling disturbances, for instance, offer better conditions for cattle breeding and forestry than for crop raising. The St. Lawrence Valley, the New England States and Scotland, visited by 150-200 disturbances a year, are famous examples.

Regions with prevailing or "semi-permanent" low pressure are so stormy, rainy, cloudy and foggy that field culture is very difficult.

Under semi-permanent high pressure conditions crop farming is only possible by artificial irrigation, if at all. As semi-permanent high pressure is typical of the subtropics, nearly all deserts on earth are located in these latitudes. The available space permits only the enumeration of some problems.

What Is Climatology?

Climatology explains why climatic conditions are much more favorable east of the 100th meridian than west of it. It accounts for the odd and very fortunate fact that most summer rains in the interior parts of the U. S. occur by night, when they are most beneficial, while all the other continents on earth record summerly daytime rains. It makes us understand why Florida has up to 90 thunderstorms a year, while there are only three in California.. It gives the reason for the cool and foggy summers along the Californian coast, which prevent the cultivation of peaches in certain regions, while the mountain peaks near the shore are much warmer. It explains why regular snowfalls on the Pacific Coast do not penetrate farther south than Oregon, while on the Atlantic Seaboard they occur 700 miles farther south down to North Carolina. It accounts for the fact that the New England and the Middle Atlantic states belong to the most regular regions on earth as far as dependability of annual precipitation and uniform distribution throughout the year are concerned; this fact is of importance to turf managers.

Meteorological research thus far dealt primarily with what is called "human climate". Our representative measurements

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Other PGA sections could save themselves misunderstandings in golf school promotion tie-ups with newspapers by following the plan used by the Southern California PGA.

Entire membership of the SC section was furnished with mimeographed sheet of assignments giving time and place and names of pros to be instructors at each place during the second annual Los Angeles Examiner golf school.

are taken at a standardized level of 6 feet above ground. But the lowest air layers immediately attached to the ground are subject to quite different conditions.

The differences between the "plant climate" of these layers and "human climate" as to temperature, number of frosts, frequency of extreme heat, humidity and wind velocity often are almost incredible and of extreme interest.

A new branch of research called "microclimatology" yielded scores of striking facts. Eastern flanks of hills receive the bulk of precipitation, although they are usually and with good reason considered to be lee sides; southwestern and not southern hill exposures record temperature maxima.

Microclimate is the more pronounced the higher the mass of vegetation; the climate of a forest is so influenced by the lack of wind velocity with resulting weakening of turbulence and of mixture of air that a very definite forest climate is encountered. Turf managers are much less interested in "plant climate" than foresters or farmers, because golf courses and lawns do not prevent the mixture of air between the lowest and higher levels. But everyone should be aware of the fact that the erection of buildings, walls, dams and the planting of trees highly influences the microclimatic conditions of the vicinity.

Greensmen Meet at Arlington Last Time; Plots to Beltsville

FOURTH annual turf meeting at the USGA's Arlington turf gardens on Sept. 22-23 was attended by some 200 greenchairmen, greenkeepers, and others interested in the problems of turf maintenance. As usual the meeting was sponsored jointly by the Green Section and the GSA.

Interest in the meeting was especially high, since the site of the Arlington Gardens has been requisitioned by the War department. Accordingly this was a farewell meeting. The plots are being moved to Beltsville, Md., but it is doubtful if they will be in shape for an annual turf meeting in 1942. As soon as something definite is developed at Beltsville, it is hoped that the meetings, which have attracted larger and larger attendance each year, will be conducted again under the same joint sponsorship. Experiments had been conducted continuously on the Arlington plots from 1920 to the present.