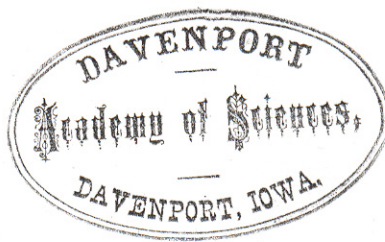


Vol. I.



No. 1.

Iowa Weather Bulletin.

By

Dr. Gustavus Hinrichs,

Director of the Iowa Weather Service.

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Hinrichs, jr.

Iowa City, Iowa.

1878.

Symbols and Definitions.

Hydro-Meteors.

- Rain.
- ✕ Snow.
- △ Sleet, soft hail.
- ▲ Hail.
- ◊ Dew.
- ┌ Frost, hoar-frost;
- ∞ Glazed frost, iced ground.
- ∨ Silver thaw; iced plants.
- ≡ Fog.

Electro-Meteors.

- ☉ Northern Light; aurora borealis.
- ⚡ Lightning.
- T Thunder.
- ⚡ Thunderstorm, both thunder and lightning.
- ⚡ Thunderbolt. Lightning striking any object on the earth.

Optical Meteors.

- * Shooting Star
- ✧ Meteor, Fireball.
- ∩ Zodiacal Light.
- ⊖ Lunar Corona, closely around moon.
- ∪ Lunar Halo. Bright ring at distance around moon.
- ⊕ Solar Corona.
- Solar Halo; Sundogs.
- ∩ Rainbow.

Haze and Storm.

- ∞ Haze, smoky atmosphere.
- ⚡ Snowdrift.
- ∩ Storm; very high wind.

---⁰ faint, feeble, slight, thus ○ a slight rain, a drizzle.

---² intense, severe, thus ≡ a dense fog.

The symbol of Phenomena is to be entered under the heading Phenomena on the face of the blanks, followed by the indication of the time of observation, using a for A.M. and p for P.M., the date of entry being the civil day, beginning at midnight, O, or Noon is 12, a or O, p, to avoid mistakes. Thus $R_2^2, O, a - 2, p$, would represent a severe thunderstorm, beginning at midnight, and continuing till 2 P.M. of date of entry. Any phenomenon, beginning before midnight, but continuing until after midnight, will therefore be recorded on both ^{civil} days. —

A stormy day is one during which at any time the wind was very high, blowing a gale; entered under Phenomena, also direction of the wind, estimated force, and duration of same, time of blowing. —

A day is counted cloudy if mean cloudiness or sky of same extent $\frac{4}{5}$ of total sky covered; clear if equal or less than $\frac{1}{5}$ total covered. Thus, if 3 obs. a day on scale 5 are taken, a day is cloudy if sum of sky equal to or greater than 12; clear, if 3 or less than 3. —

The different number of times on separate dates that Δ and R_2 have been recorded, will be the number of days with \times , Δ and R_2 . Accordingly, this number is the number of civil days on which snow or hail fell, and Thunder and Lightning occurred. On one day, there may have been more than one thunderstorm, it is, however, counted as but one day of thunderstorm.

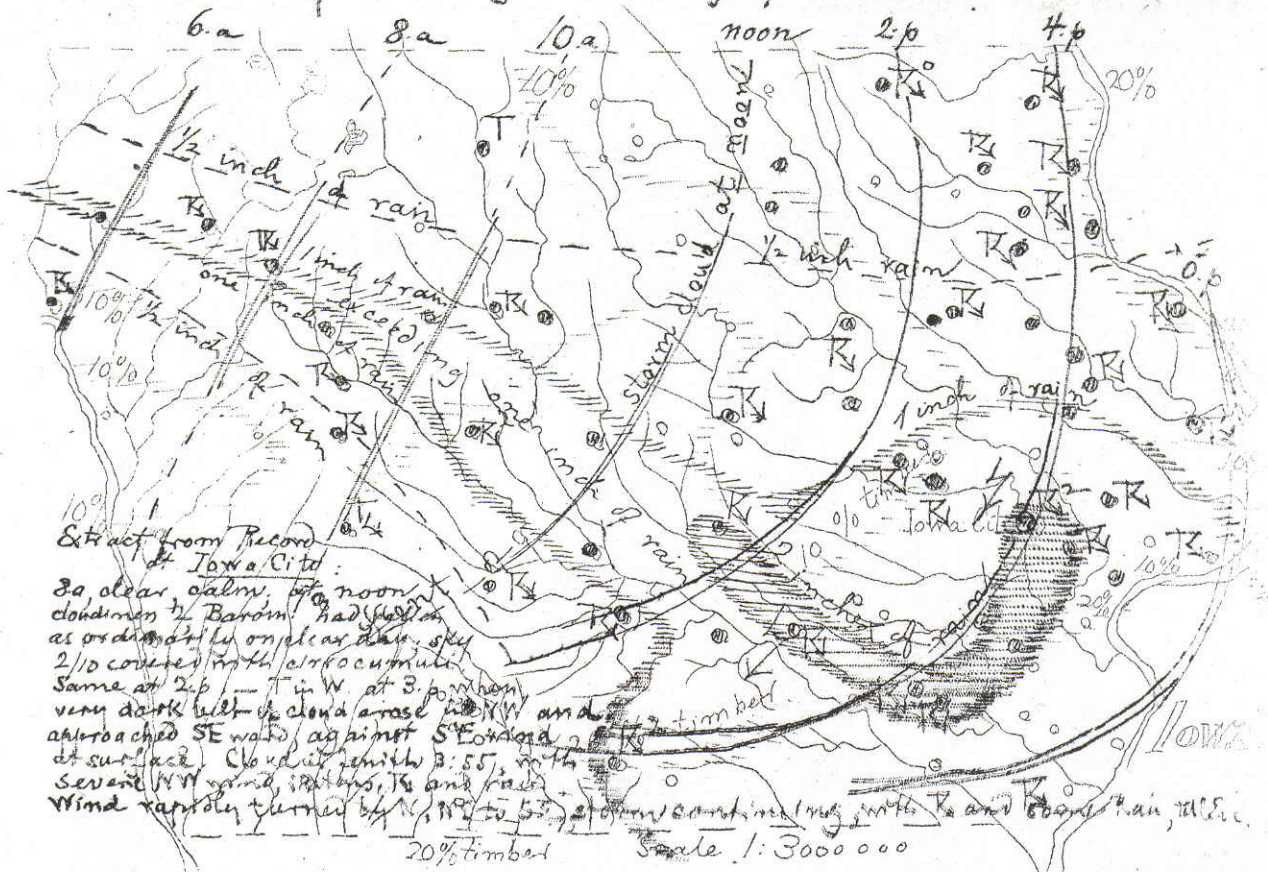
The Rainday is invariably the Solar Day, ending at noon of the day of entry or record. It is counted a rainday or day with precipitation, if ○ or melted Δ and Δ equal or more than 0 at any time.

The Thunderstorm of July, 31, 1877

was quite severe over an area of 20 000 square miles, about $\frac{2}{5}$ of all Iowa. Like most of our severe thunder storms, it was not associated with any marked changes in the barometer. Hence, as usual, it was not foreseen in the Indications of the Signal Service, which stated, at 7:35 AM. of that date: "For Upper Mississippi and Lower Missouri Valleys, rising barometer; warmer southerly, shifting to cooler north west winds, partly cloudy weather, and occasional light rains."

The map below shows the extent of the storm in Iowa, the greater area with over one inch of rain-fall, the smaller area - over 1000 square miles - with more than 2 inches of rain; at Iowa City, 2.5" fell in 50 minutes, a decidedly severe summer rain. The places from which thunder T and lightning ⚡ is reported, are also shown, as well as the stations where lightning struck, indicated thus ⚡.

By a study of the special maps of 8 a, noon, and 8 p, it appears, that both in the morning, and in the evening, SE winds prevailed over the State; at some places S or E. At noon likewise in the entire East and South the winds were the same. Hence the Storm was due to an enormous and spreading influx of cold NW winds, rolling over the country with a velocity of 25 miles an hour, having its dark front along the lines marked at the hours specified. Its arrival in the East and South of Iowa, could have been predicted by a local telegraphic weather service.



Iowa Weather Service.

The Earthquake of Novbr 15th extended from Julesburg, Colorado, to La Crosse Wisconsin, and from Olive, Dakota, to Topeka, Kansas. The territory disturbed forms an ellipsis, the minor axis of which measures over 300 miles, from N50W to ENE NNW to SSE, while the major axis extends from WSW to ENE over 600 miles. The area of this ellipsis comprises over 150 000 square miles.

The greatest energy of the Earthquake was manifested along the Missouri Valley, from Yankton to Sioux City, at 11:30 A.M., and along the Platte River, from Columbus to Omaha, at 11:40. The principal shock reached the eastern, southern and western limit about 11:50 Railroad time. From these data it follows, that the velocity of transmission was fully 600 miles per hour.

In Iowa, the greatest disturbance occurred along the Missouri River, the effects diminishing southwards. A secondary line of greatest disturbance is very distinctly marked, running from Council Bluffs, by way of Avoca, Boone, and Waverly, to Dubuque and McGregor. Both north and south of this line, the disturbance is very much less marked.

The effects ranged from a swaying and rolling motion of the ground, associated with a rumbling noise, alarming about the entire population of a town, to a mere oscillation of chandeliers and liquids. Generally, the effects were more pronounced on high ground, and in brick buildings, especially in the upper stories of the latter. The more feeble manifestations were most readily recognized by children at their school-desks, and by clergymen, lawyers and editors at their writing tables. Thus the schoolchildren were alarmed at Dubuque and Waverly, fully 300 miles away from the centers of the disturbance.

In this Bulletin I have aimed to state the most general features of the Earthquake only. The great number of letters and reports, from which these results have been extracted, will be kept on file for future publication.

Iowa City, Decbr. 26, 1877.

Gustavus Hinrichs.

Please compare the accompanying map of the Earthquake with the above description. Persons having favored me with special reports, receive this Bulletin as an expression of my thanks.

Map of the Earthquake of Novbr. 15, 1877







along the middle course of the

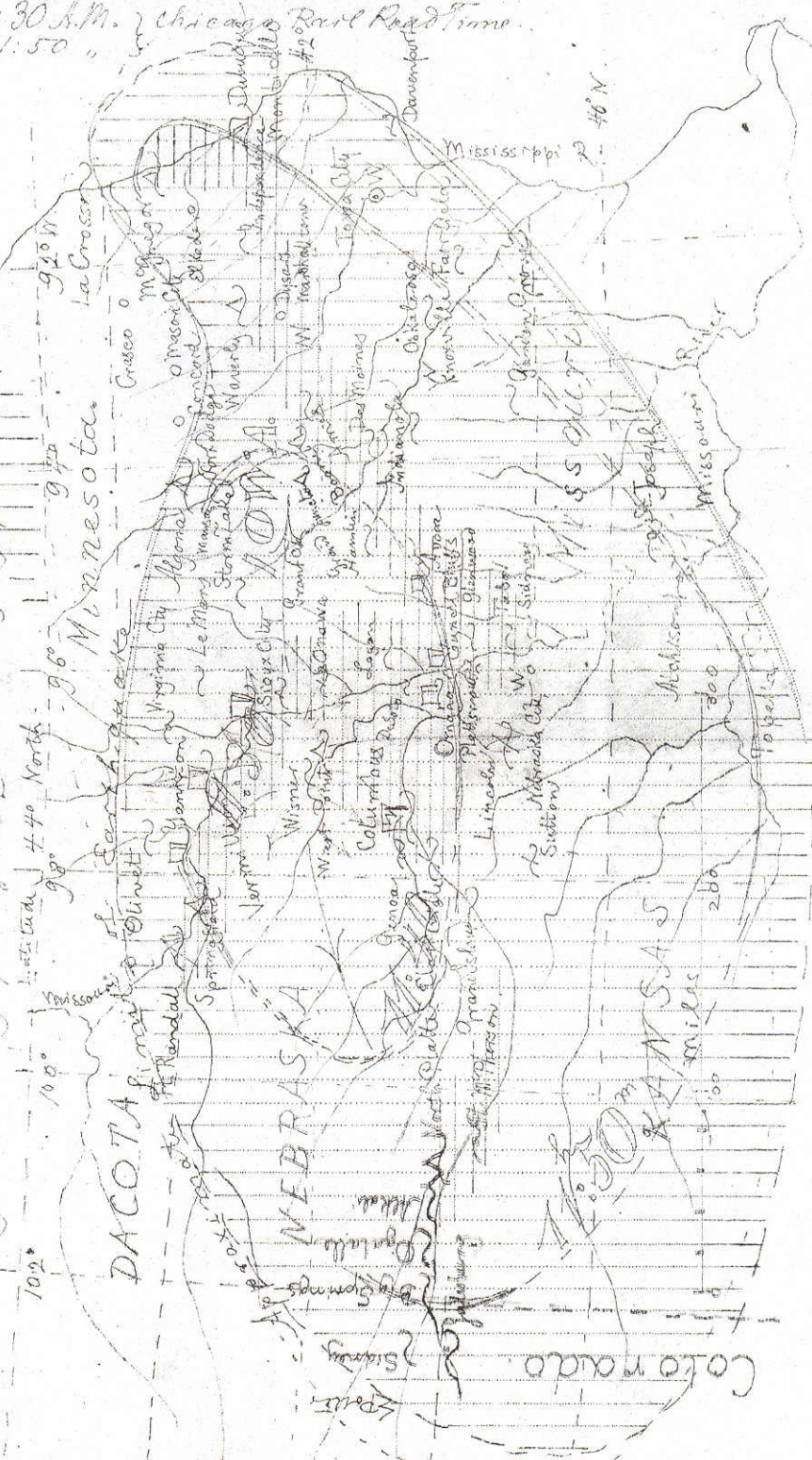
Missouri River.

Observations of Anna Weather Source and others for the territories West of the Missouri River. Drawn by Gustavus Hinemann

Time: near Center, 11:30 A.M. } Chicago & Rock Road Time.
 near Crookmance 11:50 "

Symbols representing the severity of the Earthquake.

1.  Buildings ruined, thrown down.
2.  Buildings cracked.
3.  Buildings shaken so as to create alarm, of many people in different parts of a town.
4.  Buildings shaken, alarming many persons in one building only.
5.  Buildings shaken, so as to alarm a few individuals only.
6.  Rattling and moving of things, Z ~ Swinging of chandeliers, etc.



Iowa Weather Service.

October was very cloudy and rainy, with northeasterly and northwesterly winds prevailing; the rainfall and mean temperature were considerably above normal.

At Iowa City, the mean temperature was two and a half degrees above normal, and the rainfall was over three inches in excess of normal.

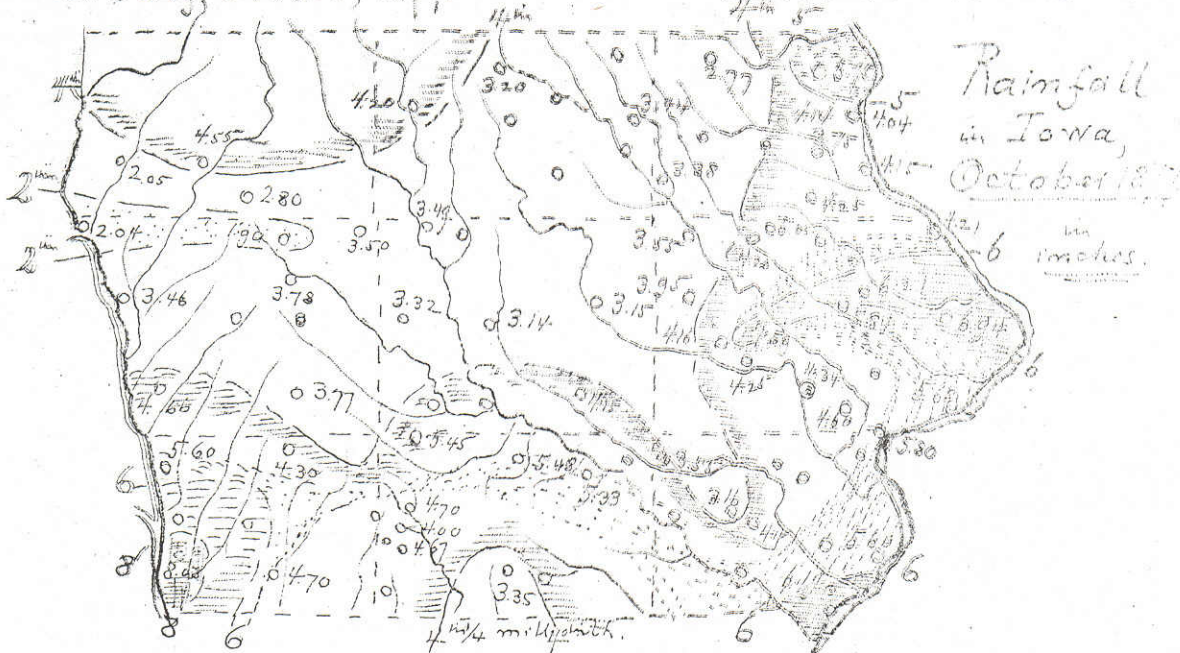
In eastern Iowa, and also from Charles City and Waverly, southwestwards to Greene County, the number of raindays exceeded ten. In a belt from Fairfield over Iowa City, to Elkader and Waukon, the number of raindays was greater than fifteen.

The least amount of rain — about two inches — fell from Sioux-City to Sac-City. — Eastwards, between Grand-Junction, Fort-Dodge, to Forest-City and Cresco in the North and down by Waterloo to Rose Hill (Mahaska Co) in the South, the rainfall averaged three inches and a half. East and south hereof the rainfall exceeded four inches, reaching six inches along the lower Maquoketa River; also in the Southwest of Iowa. The rainfall was greatest at Tabor, Fremont County, namely eight inches.

The Sun was almost free from spots until the 27th, when a spot of very large size appeared, followed by smaller ones, in two distinct groups. The daily oscillation of the magnetic needle averaged five minutes and a half.

Iowa City, Nov. 5, 1877.

Gustavus Hinrichs.



Note: This edition is simply a reprint of the Ist Edition, with the addition of the rainmap.

Iowa Weather Service.

November was warm, cloudy and rainy, with frequent northeasterly winds and a moderate excess in the amount of rainfall.

At Iowa City, the mean temperature was nearly three degrees above normal, and the rainfall was one inch in excess of normal. The amount of Ozone in the air was remarkably low. The 27, 28 and 29 were cold days.

In eastern and middle Iowa, the number of days with rainfall (rain or snow) ranged from 10 to 15; in Western Iowa, from 6 to 9. — The greatest rainfall occurred in nearly all Iowa during the storm of the 20 and 21st.

In November, Western and Middle Iowa received from one to two inches of rainfall (rain or melted snow). The rainfall exceeded two inches north and east of a line running from Sioux-City over Algona, Waverly, Waterloo, Florence, Iowa City and Washington to Fairfield. — The rainfall was greatest, and exceeding three inches, east and south of the line: Monticello, Maquoketa, Davenport, Burlington, Denmark and Corydon.

A bright Aurora was observed on the second, from Dubuque to Newton and Afton; also, on the ninth at Clermont and Waukon in the Northeast. — A solar halo was seen on the 29th at many places in eastern, southern and central Iowa. But the most remarkable phenomenon of the month was the Earthquake which at noon on the fifteenth was experienced throughout Iowa, a special report of which will soon be issued.

Large sunspots were seen on the 3rd, 15th, and 23rd. The daily variation of the magnetic needle averaged five minutes.

Iowa City Decbr. 5th 1877.

Gustavus Hinrichs.

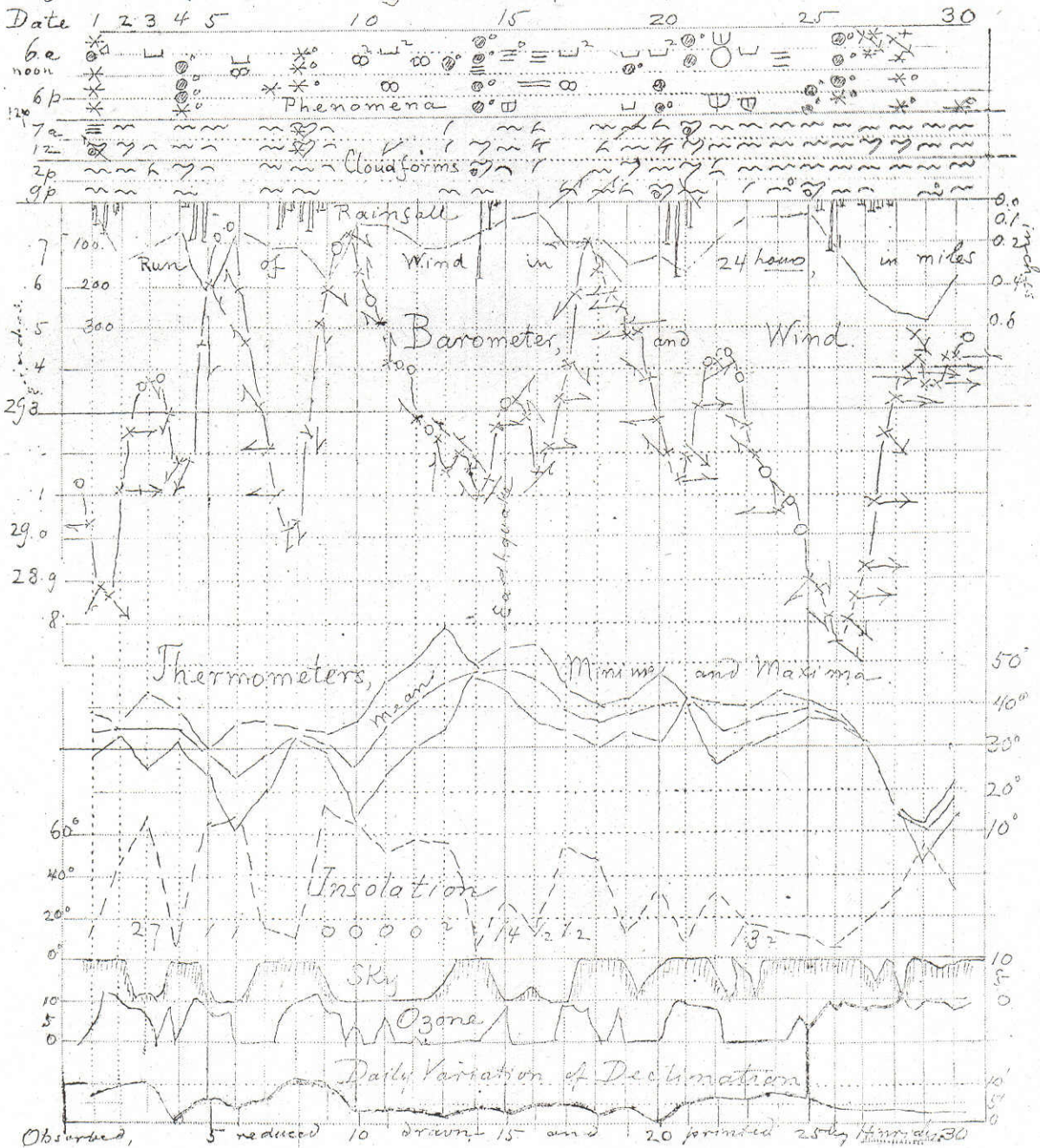
Central Station,
Iowa Weather Service,
at Iowa-City.

Observations of
November 1897
Remarks.

mean values
To 2p 9p Mean

Pressure 29.304 27.3 29.8 29.2 -0.04 low
 Temperature 30.7 38.5 34.1 34.4
 Min & Max 28.8 39.4 34.1 +2.7 warm
 Humidity absd 15.5 18.4 16.9 16.9
 relative 84.4 75.3 82.8 80.8 +7% moist
 Cloudiness 7.3 6.5 5.5 6.4 +1.0 cloudy
 Rainfall 2.57 +0.88 wet
 Rain days 15 +7 rainy
 Wind, direct WNW - ESE - calms
 times 28 25 18
 total run 34 27 miles, 1142 miles a day
 Ozone 5.5 4.8 4.4 4.9 Mean daily variation, 5 minutes.

Sunspots Nov 3
 on 5th & 6th, only large spot left.
 Nov. 15. On 16th & 17th the spots much smaller.
 Nov 23, One enormous spot, certain, two or three small ones uncertain on account of fleeting clouds.
 Magnetic Instruments are not yet properly located for want of suitable room.



Central Station,
Iowa Weather Service,
at Iowa City

Observations of
December, 1877

Mean Values. Deviations from Normal.

Pressure --- 29.315 in. 0.09 low.

Temperature, ^{Month} 40° 19° 5 high

" " $\frac{VI+11+2.1X}{4}$ 39° 8

Humidity, absol. 22.9 $\frac{\text{in. ch}}{100}$

" " " relat 84.1 %

Cloudiness ---- 5.2 0.6 low.

Rainfall amount - 2.68 in. 1.15 high.

" " " days 14 8 high.

Wind, total run 346 1/2 miles

" southerly prevailing.

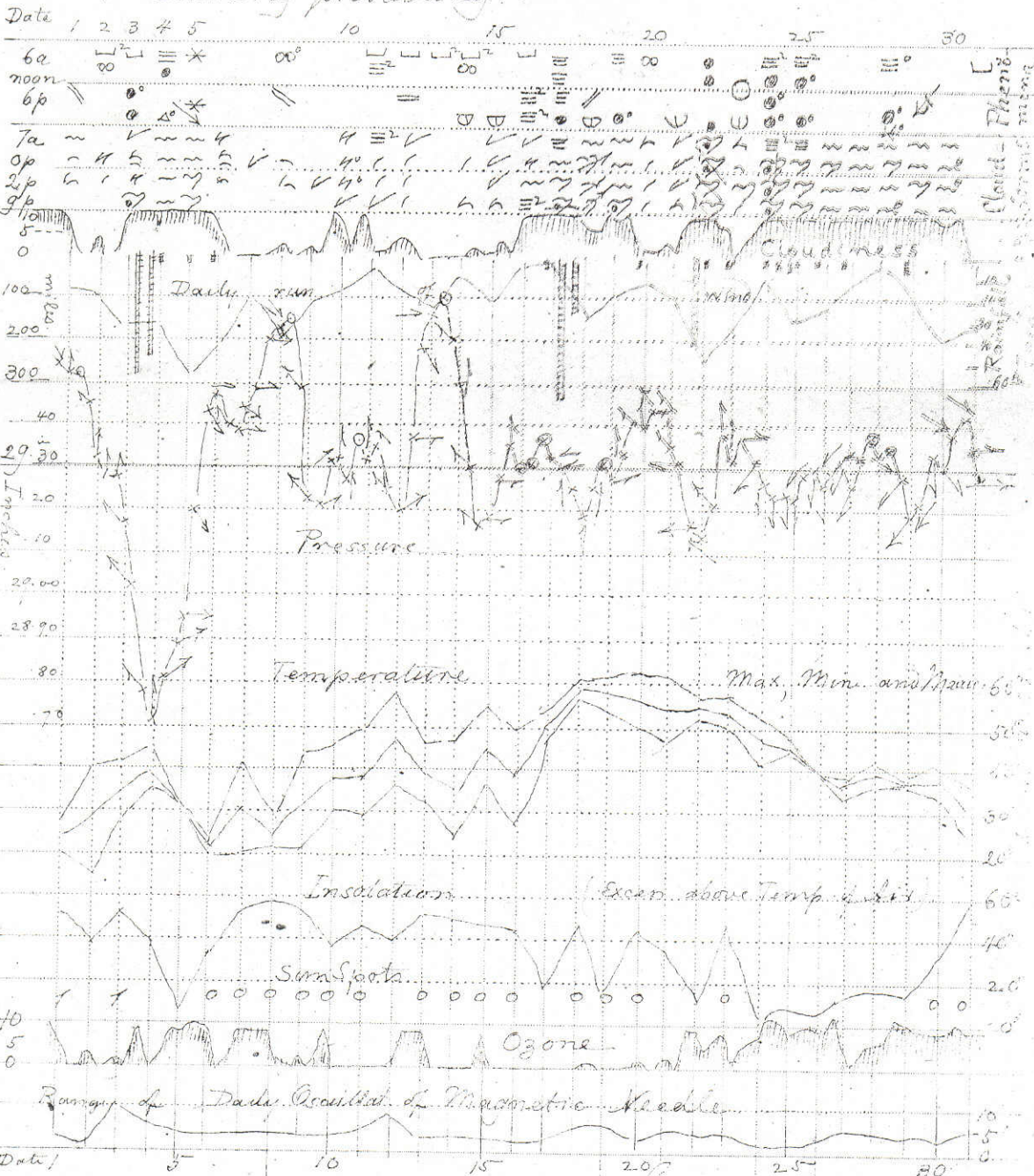
Ozone, mean 4.2 (low)

Daily Variat. of Declinat. 4-1 min.

Sunspots, mean relat. no. 0.1

in 18 days observations

Frequency	10	North	8
	12	West	5
of Wind:	6	South	18
		East	



Press-Bulletin, No 51.
Iowa Weather Service.

December 1877 was by far the warmest December ever observed in this part of the Mississippi Valley. The mean temperature at Iowa City was 40.1 degrees, which is ten degrees above the highest mean temperature observed before (1875), and 27.5 degrees above the mean temperature of Decbr 1876, which ~~was~~ is the lowest ever observed. Hence the last two December months differ more from one another than any other two December months since 1860, and even since 1840.

The absolute temperature of the air was at no time excessive, the highest reading being 63°, which is only one degree above earlier observations. The high mean temperature is due to the uniformly high temperature of the nights, only during 13 nights did the temperature sink below the freezing point, and at no time did the temperature sink below 15 degrees above zero.

The first half of the month was clear and mild, the latter half was warm, very foggy and cloudy, with frequent slight rains, and one thunderstorm along the Skunk and lower Des Moines on the 17th. The dense fogs of the 16th and 24th covered the entire State.

Rainfall was most frequent in the South and East, ~~the~~ South of the line Corydon - Oskaloosa, and East of the line Iowa City - Dubuque, rain fell on from 10 to 14 days.

The amount of rainfall, while above normal, was not excessive. It averaged ^{one} ~~an~~ inch and a half in the north and along the Missouri. Two inches fell in the Des Moines River valley from Fort Dodge down to Keokuk, also east of the line drawn from Newton over Grinnell, Blairston and Independence to Waukon. A rainfall of over three inches was measured at but a few points - in Warren, Jefferson, Benton and Clinton counties.

One large sunspot was observed on the 7th and 3rd; until the 23rd the sun's disk remained free from spots, and was also free of spots on the 31st, at the close of our cloudy weather. The daily variation of the magnetic needle averaged four minutes.

Iowa City, January 4, 1877. Gustavus Hinrichs

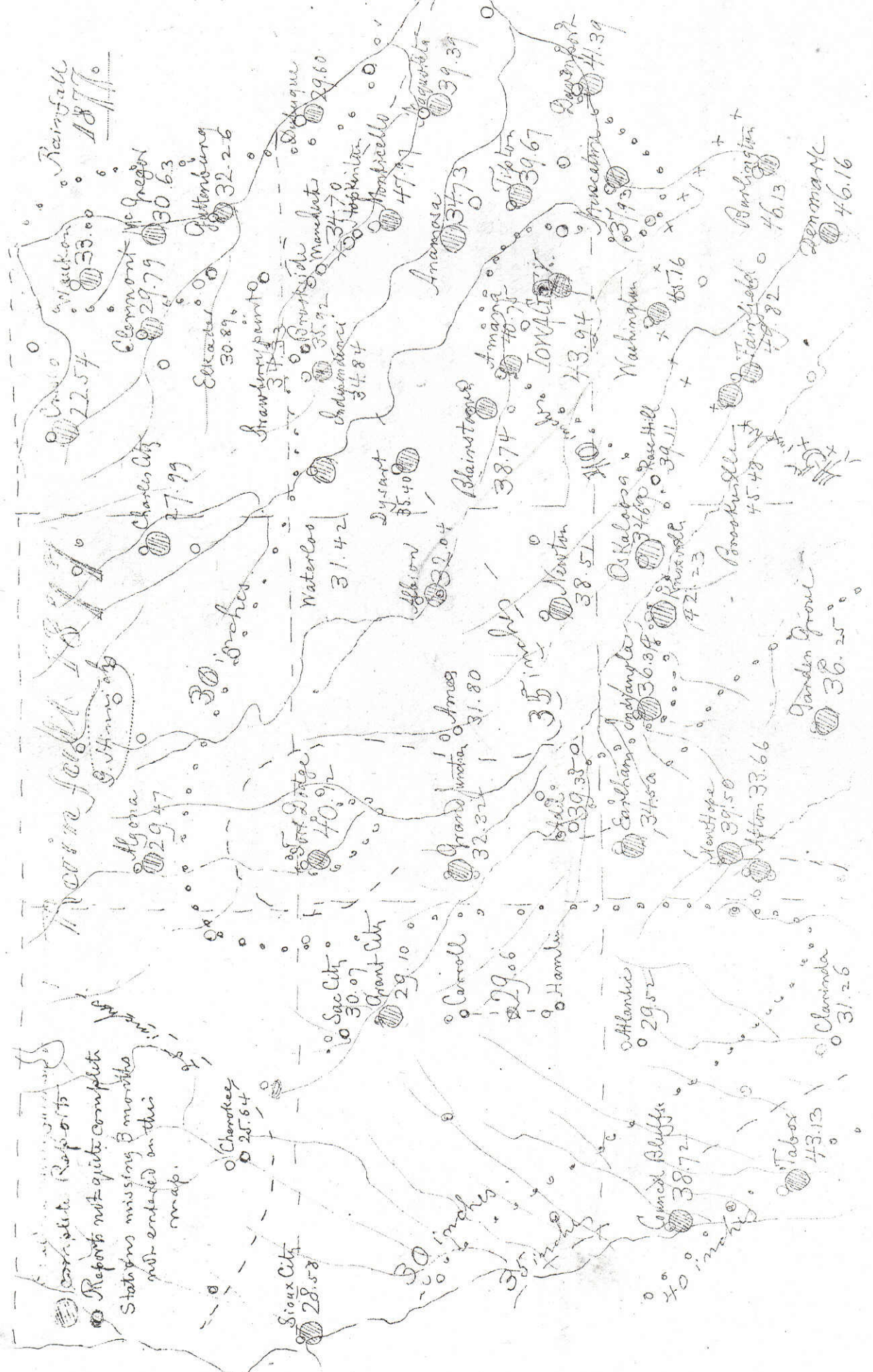
Rainfall
in
10 WVA,
1876.



Greco 33.53
Waukon 36.39
Clermont 39.91
Autumburg 44.81
Stramborn 42.34
Dubuque 43.80
Manchester 41.67
Mentacotta 51.90
Maquoketa 37.58
Tipton 45.91
Davenport 45.12
Muscatine 43.48
Washington 43.57
Granforsville 43.57
Havfield 45.12
Butterington 47.04
Bloomfield 47.04
Madison 47.04
Hinnichg 47.04
Oskaloosa 41.47
Journey 41.17
Blairtown 41.23
Amama 43.04
Florence 44.09
Asamosa 43.41
Albia 42.01
Newton 32.99
Anoxville 40.38
Oskaloosa 41.47
Ottumwa 41.47
Havfield 45.12
Bloomfield 47.04
Madison 47.04
Hinnichg 47.04
Council Bluffs 32.93
Tabor 33.03
Clarinda 29.30
Grant 32.98
Adel 34.65
Bertram 41.47
Anoxville 40.38
New Hope 41.70
Atton 36.47
Grant 32.98
Stout City 33.00
Onawa 33.00
Cherokee 25.27
Rolle 18.92
Fox Dodge 30.80
Grand Junction 40.70
Grant City 40.22
Carnoll City 31.80
Amos 38.49

Rainfall
in
Inches.

Complete Reports
 Reports not quite complete
 Stations missing 5 months
 not entered on this map.



Reinfall
 1877