

## An Unusual Aggregation of the Milliped

### *Zinaria butleri* (McNeill)<sup>1</sup>

ELIOT C. WILLIAMS, JR., Wabash College and DANIEL B. WARD,  
Wabash College and Cornell University

The appearance of large aggregations of organisms is always an interesting phenomenon to an ecologist. Some groups of animals are prone to aggregate quite regularly, either as a recurring daily phenomenon or as a seasonal one, and others appear in large numbers with a rather regular periodicity, as in the case of the well-known cycles among rodents. There are, however, fewer references in the literature to large aggregations of millipeds. Cloudsley-Thompson (1) of Cambridge University cites 21 recorded instances of mass migrations of millipeds in North America, 14 of which were in West Virginia. We can find only one record of aggregating millipeds in Indiana, a report by A. V. Mauck (2). During August of 1898 a swarm of millipeds, *Fontaria virginiensis* (Drury) appeared in the fields and woods south of the Indiana University Biological Station at Vawter Park on the south shore of Lake Wawasee. The swarm was very conspicuous with every square foot of roadway containing one or more individuals. The migration was noticed during the early hours of several days, moving in a northerly direction towards the lake a little over 100 feet away. Mauck reports that all traces of the swarm vanished in a few days. The specimens were all adults and all of about the same size.

On August 31, 1950 an unusually large concentration of the milliped *Zinaria butleri* (McNeill) was observed by the junior author on the stone bridge over McCormick's Creek in McCormick's Creek State Park near Spencer, Indiana. An estimated 6,000 of the one and one half inch millipeds were heaped together at the ends of the bridge railings and had spread in a serried layer over several square yards of the abutment's vertical surfaces. This estimate is possibly too conservative since it was obtained by allotting an arbitrary one square inch of closely covered surface to each milliped, while in some areas they were piled one upon the other to a depth of four or five. The greater part of the bridge was either bare of millipeds or was scattered with slowly moving individuals. The organisms in the denser masses were completely quiescent, but became active when disturbed by light prodding or stroking. The stimulated animals crawled over their fellows and often fell to the ground singly or in intertwined groups. The dislodged individuals crawled about aimlessly on the ground below the abutments,

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<sup>1</sup>The writers are indebted to Dr. A. R. Bechtel of Wabash College for collecting specimens of the milliped on August 31 and to Dr. Nelle B. Causey of the University of Arkansas for the identification of the milliped and for bibliographic assistance.

making no apparent effort to regain their former position. No predators were seen to be availing themselves of the helpless throng; a probable factor was the decided odor of prussic acid emitted by the mass.

Very few millipeds were found in the area surrounding the bridge. It was not possible to determine whence they had come or the cause for the aggregation at that point.

On October 22 the senior author visited the bridge on which the aggregation had been observed. In the leaves and under stones near the abutments at the n.w. end of the bridge, living adults were found in numbers greater than one would normally expect to find in such a situation. There were also many dead specimens. The ground on the side of the abutment away from the road, sloping down toward the creek, was pitted with small holes 1-1.5 cm. deep and .75-1 cm. in diameter. In some places there was one hole every 3 or 4 cm. and in others somewhat fewer. The holes were most abundant close to the bridge. It seemed fairly evident that these holes had been made by the millipeds and since millipeds are reported to dig holes in which to deposit their eggs, it may be that this was the purpose of the holes. On the other hand, the holes may have been made as a sheltered niche since some of the living individuals collected were curled up in them. No evidence of eggs or young was found. Perhaps the eggs had hatched and the young had moved to other places.

Mr. Tom Overmire, the park naturalist, was consulted on October 22 and he reported that the millipeds had been very abundant in the area at the end of the bridge ever since late in June of this year. In his activities in the park he had occasion to pass the spot in question quite frequently and apparently the millipeds were there in large numbers during most of the summer.

When the initial observations were made on August 31 it was thought that this was a temporary phenomenon which had occurred a relatively short time prior to the observations. Mr. Overmire's evidence places a different complexion on the problem.

Most of the published reports of similar phenomena deal with migrations in which the organisms appear suddenly and are as suddenly gone. In this instance the millipeds remained in force in a relatively small area over a period of several months, and four months after they were first observed they were still moderately abundant.

Morse in 1903(3) suggested three possible causes of migration and aggregation of millipeds. He referred to the rather regular appearance of large numbers of millipeds, *Fontaria indiana* Bollman, at Cedar Point, Sandusky, Ohio. In this case it was attributed to a mating reaction as the aggregation occurred immediately prior to and during oviposition. Other cases have been attributed to overpopulation. Finally, Morse suggested that millipeds might move from low damp areas used in oviposition to higher regions where they could over-winter under logs and leaves.

Cloudsley-Thompson (1) quotes Sinclair (4) on the phenomenon of

sudden increase in numbers of various species of millipeds and their short duration. Sinclair suggests that there is a delicate correlation between the factors which hold an even balance of the population and a very slight disturbance may let loose a flood of fertility. Perhaps something of this nature is the explanation of the tremendous local increase in this species. This year may have been a particularly favorable one and the large number of individuals came together for breeding purposes. The evidence of the numerous holes in the ground points to this as a possibility. Any analysis of a set of environmental conditions which could account for the phenomenon would have to be on a long-range basis and could not be made to explain this isolated instance. The fact that millipeds take two years to mature makes such an analysis even more difficult.

A continued study of the location next year is planned, with the purpose of possibly finding evidences of many young individuals. Such a finding would support the suggestion that breeding was the major sudden increases in numbers of various species of millipeds and their factor in the aggregation.

The milliped involved in this study was described by James McNeill in 1888 from Bloomington, Indiana, as *Polydesmus butleri*. In 1939, R. V. Chamberlin set up the genus *Zinaria* for this and several related species.

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