



One of the tornadoes developed in eastern Missouri and entered Illinois near Alton in northwest Madison County about 6:15 p. m., and dissipated in the vicinity of Litchfield about 6:45 p. m. This storm was 500 feet to one-fourth mile in diameter and did damage over a strip of territory approximately 30 miles in length. No one was killed, but more than 100 residences and several public buildings were damaged, mainly in Alton and Bunker Hill. The total damage of the storm was estimated at about \$315,000.<sup>1</sup>

Another small tornado made its appearance near Glen Carbon, Illinois about five miles south of Edwardsville at 6:45 p. m., and moved northeast about six and one-half miles before dissipating. Its path was 600 feet to one-half mile in width. No one was killed but damages were approximately \$75,000. While this storm covered only a small area, it did damage to orchards, live stock, rural buildings, and one grade school. Other isolated storms reported as having funnel-shaped clouds appeared in Sangamon, Christian, Macon, Champaign, Randolph, and Wabash Counties, Illinois. Several of these storms caused some damage, but their importance sinks to insignificance compared with the serious damage of the major storms.<sup>2</sup>

**Major Tornadoes. Columbus, Kansas.**—The first of the two major tornadoes of the day occurred shortly before noon. Originating in northern Oklahoma, it reached its most destructive violence at Columbus, Kansas and dissipated in the vicinity of Humansville, Polk County, Missouri about one o'clock in the afternoon. It covered a path about 35 miles long in Kansas and perhaps as great a distance in the other two states. The following quotation describes the damage of the storm: "One of the most destructive storms known in Kansas. Originated in Oklahoma, and ended in Missouri. Chief Kansas damage was at Columbus, where 10 persons were killed, 150 injured, and 180 residences demolished or greatly damaged, and 45 other buildings including Highland School damaged or demolished."<sup>3</sup> The average width of the storm was 400 feet, and property damage in Kansas was estimated at \$575,000.

**The Major Illinois Tornado.**—The most destructive tornado of the day developed in Illinois southwest of Kellerville in east-

ern Adams County and moved northeastward, passing near Astoria and Havana, through South Pekin and south and east of Eureka. Figure 1 shows the path of this storm and the location of the other tornadoes. The following quotation gives in detail the location of the storm path, its approximate width, and rate of speed, as well as other interesting details.

"The tornado left a path of damage varying from one-eighth of a mile to more than one and one-half miles in width and extended approximately 115 miles almost due northeastward from point of apparent origin. It has been calculated its average progressive speed was about 48 miles per hour. The storm passed one-half mile north of Kellerville, going between Timewell and Mt. Sterling about 3:30 p. m., through the south portion of Rushville at 3:50 p. m., reached Astoria 4:10 p. m., thence passing about four miles north of Havana about 4:30 p. m., through South Pekin about 5:00 p. m., about three-fourths mile south of Eureka about 5:20 p. m., and lifting a few miles to the northeastward. The storm killed 13 persons, nine at South Pekin, two at Morton, and one each at Astoria and near Kellerville, and injured nearly 75. Property damage for the entire area is estimated to be about \$1,000,000. A responsible party asserted he positively observed momentary separation of the base of the funnel cloud over Rushville, and the writer noted two definite and parallel paths of damage with a narrow strip between unaffected."<sup>4</sup> Mr. M. L. Fuller, the Weather Bureau Meteorologist at Peoria furnished the following: "The path of damage at South Pekin was more than one-fourth mile wide and probably approached one-half mile, but as it took in the whole town the edges were not distinctly marked. Numbers of trees were blown over; directions differed but without noticeable overlapping as from different directions in succession. About all the trees that remained standing showed violent whipping. Apparent violence was much less than that reported of some tornadoes. The east-west high line northeast of Pekin lost three towers, a spread of 1800 feet, and less damage to two adjacent towers, bringing the total damage width to about two-thirds mile. Some observers beyond South Pekin on either side of the path reported 'tails' of funnels

hanging from main funnel or main cloud. An anemometer near Pekin, three miles from the path, recorded gusts of about 50 miles per hour from the northwest, and a barograph at that point recorded no unusual barometric effect."

*The Width of the Illinois Storm.*—Apparently the width of the storm varied considerably from place to place as shown in the quotation above from the Springfield office of the Weather Bureau. South Pekin is located east of the Illinois River on sand hills of the flood plain. The bluffs bordering the east side of the valley are about a mile distant and are well wooded. Where the tornado passed through the timber land on the bluffs the destructive path was from a mile and one-half to two miles in width. Near the southern margin of the storm path, (see Fig. 2) trees lay in a parallel direction pointing toward the northwest. A barn was completely destroyed across the road to the south. The center of the storm, however, passed as much as a mile to the northwest. The path of the storm was crossed at several other places and

the width varied from one-fourth of a mile or even less to as much as a mile.

The storm apparently blew itself out or lifted at a point about midway between Eureka and El Paso. A small gas station standing on the concrete highway was partially unroofed, and this appeared to be the last destruction of the storm as it passed off in a northeasterly direction. The path of the storm at this point was narrow, probably not exceeding an eighth of a mile.

*Destructiveness of the Tornado.*—Many buildings were wrecked completely, while many others were unroofed, shifted on their foundations, or otherwise seriously damaged. In much of South Pekin all of the buildings were completely wrecked. Freight cars were overturned in the freight yards, and some live stock was killed in the adjacent rural districts. The storm does not appear to have been as severe nor the wind velocity so great as that of many other tornadoes. However, its destructiveness was severe over wide areas in both city and rural districts.

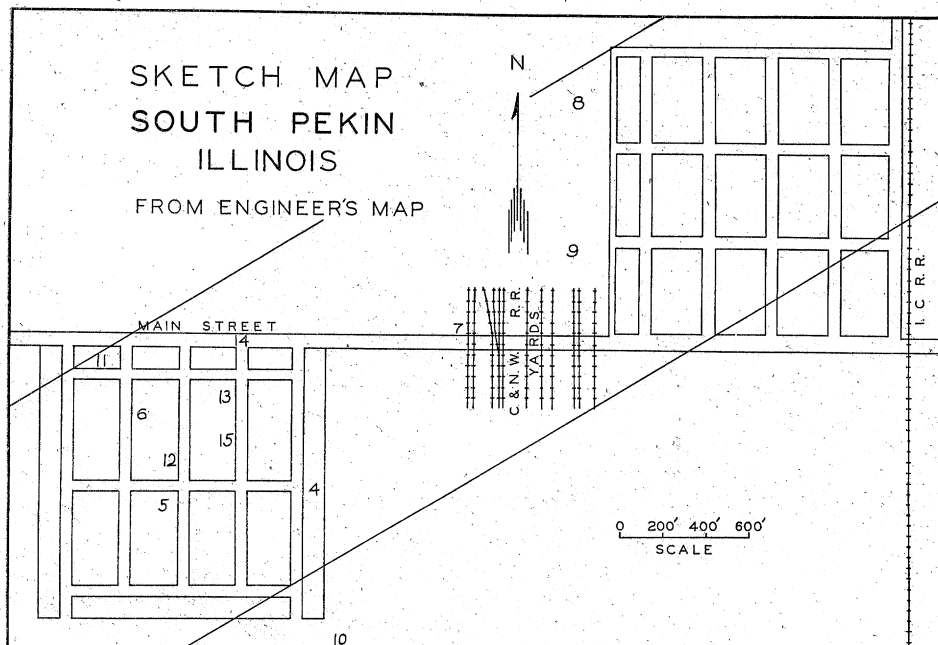


Fig. 2.—Sketch map of South Pekin, Illinois, showing path of the tornado between heavy parallel lines. Strong winds prevailed and some damage was done outside the parallel lines. Numbers on the map show the location of various places described in manuscript.

The accompanying map, Fig. 2, shows the general layout of South Pekin. It so happens that this railroad town was laid out with the section of the city west of the railroad lying in a southwesterly direction from the portion east of the railroad. The tornado struck the city almost centrally and passed over it from the southwest toward the northeast, completely demolishing almost the entire city. It is difficult to see how it could have been plotted mathematically to have wrought greater destruction, granting that the width of the storm remained the same. In the southeast and northwest portions of the west section of the city a few buildings remained which were damaged but not destroyed. These were apparently on the very margins of the storm, although people were killed within a short distance of these corners of the city. The southeast portion of the east section of the city was damaged less than other portions of that section. This corner apparently was on the southeast margin of the storm, although it had considerable force even to the south of the city, as evidenced by the effect in an adjacent cornfield across the road to the south, where the corn stalks had been almost completely blown from the field. From a distance one could lay a definite line marking the edge of the storm where it had picked up the corn stalks. This margin of the storm was not sufficiently destructive to blow down buildings because the houses on the north side of the road across from the corn field were not destroyed.

Stable structures in the city seemed to have been destroyed as badly as smaller buildings. The water tower supported upon a steel framework was blown down, and the brick school building was a complete wreck, no part of it standing more than 10 to 15 feet in height. (At Nos. 4 and 5, Fig. 2.) A large brick church, the brick railroad station, and the brick buildings of the railroad repair shops were completely or partially demolished (at Nos. 6, 7 and 8, Fig. 2). One of the interesting sights was the ice house, in which the building was completely blown away leaving the blocks of ice exposed (at No. 9, Fig. 2). Apparently the blocks of ice were frozen together in a solid mass and none of it was moved.

Even much of the sawdust remained on the ice because it had been frozen to it.

Extensive search was made in different parts of the storm path to determine if the debris along the margins of the path of the storm pointed in toward the center, thus indicating the twisting character of the storm. The evidence was unmistakable all along the course of the storm showing that this was true.

Careful study was made of the location of the debris in demolished buildings. In most instances the debris was shifted toward the east and north sides of the foundations and in many cases the southwest part of the basement had little or no debris in it (at No. 12, Fig. 2). There was little debris in the southwest corner while most of the remainder of the basement was filled with wreckage. This may well be considered evidence that the southwest corner of the basement is probably the safest place in the house if the storm comes from the southwest, as most tornadoes do.

**Weather Map.**—The weather maps studied show an interesting succession of changes of pressure and temperature conditions throughout the day of March 30. At 7:30 a. m. the map shows an elongated low pressure area which was central over the Texas Panhandle with the long axis extending from the northeast toward the southwest. The lowest barometer reading on the morning map was 29.40 inches. Lying to the south of the wind shift line was a mass of Transitional Polar Pacific air (NPP) while to the east and to the south of the wind shift line was a mass of Tropical Atlantic air (TA). On the southern margin of the NPP air mass was an area of Upper-Air Subsidence (S).

A second low pressure area was central over North Dakota and the Canadian border, which was characterized by Polar Continental air (PC) while in the east and northeast margins there were areas of Transitional Polar Pacific air (NPP).

By 1:30 p. m. the low pressure area over the Canadian border had remained stationary while the one over the Texas Panhandle had moved rapidly toward the northeast and centered over northeastern Kansas, northwestern Missouri, and southern Iowa, and showed a minimum pressure of 29.30. It had developed a well marked wind shift line extending from

the Great Lakes region southwestward to New Mexico. The winds on the south side of the wind shift line were fresh to strong winds from the south and southeast, while the winds on the northwest of the wind shift line were moderate winds from the northwest.

By 7:30 p. m. the low pressure area had developed a marked pear-shaped or "frying-pan" configuration with the handle portion extending from the northeast toward the southwest and running from near the Mississippi River along the western boundary of Illinois, southwestward through the Texas Panhandle. On the 7:30 p. m. map a temperature of 70° existed to the south side of the wind shift line, while temperatures of 50° ran through the center of the low and 40° ran just to the west of the center.

Thus, on the afternoon of March 30 there were large masses of warm, moist air partly of tropical origin on the southeast side of the wind shift line. To the north and west of the wind shift line temperatures were 20 to 30° below those one to two hundred miles to the south, and these air masses were of Polar Pacific or Polar Continental origin. By the afternoon of March 30 the unstable air conditions favored the formation of severe wind storms of a tornado nature in the vicinity of the squall line of the low pressure area.

On the succeeding day the weather map showed a strong low pressure with a minimum reading of 28.90 located over the Lakes region accompanied by heavy precipitation. The frying-pan configuration had entirely disappeared and the cyclone was circular in shape. High pressure areas bringing colder weather with snow in the north portion of the Great Plains spread westward from the Mississippi River and reached to the Pacific.

*Freaks of the Storm in Pekin.*—The portions of the destructive path of the South Pekin tornado visited by the writer did not have any outstanding freaks, such as sometimes attend these storms. There were, however, some things of an un-

usual nature. The pile of ice without any building has already been described. The buildings about a small bird house (at No. 13 on map) were more or less demolished and the trees were blown down or badly whipped. However, the bird house stood without any apparent damage, and the birds were occupying it as usual. In the southeastern part of the city a small wooden garage was not destroyed, and the car within was not scratched, but a cement-block garage in the same block was completely wrecked. At No. 15 on map, timbers were driven into the sides of a stucco house located north of Main Street on the margin of the storm, while a large residence nearby standing directly in the path of the storm, was little damaged. An unusual characteristic was noted in the country southeast of Eureka where two sets of farm buildings were completely destroyed with the exception of the corn cribs. In each instance the corn crib, filled with corn, stood close by the barn and other out-buildings, but showed no evidence of destruction. Whether it was the weight of the corn which held the building down or whether the slatted siding permitted equalization of pressure within and without, thereby preventing destruction, is impossible to say.

**Conclusion.**—The numerous tornadoes and other types of storms that occurred on March 30 accompanied a "frying-pan" low as it moved eastward during the day. Most of the storms appear to have occurred slightly in advance of the wind shift line, although some of them developed west of this line. While some of the storms may have lifted over long distances and descended to the earth farther to the northeast, it appears that most of the tornadoes had an individual origin and existence. A combination of pressure conditions, wide variations of temperature in short distances, and contrasting air masses with accompanying winds seem to be the conditions favoring the development of the tornadic type of storms. When such a combination of conditions prevail, numerous such storms may develop.

<sup>1</sup> Holcomb, E. W., Meteorologist, U. S. Weather Bureau, Springfield, Illinois, Climatological Data, Illinois Section, March, 1938, p. 12a.

<sup>2</sup> *Ibid.*, p. 12a.

<sup>3</sup> Flora, S. D., Meteorologist, U. S. Weather Bureau, Topeka, Kansas. Climatological Data, Kansas Section, March, 1938, p. 24.

<sup>4</sup> Holcomb, E. W. *op cit.*, 12a.