Notes on the Ecology of the Milliped, *Pleuroloma butleri* (McNeill) in Migration[1]

MURVEL R. GARNER, Earlham College

The phenomenon of milliped migration has been observed several times over many years. Three earlier instances have been recorded for Indiana. Mauck (3) in 1898 reported a large aggregation of *Fontaria virginiensis* on the bank of Lake Wawasee near Syracuse, Indiana about four miles from the site of those to be reported herewith. Williams (5) in 1951 reported an aggregation of *Zinaria butleri* near Spencer, Indiana. Young (6) in 1958 reported an aggregation of larval forms of *Zinaria butleri* at Nashville in Brown County. Cloudsley-Thompson (1) cited the occurrence of as many as fourteen migrations of millipeds in West Virginia, half a dozen in other parts of the United States and many in various parts of Europe.

It should be pointed out that the synonomy of the Myriapoda is confused and that the genus *Pleuroloma* which is discussed in this paper is identical with the *Zinaria* of Williams and of Young.

On the morning of September 1, 1962, I found a considerable number of specimens of the milliped, *Pleuroloma butleri* (McNeill) on the road in front of the laboratory of the David Worth Dennis Biological Station of Earlham College on Dewart Lake near Syracuse, Indiana. They appeared to be coming from a nearby cattail swamp at the edge of the lake. In general, they were travelling uphill. Shortly many thousands were occupying the grassy areas on the hillside. They piled up, several deep, where they were trapped by a cement wall and by the side of a laboratory building.

The animals were adult but only about ten percent had attained the full coloration indicating complete maturity. After a few hours the animals were dispersed over a wide area. In a day or two only occasional stragglers were to be found.

On September 3 (Labor Day), I saw another extensive aggregation in a glacial kettle hole about a hundred yards from the above mentioned site. The animals had a larger proportion (approximately half) with full coloration. The observation of this colony was interrupted by the burning of much of the ground cover by the owners.

On September 9, a neighbor called my attention to a large accumulation of millipeds along a stone wall in his yard. This was the most numerous of all the aggregations seen. In places the worms were piled several inches high. They were intermediate in degree of coloration between the first two aggregations. A slight rain in the previous night had left several shallow puddles on a cement walk. Animals moving through the water showed no instinctive reaction against it but many drowned in as little as a half inch of water.

---

1. The identification of this milliped was made by Dr. Nell B. Causey, to whom I am indebted.

Finally, on September 10, I found a fourth aggregation crossing the road at the site used by the first. These animals were the most mature of all, more than half having full coloration. They dispersed quickly after the sun came out.

In all these instances the nights and mornings were humid and overcast. The cattail swamp from which they came was unusually dry, the lake having the lowest level of several years.

Since the millipeds were almost continuously under observation for more than a week I was able to make a number of ecological observations. The animals are scavengers, eating their way through soil. The earlier castings were very black, being composed of the muck from the swamp. Later castings formed from upland soil were much lighter. In some places the ground was covered completely by castings. They are very distinctive. Being dropped in a semi fluid condition they flatten out to form little patties with turned-up rims. Much of the woodland mull nearby appeared to be composed of more or less entire milliped castings. Eaton (2) and Romell (4) have discussed the mull forming capacities of millipeds. Microscopic examination of castings showed that the animals were indiscriminate eaters. The castings included many sand grains and woody fragments. It was often possible to hear the crunching sound of their chewing activity.

In the migration pattern of the millipeds I could detect little or nothing of a social instinct. I saw no instances of mating. When two animals came in contact, one would glide over the other with only a bare slackening of pace or change of course. The aggregations seemed fortuitous as the animals were stopped by obstacles. Beside a brick chimney they chewed out cavities in the soil into which two to eight individuals crowded, apparently to escape from light, although they lacked eyes. The greatest activity was at night. All aggregations appeared in early morning and the animals tended to disperse as the light became strong. Several groups, numerous in grass in the evening, had disappeared by the following morning. In the laboratory, they congregated in the darkest part of their containers.

The presence of such a large number of animals appeared to be the result of an unusual rate of survival. The swamp from which they emerged was the driest it had been for many years. The susceptibility to drowning in very shallow water leads me to believe that usually there is a high mortality among migrating individuals and that the unusual dryness led to a phenomenal survival rate, hence the conspicuous migrations. This conclusion is in accord with suggestions by earlier writers.

I hope that further observations will be recorded, in order to determine more accurately the nature of the stimulus to the sudden change in population.

Literature Cited

1. CLOUDSLEY-THOMPSON, J. L. 1949. The significance of migration in myriapods. Annals and Magazine of Natural History Ser. 12. **11**: 947-962.
2. EATON, T. H. 1943. Biology of a mull-forming millipede, *Aphelora coriacea*. Am. Mid. Nat. **29**:713-723.

3. MAUCK, A. V. 1901. On the swarming and variation in a myriapod (*Fontaria virginiensis*) Amer. Nat. **35**: 477-478.
4. ROMELL, L. G. 1935. An example of myriapods as mull formers. Ecol. **16**: 67-71.
5. WILLIAMS, E. C. 1951. An unusual aggregation of the milliped, *Zinaria butleri* (McNeill). Proc. Ind. Acad. Sci. **60** (1950) :329-331.
6. YOUNG, F. N. 1958. A large aggregation of larval millipeds *Zinaria butleri* (McNeill) in Brown County, Indiana. Proc. Ind. Acad. **67** (1957) :171-172.