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**Documentation of a Mass Emergence of *Hexagenia* Mayflies
from the Upper Mississippi River**

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Documentation of a Mass Emergence of *Hexagenia* Mayflies from the Upper Mississippi River

This report documents a mass *Hexagenia* mayfly emergence from the Upper Mississippi River, so that others may know of the magnitude of the phenomenon if *Hexagenia* populations are further reduced by pollution along the Upper Mississippi River. Man has already virtually eliminated *Hexagenia* mayflies from portions of Lake Michigan's Green Bay, western Lake Erie, most of the Illinois River, and from segments of the Mississippi River.

Mayflies are primitive insects which belong to the order Ephemeroptera. The adults, which have vestigial mouth parts, usually mate and die within 30 hours after they emerge from the fresh water in which they have lived as aquatic nymphs. The genera *Hexagenia*, *Pentagenia*, and *Ephemera* are of special interest to vacationers, tow boat captains, motorists, and others who spend much time along the water's edge. The biology of these insects has been reviewed by Needham *et al.* (1935), Hunt (1953), Fremling (1960), Britt (1962), and Swanson (1967).

The name "Green Bay fly" is often used for the mayfly because people still recall the hordes of *Hexagenia* mayflies which formerly arose from Green Bay of Lake Michigan and literally covered portions of the city of Green Bay, Wisconsin. Because of pollution, Green Bay flies are now rare on the lower reaches of the bay near the mouth of the Fox River (Lee, 1962). Pollution has decimated the *Hexagenia* mayfly population in the western end of Lake Erie (Britt, 1955; Beeton, 1961;

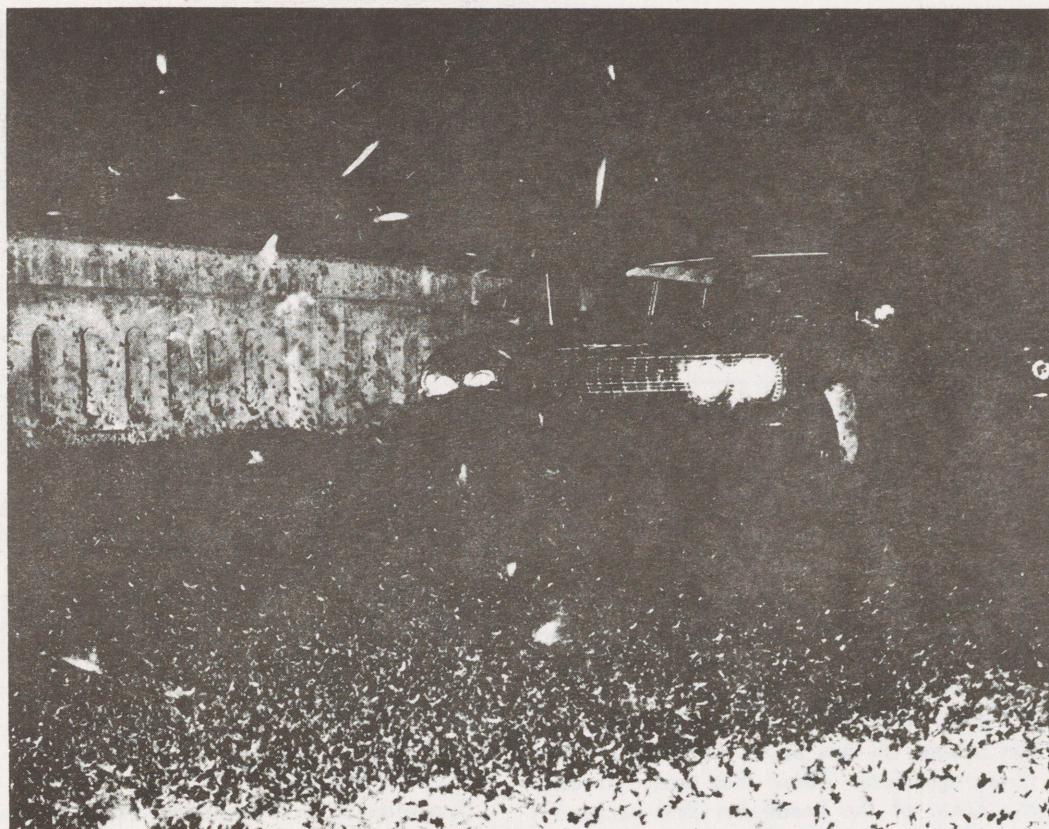


FIGURE 1.—*Hexagenia bilineata* mayflies attracted to automobile headlights on Mississippi River bridge at Winona, Minnesota, 8 July 1966.

Carr and Hiltunen, 1965). *Hexagenia* emergences were once common along the Illinois River, but pollution has virtually eliminated the insects from the upper 150 miles of the river (Richardson, 1921; Mills *et al.*, 1966). *Hexagenia* mayflies, which were once common along the entire Upper Mississippi River, are now rare for 30 miles below Minneapolis, Minnesota, and for almost 200 miles downstream from St. Louis, Missouri (Fremling, 1964). *Hexagenia* and *Pentagenia* mayflies still occur abundantly in the less polluted areas of the Upper Mississippi River. In Pool 19, for example, Carlander *et al.* (1967) estimated the June, 1962, nymphal *Hexagenia* population to be 23.6 billion.

On the afternoon of 8 July 1966, thousands of cast *Hexagenia* nymphal exuviae were observed floating on the surface of the Mississippi River at Winona, Minnesota. The trees

on several near-by islands were examined and they were found to be laden with *Hexagenia bilineata* subimagos. Being quite sure that the subimagos would molt to the imago form late on the afternoon following emergence from the river and be wafted by the slight northerly breeze into Winona that evening, I planned to collect large numbers of eggs and adults for laboratory experiments.

The first adult insects were attracted to waterfront lights at 2130 hr Central Daylight Time, and by 2200 hr large swarms had formed around most lights. I drove to a little-used bridge which spans a side channel of the river and parked my car. A tub of water was placed beneath the headlights, and mayflies which were attracted fell into the water, where they released their eggs. As the layer of insects became too thick on the water's surface, the spent insects were scooped

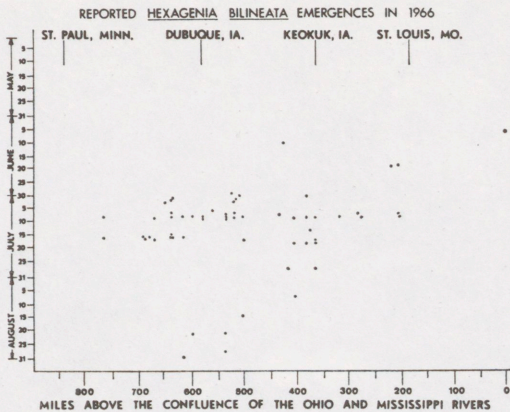


FIGURE 2.—Mass *Hexagenia bilineata* mayfly emergences observed by cooperators on the Upper Mississippi River during 1966. Each dot indicates one observation.

away by hand to make room for more. In less than two hours, 5.5 liters of eggs (ca. 345 million) were thus collected.

Female mayflies comprised all of those collected. They passed in steady flight over the bridge, 50 feet above the river surface, flying upstream. Those that passed through the beam of the headlights flew erratically toward them and milled around in the beam. As they landed on the bridge or on the car, they were quickly buried beneath other incoming insects. With each light gust of wind, high-flying insects suddenly descended to a lower level, thus increasing temporarily the hordes of insects in the area of the headlight beam.

Camera strobe unit flashes induced an immediate rustle of thousands of wings and an increased pelting of the observers. Insects which had previously landed were similarly affected.

The pile of insects was so deep by 0020 hr that they began to cover the headlights of the car (Figure 1). The height of the pile tapered off with increasing distance from the lights, but it was still an inch deep 30 feet away. The insects were still flying in undiminished numbers when the car was shoved free of the wet, greasy mass at 0035 hr.

During the observation, the annual celebration "Steamboat Days" had been in progress at Levee Park along the Winona waterfront.

The brightly-lighted carnival area attracted many insects and by 2300 hr the insects were over 6 inches deep on the floor of the carousel. The carnival was shut down completely after mayflies clogged the radiators of the diesel-powered generators at 2345 hr, causing them to overheat.

The Hannibal Courier-Post reported that on the night of 10 July, two motorcycles and four cars were involved in a series of accidents on the Mark Twain Bridge at Hannibal, Missouri. The vehicles, which had slid into each other on a 6-inch carpet of mayflies, were removed, and a snow plow was used to clear the slippery bridge. Cinders were then applied to insure traffic over the bridge.

Collections made by ship captains, lockmasters, and other cooperators revealed that the mass emergence encompassed the river from Wabasha, Minnesota, to Alton, Illinois, a distance of 550 river miles (Figure 2). Another emergence of almost the same magnitude occurred on the nights of 15–17 July over much of the Upper Mississippi River.

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