

and one chief dependence must be upon the birds, which seem to detect its presence readily, and which seldom fail to extricate it from the sod, by a few vigorous pecks.

NOTES OF A REMARKABLE STORM.

BY GEO. B. WRIGHT.

(*A Paper read March 7, 1876.*)

The 18th day of July, 1867, will long be remembered by those persons who were, at the time, in the region comprising the counties of Pope, Douglas and the western part of Stearns, in this State.

I was, at the time, engaged upon the government land surveys in the western part of Pope county. The storm did not extend eastward as far as Minneapolis, and the only effect here was a sudden flood in the river, by which booms were destroyed, and about fifty million feet of logs were carried over the falls. The flood came mostly from the Sauk River. As I have never seen any printed account of the storm, which stands, I believe, in the amount of rainfall, without a parallel in temperate climates, I take this opportunity to call your attention to it. I shall confine myself mainly to the incidents which came under my personal observation, of the storm and its effects. We had been for several days surveying along the Chippewa river, a tributary to the Minnesota. This was in T. 124, R. 40, about 15 miles S. W. of Glenwood, county seat of Pope county. The Chippewa there is a creek from 12 to 20 feet wide, and varying with the rapidity of its current, from 1 to 3 feet

in depth. On the 16th of July I forded it several times at different points. Our camp was on the high land between the Chippewa and Pomme de Terre rivers, on the east shore of a lake, in Sec. H of Hancock. We were about four miles west of, and overlooking for several miles, the valley of the Chippewa, and about 5 miles to the east of the parallel stream, the Pomme de Terre, and our elevation about 110 feet above the latter, and 150 feet above the former stream.

The storm commenced about noon of July 17th, with some thunder and lightning and a little wind. It seemed to form in that vicinity, and I have no clear recollection of its commencement, except that the sky clouded up and that it began to rain.

There were no unusual features in the storm except the great amount of rainfall. Our camp was in a high exposed place, under tall cottonwood trees. There was little wind and no unusual electrical display. The rainfall from being moderate at first continued to increase during the night. It was not till morning we became aware of the enormous quantity of rain that was falling. It continued by the hour, pouring down as is frequently the case for five or ten minutes at a time, during the passage of a violent thunder shower. About 9 o'clock A. M. there began to be perceptible lulls in the storm, which increased until the steady rain was broken into showers, which continued with brief intervals all day, closing up with a heavy one just before sunset. The storm lasted about 30 hours. Further north and east it is reported to have continued for 36 hours. Early in the day, in the first lulls of the storm, we saw the Chippewa Valley before us one broad sheet of water as far as the eye could reach. When the storm ceased the upland ridge on which we were camped was shedding torrents of water into that valley. Within 40 rods of the summit every line of drainage carried a foaming mill stream. Some of these streams—not far from their sources—were, even a week after the storm, not fordable and in another week had disappeared altogether. The Chippewa spread from bluff to bluff, nowhere less than 50 or 60 rods, and in places 3 or 4 miles in breadth, and

it did not get fully into its natural channel again till October, leaving even then wide lagoons on either side.

The Pomme de Terre fell much more rapidly, whence I infer that the heaviest part of the storm was farther east.

Four weeks afterward we crossed the Chippewa at the old ford, a party of freighters having arrived from Sauk Centre with a boat. The water was then at that point—a narrow place—some 40 rods wide, 2 to 6 feet deep on the flood plain and perhaps 15 or 20 feet deep in the channel.

The waters of all the lakes of that region of country which before that storm were at a very low mark, had suddenly risen to full bank. The rise varying from 2 or 3 to 10 or 12 feet in the course of 2 or 3 days, time. The weather that followed was hot. The atmosphere a constant steam, both the saturated earth and the broad sheets of warm water that spread everywhere over the surface poured forth volumes of vapor and larger volumes of mosquitoes.

In 20 years of camping experience I think I saw and felt ten times more of mosquitoes between July 25th and October 1st, 1867, than in all the balance of the time together. The sun shone out of a coppery sky, and the hot heavy vapor in the air could be seen and felt everywhere and all the time. Our provisions had not been injured by the storm, the heavy double covers of the wagons (canvas tops) having protected them, but sugar melted and ran out of the barrels under the influence of that steam bath, and clothing mildewed and rotted in spite of all the air and sunshine we could give it. It was just such a summer as one might find in Central America or along the Orinoco River.

Of the actual fall of rain I have no means of estimating. The people of Sauk Centre, Osakis and that vicinity, claim with great unanimity that it exceeded 30 and probably reached 36 inches. I have heard it stated by several of them, reliable persons I believe, that empty barrels, standing where they could catch no drip or anything but the average rain fall, *filled and ran over before the storm ended.* One very intelligent farmer at Westport, Pope Co., told me that a large kerosene cask, empty, standing on the prairie some

rods from any building, filled from $\frac{2}{3}$ to $\frac{3}{4}$ full. The heaviest part of the storm was, as the various facts I have stated would indicate, probably further north and east than Westport, and I think it probable that the rainfall in some places reached nearly 30 inches in as many hours, or as much as the average *annual* deposit of rain and snow in the same region of country, something I believe entirely unparalleled in the records of this State or of this latitude anywhere.

The *geographical extent of the storm* is also unknown to me. I have heard that it did not reach Fort Wadsworth, Dakota, and was light at Big Stone Lake.

The records of Forts Wadsworth and Abercrombie will no doubt settle that point.

In this direction it did not extend to Minneapolis, but I have been told that it did reach St. Cloud, and that Sam. Lawrence reported tremendous rains on the Upper Mississippi at or *about* that time. He might perhaps be able to give the exact date. All the western tributaries of the Mississippi were at flood tide, but those tributaries mostly rise in the high plateau of Pope, Douglas, Stearns, Todd and Otter Tail counties, where we know the storm was very violent. In September, 1867, I traveled north as far as Otter Tail river. The Chippewa and Pomme de Terre showed signs of unusual flood to their very sources, and for miles were barely fordable on the 10th of September—nearly 2 months after the storm—where at ordinary high water they would scarcely be knee deep. But passing a few miles further—to the Otter Tail—which I found then high but not remarkably so, I saw no traces of flood. The water had been a little higher only. That stream, however, is one that rises and falls very slowly and comparatively very little.

There were at that time no settlements northward of the old St. Cloud and Abercrombie stage line, nor much westward of Alexandria, except the stage stations and military posts. The streams so far as I know that showed the highest floods, are (in order named) the Sauk, Chippewa, Long Prairie and Pomme de Terre. The first three rise in Douglas and the latter one in Otter Tail county, all in the circuit of a few miles. If the particulars of the storm, its

extent, characteristics and amount of rain fall have not been previously recorded, I believe your committee will do valuable service by collecting and presenting them to the scientific world. I would suggest as persons from whom information might be obtained the names of the Hon. H. C. Wait, of St. Cloud, (who had a mill on the Sauk that weathered the flood); Alexander Moore, Esq., Sauk Centre (whose mill was destroyed); Hon. W. Adley, (at that time of Osakis) Register U. S. Land Office, Alexandria; Hon. F. B. Van Hoesen, Alexandria; Hon. H. C. Burbank, (now of St. Paul, but who then was engaged in the freighting to the frontier forts); William McArthur, Otter Tail City; Sam'l. Lawrence, Minneapolis, and Saml. Brown, son of Hon. I. R. Brown, Brown's Valley (Head of Lake Traverse). The records of the forts above named which forts were to the west perhaps of the whole storm, are I presume the only authentic *records* of rainfall in all that country, but I doubt not patient inquiry among the old settlers will give approximately the extent and quantity of rainfall of this remarkable storm.

METEOROLOGICAL STATISTICS.

BY WM. CHENEY.*

The following statistics are the result of personal observations taken daily, at 7 A. M. and 2 and 9 P. M., and extend over a period of more than eleven years, beginning with Nov. 1st, 1864.

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