all the kinds of weather and abnormalities of seasons likely to occur in a region are experienced. Instrumental records go back more than 100 years at several places in the northeastern quarter of North America and for nearly 150 years at some points. Chronicles of the early settlers give us knowledge of the most extreme seasons for 100 to 150 years more at a few places. In all this period of 300 years there has been but one summer, that of 1816, widely snowy or frosty in every month in the region south, roughly, to the Ohio and Potomac rivers. Milham has shown that at Williamstown, Mass., there have been summer months since 1816 as cold as any summer months in that year, but that in none have three such cold months as occurred in 1816 come in the same summer. Our climatological record then would lead us to expect "a year without a summer" in these latitudes not oftener than an average of once in more than 300 years.

The circumstances surrounding the one occurrence of which we know included a cold period of years, a severe volcanic eruption in April of the preceding year throwing a great dust veil around the earth, considerable solar activity as shown by numerous sunspots, and extraordinarily ice-free conditions in the northeastern Atlantic. Apparently a combination of all these was necessary for the production of such an outstanding cold season here.

How about the present? We are in a warm period of years and no great dust eruption has occurred. But sunspots are numerous, and, of course, an ice-free condition far north in the Spitzbergen region may develop. But sunspots become numerous on the average about every eleven years, and the ice about Spitzbergen is always varying. The present situation, therefore, comparing it with that in 1815 makes a "summerless" year in 1927 seem highly improbable.—*C. F. Brooks in "Why the Weather?" Science Service.*

CO-OPERATIVE OBSERVERS' DEPARTMENT

Simple Weather Observing

Complex and expensive though the equipment of government weather stations is, one may very simply and inexpensively set up an observatory. Perhaps a thermometer is considered the first essential, but the barometer has some claim to this distinction. One can estimate the temperature fairly well, but it is difficult to get any knowledge of the of the pressure without a barometer. The usual changes in atmospheric pressure are too small for our perception. So perhaps a barometer should be the first purchase for an observatory. A thermometer is the next essential, and can be used for finding both air temperature and humidity. A barometer may be had for $5.00 and a good thermometer for about $1.00. Means for obtaining at least roughly quantitative observations of wind, cloudiness, and rainfall can be devised with practically no expense.

Direction cross-arms and a vane of wood, metal, or cloth can readily be set up. One can learn to estimate wind velocity to within the nearest five miles an hour, by the feeling or the effects of the wind on water or trees. For observing cloudiness, it is easy to divide the sky into quarters or tenths. Rainfall can be noted in general terms, according to time of beginning and ending and its apparent intensity, light, medium or heavy. Almost as easy, however, is the observation of actual depth of fall. A straight-sided can of 3 to 12 inches diameter, preferably with a funnel top to prevent some of the loss by evaporation, can be set in the open and the catches of rain measured with a ruler or in a graduate. Snowfall is fairly simple to measure. The occurrence of miscellaneous phenomena such as halos and thunderstorms are easy to record, while brief word descriptions of the general character of the day will make any record complete enough, for reasonably accurate mental reproduction later.—*C. F. Brooks in "Why the Weather?" Science Service.*

To Ascertain Cloud Direction

The following suggestion from the Groesbeck aerological station is published for the benefit of observers not supplied with nephoscopes or other equipment for observing cloud direction.

The observer takes a position where his line of sight to some selected point on the cloud to be observed cuts the top of some fixed object, such as a tower or flagpole, and marks the place where he is standing. After sufficient time he takes, and marks, a second position from which his line of sight to the same point on the cloud will cut the same fixed point. Then, if the cloud keeps the same level and his eye has been at the same level at the two points of observation, the direction from his second position to his first position is the cloud direction.—*U. S. Weather Bureau "Topics and Personnel."*

J. B. Parmelee's Long Record

With much regret the death of J. B. Parmelee, Corn and Wheat Region Observer of the Weather Bureau at Iowa Falls, Iowa, is announced. He was born at Bainbridge, Ohio, March 18, 1845 and died at Iowa Falls, Iowa, July 20, 1926.

His record as a co-operative observer of the United States Weather Bureau is remarkable. He began at Nebraska City, Nebraska, February, 1880, where he continued 12 years to and including January, 1892. He then moved to Iowa Falls, Iowa, where he lost no time in re-establishing connections with the Weather Bureau, for he rendered a report at Iowa Falls for the month of March, 1892. From that time to and including June, 1926, he never missed making a reliable monthly report, and during most of that time made daily telegraphic reports to Des Moines during the crop season. In all he served 46 years and five months, with only two months, April, 1891 and February, 1892 missing, the latter month while moving from Nebraska City to Iowa Falls.

His records were at all times remarkably free from errors and inconsistencies. He made extensive and interesting tabulations and summaries of his observations. Besides his purely meteorological records, he made interesting notes of planting and harvesting dates and other events on his farm. He was a faithful reporter for the weekly weather and crop bulletin and actively participated in many other co-operative lines with the state and government.

Miss Mary F. Parmelee, his daughter, has consented to continue observations for a time.—*Climat'l Data, Iowa Sec.* (*C. D. R.*)

Faithful Co-operative Observer Resigns

After 29 years of unbroken service as a co-operative observer of the U. S. Weather Bureau at Thurman, Iowa, Mr. C. R. Paul on July 31, 1926, turned the work over to Mr. H. H. Askew. Mr. Paul's precipitation record has no break in all that time, but due to defects that developed in the thermometers two months of temperature records were unreliable through no fault of the observer. This is a highly commendable achievement, one for which the nation, state and community are Mr. Paul's debtors.

A Noteworthy Private Observatory

The meteorological work of Mr. Antar Deraga, storm-warning displayman of the Weather Bureau at Balboa, California, was the subject of a letter recently received at the Central Office from Mr. Floyd D. Young, meteorologist in charge of frost investigations in the Pacific coast states. Mr. Deraga's work, doubtless unknown to more than a very few readers of the BULLETIN, is a shining example of what keen interest can accomplish in the face of obstacles. Mr. Young writes, in part:

"Mr. Deraga has at his observatory practically every meteorological instrument that will be found at a first order station of the Weather Bureau, and some instruments that are not furnished to Weather Bureau field stations. He is planning to install a seismograph in the near future. All of the instrumental equipment at the observatory has been purchased out of Mr. Deraga's personal funds because of his intense interest in the work. . . .

"Besides the records from the automatic instruments at the station, four regular observations are taken daily, three of them coinciding with the three daily observations taken at Weather Bureau stations. The instruments used are all standard, and the observations are made with the greatest care. The observatory is situated on high ground, overlooking the mouth of Newport Bay, and the Pacific Ocean. It is therefore a true "coast" station . . . and the records are of great practical value. The storm warning station which is in Mr. Deraga's care is under the supervision of the Los Angeles Weather Bureau office.

". . . Although his records are being widely used by engineers and others for practical purposes, the general public does not realize the importance of the work which he is doing. . . ."

One may well ponder the devotion to a self-imposed task (undertaken in addition to the job of earning a living) evidenced by the following list of items, which are attended to, as Mr. Young says, "with the greatest care."

DERAGA GEOPHYSICAL OBSERVATORY—DAILY RECORDS

(Time used, 120th Meridian. Observations at 5 a. m., 8 a. m., noon, 5 p.m.)

1. State of weather
2. Cloudiness
3. Kind—upper clouds
4. Moving from
5. Velocity and height
6. Kind—lower clouds
7. Moving from
8. Velocity and height
9. Wind direction
10. Wind velocity
11. Air temperature (dry)
12. Air temperature (wet)
13. Depression of wet b. t.
14. Relative humidity per cent
15. Vapor pressure
16. Temperature of dew-point
17. Evaporation
18. Barometer as read
19. Attached thermometer
20. Actual air pressure
21. Reduced to sea level
22. Visibility upper
23. Visibility lower
24. Visibility horizon—ocean
25. Visibility mountains—land
26. State of sea
27. Sea coming from
28. Sea current dir. and vel.
29. Sea water temperature
30. Salinity
31. Surf and tide
32. Earth temperature
33. Sky brightness
34. Atmospheric dust
35. Dust counting
36. Solar
37. Solar radiation
38. Sunrise
39. Sunset
40. Terrestrial radiation
41. Fog
42. Duration of fog
43. Precipitation time of beginning and end
44. Precipitation amount—12 Md. to 12 Md.
45. Thunder and lightning
46. Sound—atmospheric—acoustics
47. Maximum temperature—24 hours
48. Minimum temperature—24 hours
49. Range
50. Mean temperature—24 hours
51. Highest air pressure (Barograph)
52. Lowest air pressure (Barograph)
53. Highest humidity (Hygrograph)
54. Lowest humidity (Hygrograph)
55. Prevailing weather for the day
56. Possible sunshine duration
57. Sunshine recorded during hours ending
58. Total hours sunshine (twilight correction)
59. Prevailing clouds upper
60. Prevailing clouds lower
61. Prevailing wind direction for the day
62. Wind direction hours
63. Total wind movement Md. to Md.
64. Maximum in 5 min., and direction from
65. Hourly wind velocity
66. Prevailing state of sea
67. Lunar and stars brightness
68. Weather during the night
69. Radio—static
70. Seismic disturbances
71. Remarks

NOTES

The Third Pan-Pacific Science Congress will be held in Tokyo, October 30 to November 11, 1926. While it is most unfortunate that the American Meteorological Society is not in a position to respond to the invitation to send a delegate to this gathering, we shall nevertheless be indirectly represented through the presentation by Dr. T. Wayland Vaughan, Director of the Scripps Institution of Oceanography, of a paper prepared by Major E. H. Bowie of the San Francisco Weather Bureau Office, entitled: "Daily World Meteorological Charts Essential tc Continued Progress in Meteorology." Among the topics listed in the announcement of the congress is: "Meteorological study of the Pacific region: general circulation of the atmosphere, cyclones, and correlation of meteorological elements." Major Bowie's paper is, therefore, exceedingly timely, as coming from one who is in a position to realize how urgent is the need for a better knowledge of Pacific Ocean weather as an aid to forecasting for the western United States. We shall hope to