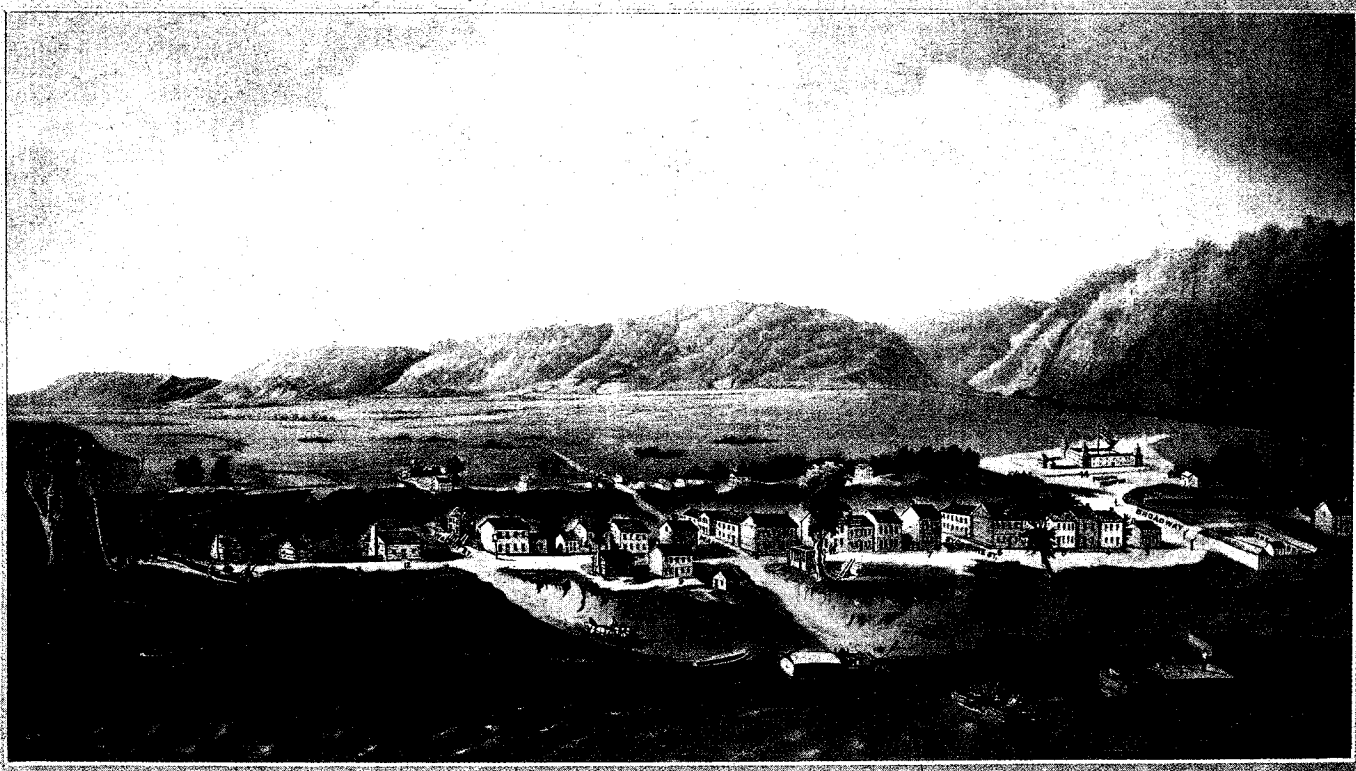


COURTESY, CINCINNATI HISTORICAL SOCIETY



IN SEARCH OF CINCINNATI'S WEATHER

by Steven L. Horstmeyer

According to some accounts the weather was cold and blustery on December 28, 1788 when 26 settlers landed on the north bank of the Ohio River in the Northwest Territory and founded Losantiville. A year later,

STEVEN L. HORSTMAYER, a student of Cincinnati's weather history, is also a meteorology instructor at Miami University, Oxford, Ohio; a weekend weathercaster for Cincinnati's WKRC-TV; a weather consultant; and the author and publisher of the annual *Tri-State Almanac and Weather Guide*.

General Arthur St. Clair, governor of the territory, left Marietta, its first permanent settlement, to visit Losantiville and Fort Washington, the local military post. While there he would change the name of the settlement to Cincinnati to honor the Society of the Cincinnati, a fraternal order of Revolutionary War Officers.

Because of its location on the Ohio River, the main route settlers used to migrate to the Northwest Territory, Cincinnati has one of the longest written weather histories west of the Appalachian Mountains. The record

is fragmentary until 1814, but nearly complete thereafter. I am in search of Cincinnati's weather on each and every day since that wintry afternoon the first settlers landed.

The Earliest Weather Records

Winthrop Sargent, a dedicated weather watcher and Secretary of the territory, accompanied Governor St. Clair on his visit to the new settlement, and brought with him Cincinnati's first thermometer. Sargent's interest in weather may have started during the frigid winter of

1777–1778, which he spent as an officer at Valley Forge.

At 7 a.m. on January 2, 1790, as his party's flatboat drifted down the Ohio River just five miles upstream from the settlement, Sargent recorded a temperature of 28°F (– 2°C). His observation is the first temperature measurement for the area; the age of quantitative meteorology had begun in Cincinnati.

The accuracy of historical temperature readings must always be questioned because thermometer quality and exposure vary. Sargent was well aware of this himself, as evidenced by two diary entries. On June 1, 1795 he wrote:

Thermometer changed this day for one of Quicksilver Fabrenbeits (sic) Scale and corresponding with accurate ones used in the Atlantic States—for comparison thereof and scale of Diff: see M. S. [manuscript] No. 1 Sheet 38th commencing July 1st 1792.

Unfortunately manuscript Number 1 has not survived.

Sargent's entry for July 19, 1795 reads,



BRAND PHOTOGRAPHY, CINCINNATI. COURTESY WJMT-TV

CINCINNATI TODAY.

... note: Spirits of wine thermometer stood at 110 deg. from 2 to 3 p.m. in a free circulation of air suspended at the eastern side of any house, wind light and blowing from the south at 3 it veered to the southeast, some clouds and the quicksilver thermometer fell from 98 to 95.

Diary entries such as these enable the historical researcher to make judgments regarding the accuracy of observations. Sargent obviously did

his best to insure accurate measurements.

Following his years in Cincinnati, Sargent became Governor of the Mississippi Territory, where he continued recording detailed weather observations.

The Fort Washington Meteorological Register

Fort Washington was established in 1789 to protect settlers from Indian attack. It stood in what is now downtown Cincinnati. A meteorological register was started at the fort on June 1, 1790 and continued through September 1791. Temperature, wind direction, and cloud amount were recorded each day at 3 p.m. Winthrop Sargent was not the observer, but it seems likely he may have been instrumental in establishing the practice.

The Ft. Washington record, now at the Clements Library of the University of Michigan, Ann Arbor, contains the first account of a major Cincinnati snowstorm. On February 18, 1791 the observer wrote:

A steady snow of small flakes all day which began early this morning. It fell



COURTESY CINCINNATI HISTORICAL SOCIETY

THE FIRST SETTLERS land at the site of Cincinnati on December 28, 1788.



DR. DANIEL DRAKE wrote the first climatology of the Ohio Valley in 1810.

near 11 inches thick which is by far the most that has fallen at one time during this winter, or since the settlement of this place.

A schematic storm history can be constructed from the observations made at the fort. Cold temperatures, easterly winds, and "a steady snow of small flakes" suggest a classic overrunning situation. A stationary or slow-moving warm front was probably south of Cincinnati, with warm, moist air from the Gulf of Mexico being drawn northward ahead of an approaching storm. As the moisture-laden air was lifted over frigid arctic air at the surface north of the warm front, moisture falling through the very cold air would have formed the small, telltale snow flakes.

Milder temperatures that followed the storm indicate that a Pacific anti-cyclone replaced the frigid Arctic air-masses that dominated the region before the storm. On February 27, nine days after Cincinnati's first recorded major snowstorm, the temperature was 59°F (15°C), with spring-like thunderstorms reported at Fort Washington, a common characteristic of the local climate that would not escape the attention of the author of the first book about Cincinnati's weather.

Cincinnati's First Climatology

Dr. Daniel Drake, M.D., wrote the first climatology of the middle Ohio

Monday June the 1st 1810

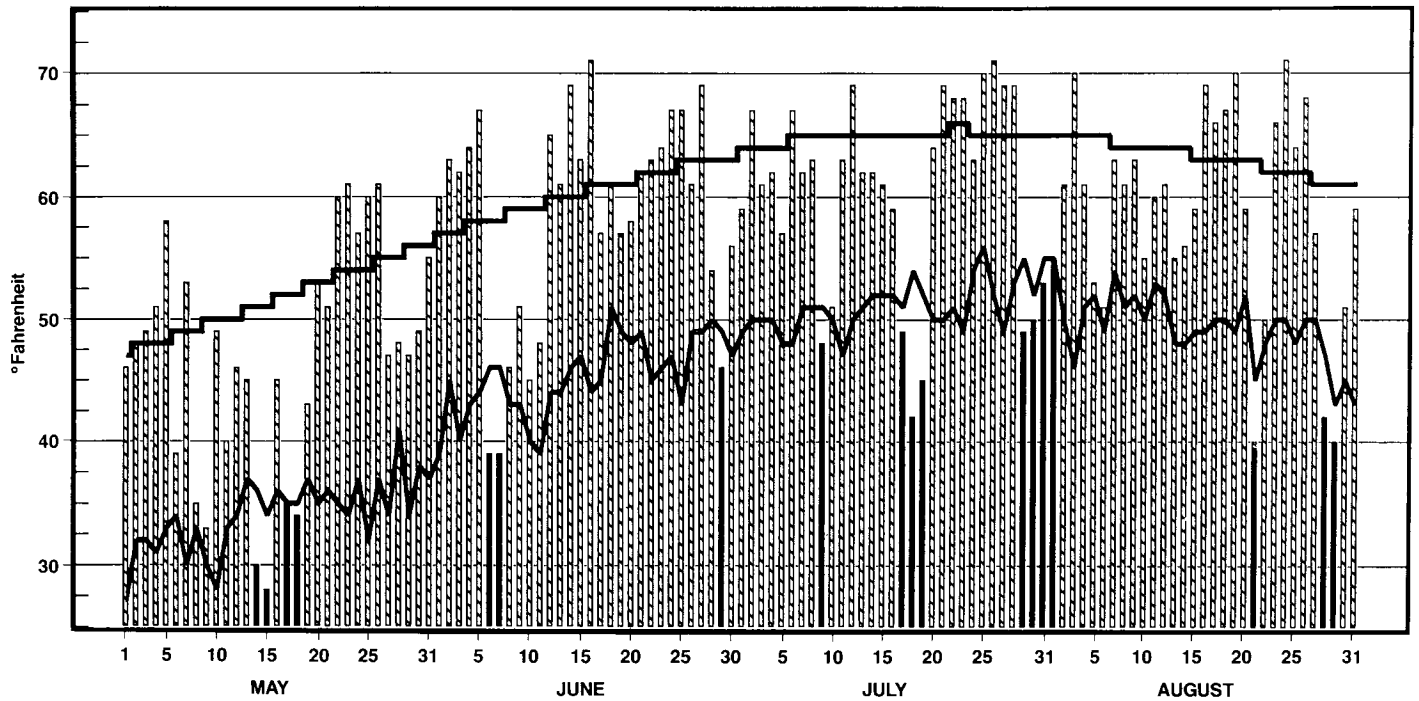
Severity of Early Cincinnati Winters as Classified by Dr. Daniel Drake M.D.

"That our climate has undergone a change, is a popular, and with many, a favorite opinion," wrote Dr. Daniel Drake in his *Notes on Cincinnati* (1810). To evaluate these climate-change rumors, Drake studied the scant oral and written record of the seasons in Cincinnati. Drake found little outstanding on summers, springs, and autumns, but he was able to characterize the following winters:

Winter	Character	Comments
1785-'86 through 1789-'90	All Mild	31 Aug. 1789, frost Indian Corn injured.
1790-'91	Mild	18 Feb., 11 inches of snow
1791-'92	Severe	Jan. snow 24 inches, - 7° 23 Jan.
1792-'93	Mild	
1795-'96	Very Mild	
1796-'97	Very Severe	Coldest Winter since settlement 8 Jan. - 18°, below 0° four more times, Ohio River frozen 4 weeks Last frost May 22.
1798-'99	Severe	
1799-'00	Mild	
1803-'04	Severe	
1804-'05	Severe	
1805-'06	Mild	Lowest + 9°
1806-'07	Severe	Lowest - 11°
1807-'08	—	Lowest - 4°
1808-'09	Severe	2 Jan. + 2°, 24 Jan. + 10°, Jan. range 2°-47°, average 25.1° Feb. range 13°-60°, average 34.2° Lowest - 2°, Last frost 1st week of May Precip. Jan. 4.6 inches, Feb. 5.6 inches
1809-'10	Mild	Frost 9 Aug. 1809 Dec. range 11°-62°, average 35.9°, precip. 6 inches Lowest - 7° (twice) 16 Mar. 5 inches snow, wind from S.E.

Drake concluded: "the temperature of our climate is now nearly the same as it was 15 years ago. . . . If however, these conclusions be rejected, and our winters and summers still be considered more intense than formerly, the cause must be sought in the partial felling of our forests, which admits the N.W. and S.W. winds, the principal sources of cold and heat, to move with increased velocity. . . ."

thermometer changed this day for one of 2.



NORMAL (UPPER LINE) TEMPERATURES AND RECORDS for May through August superimposed on Isaac Jackson's sunrise temperatures for that period in 1816; 18 record lows (listed below) may have been set or equaled that summer, more than in any year on record.

Date	Jackson's 1816 Sunrise Temp (°F)	Official Record Low (°F)*
5/14	30	36/1920
5/15	28	34/1973
5/17	35	35/1973
5/18	34	35/1973
6/6	39	46/1910
6/7	39	46/1977
6/29	46	49/1923
7/9	48	51/1918
7/17	49	51/1976
7/18	42	54/1924
7/19	45	52/1984
7/29	49	55/1928
7/30	50	52/1965
7/31	53	55/1965
8/1	55	55/1971
8/21	40	45/1950
8/28	42	47/1986
8/29	40	43/1986

*Year indicates date record was set.

River Valley and Cincinnati in 1810. He published this survey of geology, topography, and climatology, titled *Notices Concerning Cincinnati*, at his own expense.

Drake based his survey of early Cincinnati winters on "... conversation with numerous intelligent persons long resident on the Ohio and ... an abstract of meteorological observations, politely provided by Governor Sargent, formerly of this town."

He accurately characterized Cincinnati winters when he wrote:

The snow which does fall seldom lies very long, nor are our streams covered long with ice, for our winters are nothing but a succession of mild and intensive severe weather . . .

Drake also wrote about typical weather based on the direction from which the wind blew. His generaliza-

tions describe what are now recognized as typical cold and warm frontal weather. He wrote, for example:

The S.E. is one of the principal winds of this country . . . it seldom brings thunder but precedes and attends moderate continued rains.

This is a clear description of the steady rains caused by gentle lifting along a warm front.

About the northwest wind, Drake wrote:

. . . in 9 cases out of 10 it is the harbinger, and indeed the cause of clear weather. . . .

Without a doubt he was describing the approach of an anticyclone following a cold front.

Notices Concerning Cincinnati is quite remarkable for a scientific work written on the American frontier in 1810. Drake even briefly dis-

February

Reuben Farnsworth

Days	Temperature	Wind	Remarks
1	36 1/2	East	Overcast - ^{slight} snow AM. Fair but moist P.M. Slight snow again evening. (East)
2	38	S E	clear
3	37	S S E.	S: till 11 AM. Overcast with a ^{little} rain and light snow, ^{between 11 AM and 12 PM} when it became heavy at times. Overcast with much snow when it became heavy at times.
4	52 1/2	East	Overcast, cloudy & rainy A.M. & without rain P.M. Rain at evening and night.
5	55	Calm	Overcast and ^{especially on the river} misty.
6	59 1/2	East	nearly calm. Foggy morning. Overcast P.M. Some rain began to fall at 2 P.M.
7	58	East	nearly calm - Great fog on the river - raining at times - and ^{part of the night} rain all ^{day} - raining all last night.
8	45	E N E	A slight snow fall now and then during the day - Icebergs formed this morning on ^{lower} river. The Ohio has risen 13 feet here 2 days (22°C) at ^{lower} Cincinnati, great wind.
9	32 1/2	W.	Some snow A.M. cloudy with sunshine P.M. River rose 8 feet last 24 hours. The water discolored as usual in such cases. A number of ^{icebergs} ^{of 100 ft. diameter} ^{fell down} at ^{lower} Cincinnati last night.
10	28	N. W. W.	Clear. River rose 8 feet last 24 hours - Smart frost last night, mostly in morning.
11	38 1/2	South	Clear and pleasant - River rose 3 ft.
12	45	Calm	Serene & pleasant - River rose 2 feet.
13	54	W. S. W.	Cloudy all day and ^{some} rain fell to the river, ^{grew strong} P.M. Snow hard at ^{lower} Cincinnati.
14	49 1/2	Variable	Cloudy A.M. Clear P.M. Strong wind all ^{last} night and this day. A little snow in the morning.
15	22	N. W. W.	Serene and pleasant - Hard frost last night.
16	20 1/2	N E - W.	Some a steady snow of small flakes all day and ^{part of the} snow ^{early} began early this morning. I fell ^{at} 11 inches thick which is by far the most that has fallen at one time during the winter, or since the settlement of this place, or since Fair - but overcast or cloudy.
17	23 1/2	East	Serene and pleasant.
18	30	North	Serene and pleasant.
19	36	S S W.	Serene and pleasant.
20	36	S S W.	Serene and pleasant.
21	36	S S W.	Serene and pleasant.

the daily Cincinnati weather record is nearly complete back to January 1, 1814.

On July 13, 1813 Isaac H. Jackson, a native of Philadelphia and later a New York businessman, moved to College Hill, Ohio, in Green Township, five miles north of Cincinnati

For May through August 1816, the daily sunrise temperature at College Hill set or equaled a minimum temperature record 18 times.

and now within the city limits. There he began recording the temperature at sunrise, noon, and sunset on January 1, 1814 and did not miss a day through the end of 1848. Jackson's daily observations are quite valuable because no other weather records have yet been found that could show if the abnormally cold weather of 1816—the "Year Without a Summer"—extended as far southwest as the Ohio River Valley. According to David Ludlum (private communication), Jackson's diary is the westernmost set of daily weather observations for that period of American history.

"The Year Without a Summer" in Cincinnati

Cincinnati's winter started early in December 1815 as two major arctic air outbreaks dropped sunrise temperatures to single digits on three mornings. Snowfall totaled 6 inches (15.2 cm) for the month.

In January 1816 mild weather was interrupted by two more blasts of

cusses three topics of current concern to meteorologists: the effects of deforestation on weather, the urban heat island effect, and climatic change.

According to Drake no "pluviometrical" (precipitation) measurements were made in Cincinnati prior to 1809, and as of 1810 no "barometrical" observations had yet been made. *Notices Concerning Cincinnati*

is the only surviving source of weather information for many early years in the Northwest Territory.

An Exciting Find

The most exciting discovery I have made to date in my quest for Cincinnati's weather history was finding the weather diary of Isaac H. Jackson in the archives of the Cincinnati Historical Society. With Jackson's diary,

its scale and corresponding with

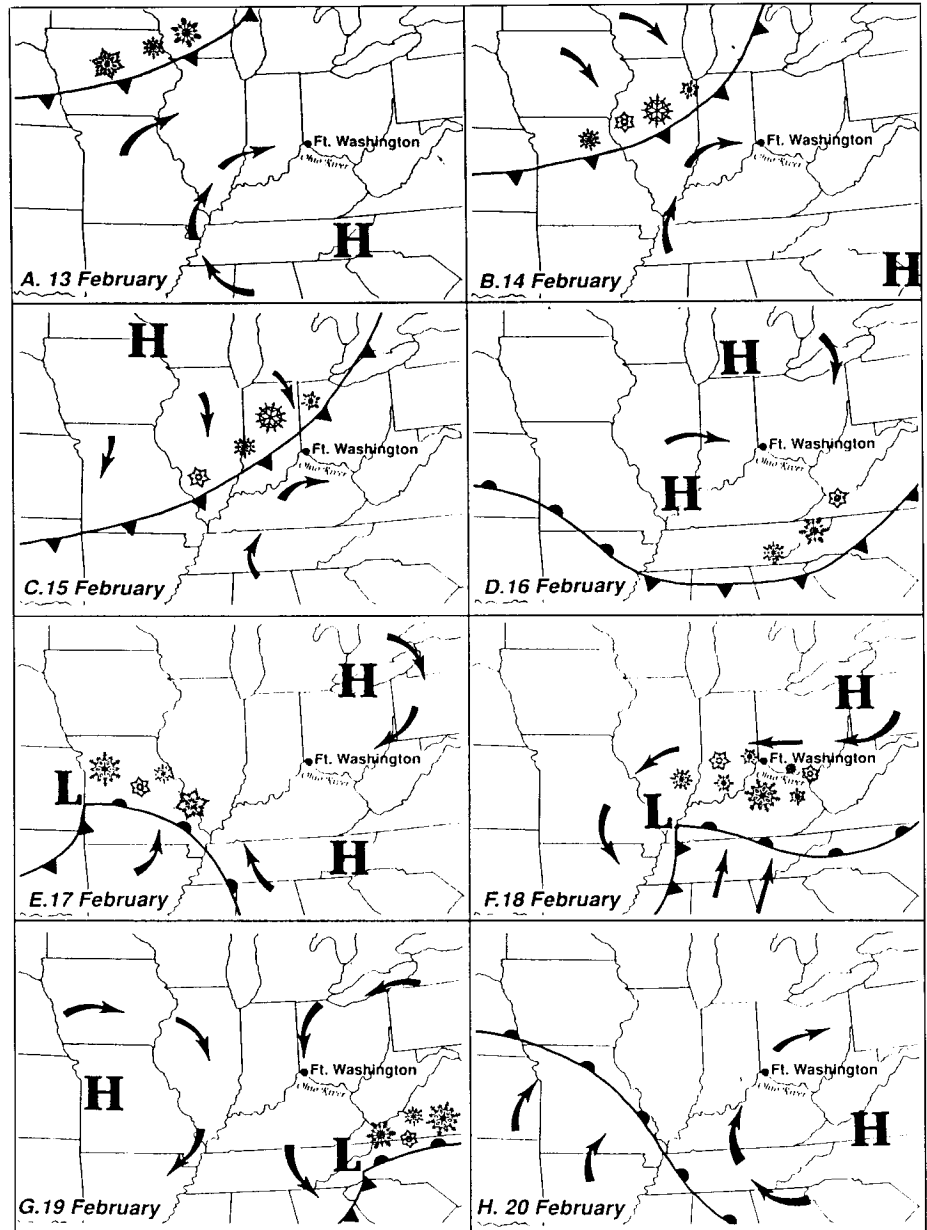
arctic air. On three mornings sunrise temperatures were below 0°F (-18°C) and on three others they were in single digits. The big event was a single-snowstorm accumulation of 15 inches (38.1 cm) on January 11. Easterly winds dominated, so it was probably another overrunning situation similar to the 1791 storm.

February began with 2 inches (5.1 cm) of snow and another inch (2.5 cm) fell the next day. During the first half of the month the temperature hovered near 0°F (-18°C) on five mornings, but from mid-February until mid-May the weather was mild. As a matter of fact peach trees were in bloom on April 7, as noted by Jackson.

Five weeks after the peach blossoms appeared, the weather took a dramatic turn. On May 14 a hard frost killed blossoms on beam, papaw, and peach trees. "Apple blossoms," wrote Jackson, "were mostly destroyed." And more cold was yet to come.

For May through August 1816, the daily sunrise temperature at College Hill set or equaled a minimum temperature record 18 times. No year since has even come close to having such a cold summer. In the modern record, for example, 1963 and 1972 were outstanding cold years, but they had only 10 and 8 record minimum temperatures respectively for the same period.

Another way to evaluate the severity of the cold is to look at the average temperature for each month. Recall, however, that Jackson recorded sunrise, noon, and sunset temperature. During summer, the minimum temperature most frequently occurs near sunrise. Noon, however, is too early and sunset too late for the maximum temperature. The average of Jackson's three readings therefore has a cold bias.



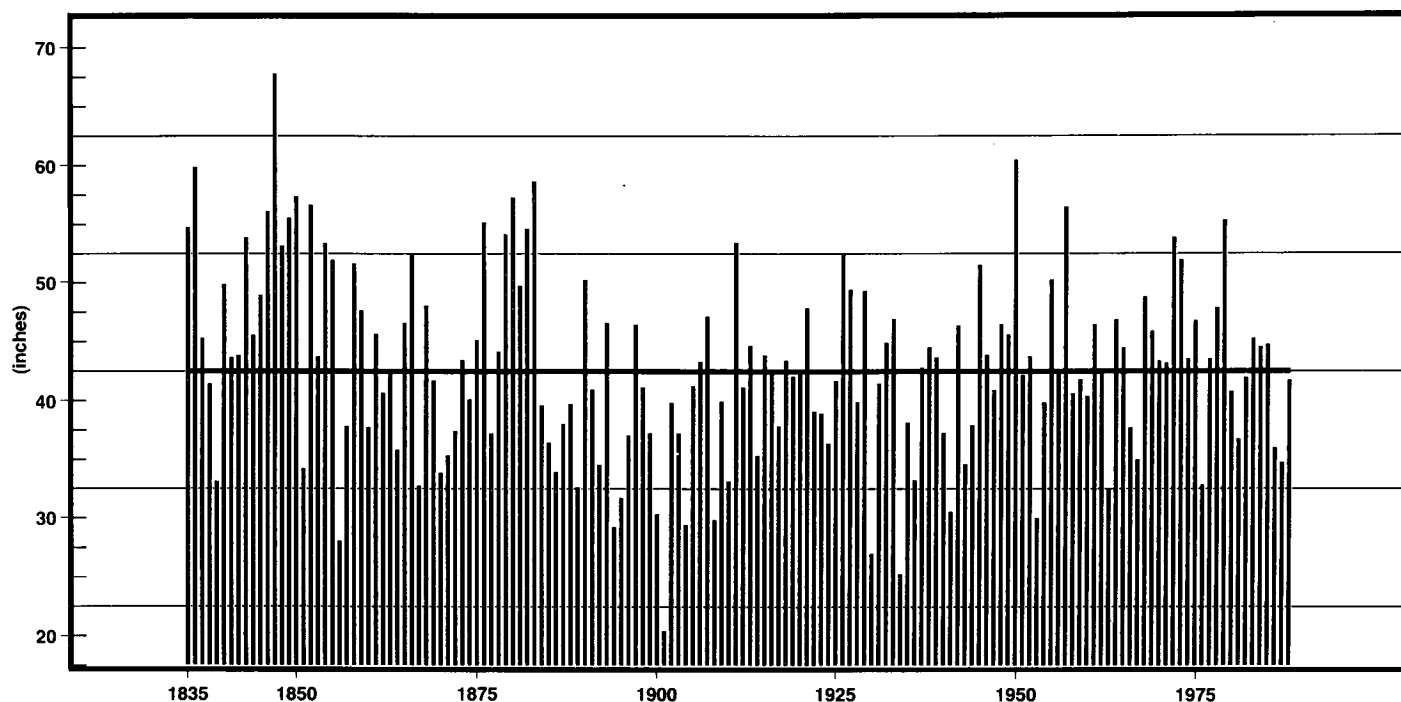
A RECONSTRUCTION OF LIKELY CINCINNATI WEATHER SYSTEMS from February 13 to February 20, 1791. Although fronts and pressure systems cannot be placed exactly, a general idea of the likely weather sequence can be gained from Fort Washington's observations.

The next best measure available is the average minimum temperature for each month and for the entire 4-month period. The average daily sunrise temperature for May through August 1816 was 56.2°F (13.4°C), 3.9°F (2.2°C) colder than the 1951-1980 normal minimum and 2.1°F

(1.2°C) colder than 1917, the coldest modern year.

Before this evidence can be accepted as proof the cold weather that plagued New England in 1816 extended as far southwest as the Ohio River Valley, however, additional investigation must be undertaken re-

as used in the Atlantic States — for 60



ANNUAL PRECIPITATION FOR CINCINNATI, OHIO, 1835-1988.

garding Jackson's thermometer. For example, could the thermometer possibly have been located in a shallow depression subject to cold-air drainage? If so, its temperature readings would have been colder than readings made in the surrounding air.

Other Weather Watchers

Demand for land in rapidly growing Cincinnati forced the relocation of Fort Washington across the Ohio River to Newport, Kentucky, in 1804. A meteorological register was kept there and portions from 1825 to 1828 have survived; the record is complete from 1847 into the 1890s.

The *Cincinnati Inquisitor and Advocate* of August 4, 1818 reported a great heat wave in the East. For comparison the paper listed days in Cincinnati that summer when temperatures exceeded 90°F (32°C). The observations were made by Pey-

ton S. Symmes, using a thermometer located "in" his office, and compare favorably with the records kept by Jackson in College Hill. (Peyton Symmes was the Register of the Congressional Land Office. His weather records may well be in the Library of Congress.)

Two important Cincinnati weather observers were sponsored by the Smithsonian Institution. Professor Joseph Ray and city engineer R. C. Phillips both kept detailed records. The observations of Ray and his successors are mostly complete from 1835 until 1886. Phillips made his observations from 1859 to 1871.

Another major weather diary was kept by prominent produce merchant John Mahard at his home in the northeast corner of the city. He recorded the temperature as many as five times a day from 1834 until his death in June 1846. His diary is now

the property of the Public Library of Cincinnati and Hamilton County.

The weather diaries of Jackson, Newport Barracks, Ray, Phillips, and Mahard, added to official observations, comprise a nearly continuous record of temperature from January 1, 1814 through the present (only December 1831 and December 1832 are missing). The record of total annual precipitation is complete from 1835 through the present.

I now have on file 64,659 of the 73,358 days of Cincinnati's weather history—only 8,699 more to go! □

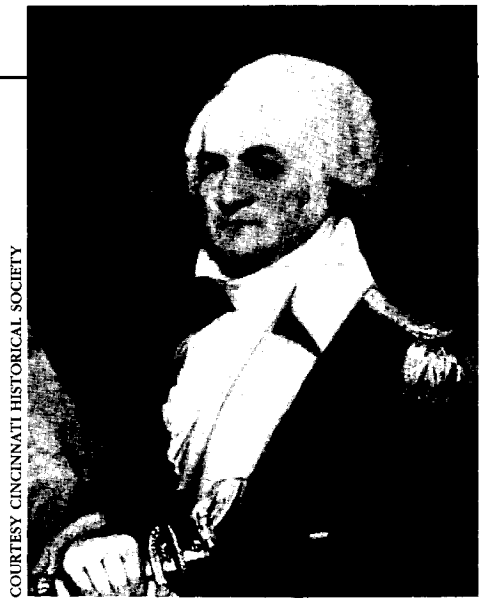
For Further Reading

Hughes, Patrick. "The Year Without A Summer," *American Weather Stories*. Washington, D.C.: Government Printing Office, 1976.

Stommel, Henry, and Elizabeth Stommel. *Volcano Weather: The Story of 1816; The Year Without A Summer*. Newport, Rhode Island: Seven Seas Press, 1983.

imprecisions there and Sabary Diff. See M. S.

TIPS FOR YOUR OWN SEARCH



COURTESY CINCINNATI HISTORICAL SOCIETY

YOUR LOCAL LIBRARY, university, or historical society may have historic weather diaries of prominent citizens like Winthrop Sargent, first Secretary of the Northwest Territory and dedicated weather observer.

Compiling your own local weather history is exciting, rewarding, and a valuable contribution to meteorology. If you would like to be a weather historian for your community, I offer the following tips:

1. Obtain David Ludlum's four-volume series on the history of American weather (Ludlum, 1963, 1966, 1968, 1970). Most of the groundwork has been done by Ludlum and many references are listed.

- Ludlum, David. *Early American Hurricanes: 1492-1870*. Boston: American Meteorological Society, 1963.
- . *Early American Winters: 1604-1820*. Boston: American Meteorological Society, 1966.
- . *Early American Winters: 1821-1870*. Boston: American Meteorological Society, 1968.
- . *Early American Tornadoes: 1586-1870*. Boston: American Meteorological Society, 1970.

2. Write to the National Climatic Data Center, Federal Building, Asheville, North Carolina, and ask for a list of weather diaries available for your area.

3. Become familiar with local history. Prominent people kept diaries, and many of these are now in local archives.

4. Familiarize yourself with local archives. The historical society, public library, and local universities may all have important diaries.

5. Be organized. I use eight files categories: local people, regional people, local places, regional places, events (snowstorms, heat waves, etc.), years (one file for each year), references by date, and references by location.

6. Record all observations. Multiple observations permit checks on accuracy and local variations.

7. Be persistent. There will be days when you make no discoveries. But when you find a forgotten snowstorm or tornado the rewards will be great.

Early newspapers can be another source of weather data. Be warned, however, that because of their lack of organization, weather information is often very hard to find and your search could consume many tedious hours.

COURTESY CINCINNATI HISTORICAL SOCIETY



CINCINNATI
TUESDAY, AUGUST 4, 1825

Threats.—A very formidable one of complaint at this time in Cincinnati is the present total dearth of public amusements. Indeed, it will hardly be credited abroad, that a town containing almost every thing and every body, does not afford a solitary place of fashionable recreation; and it is with little reluctance that we admit such to be the fact.

...to be invited by the most refined and intelligent communities of different nations; and we think that it would puzzle even the most fastidious skeptic to designate wherein they have suffered injury by its effects.

Our remarks have already exceeded their intended limitation, and we now take leave of the subject by again recommending it to the consideration of those persons who have it in their power to accomplish the project.

The reader for a few weeks past has been extremely opposite. We perceive by the case papers, that a great number of persons in New York, Boston, Philadelphia, Baltimore, and various other towns, have come to instantaneous death by imperceptibly drinking large draughts of cold water when the body was overheated by the heat of the sun.

It is stated that the mercury in Fahrenheit rose to 100 at the shade, on the 28th of June, at Hartford, Conn.—to 100 on the 12th July, also in Washington City—and at that

...the Inquisitor has been informed.

INQUISITOR, FOR THE YOUTH.

That great man appears best at a distance, has long been an established maxim with those who possess much knowledge of mankind. For such comparatively, will bear a near approach. A story is told of General Washington and a simple country lad, during one of the General's visits to New England. The youth had often heard the name of Washington, and his fame as a warrior. His little bosom beat with impatient anxiety to see, what his imagination had pictured, a superior being. He rushed through the crowd, loudly inquiring, where is General Washington? which reaching the General's ear, he pleasantly observed to the boy, that himself was the person. Struck with astonishment, the boy exclaimed, "It is nothing but a man!" His disappointment was heightened by a view of the multitude around him, who, for aught he could see, both in their dress and their actions, had the same claim to his attention and admiration. Similar impressions, though, perhaps in every instance not so strong, are made upon the minds of even the best informed of the present day. It may not be so

...the Colman's papers state, that Duncan McArthur is a candidate for the office of Governor, of the coming election.

INTERESTING TO MERCHANTS.
(Continued from the Inquirer.)

New Orleans, 3d July, 1818.

Since we had the pleasure to address you with our printed communication of 23d May last, we have not (in consequence of the wariness of shipping) experienced that animated demand for produce we usually do at this period of the year—and as the season is now so far advanced, we cannot with any degree of probability look for much improvement.—The stock of the principal articles of export, however, is not by any means large, and even with a moderate arrival of vessels, we can only look forward to our markets being cleared before the ensuing fall season commences.

Genoa.—The stock of all descriptions of this article, compared with that of the same period last year, is very trifling, particularly prima qualities, which readily command 52 cts.—inferior and second qualities would likewise meet with ready

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