

THE SUCCESSION OF POST-LARVAL STADIA OF *LITHOBIUS VARIEGATUS* LEACH, 1817 IN A SOMERSET BEECH WOOD

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INTRODUCTION

There have been relatively few field studies on the life history of British lithobiomorph centipedes. They are Roberts (1957) on *Lithobius variegatus* Leach in Hampshire, Vaitilingham (1960) on *L. curtipes* L. Koch also in Hampshire, Wignarajah (1968) on *L. crassipes* C. L. Koch and *L. forficatus* Linn. in Durham and Lewis (1985) on *L. variegatus* in Yorkshire. The results of a further study of *L. variegatus* in Somerset carried out from January 1987 to July 1994 and April 2002 to April 2003 are reported here and compared with data for other *L. variegatus* populations.

There are two phases in the life history of lithobiomorphs. During the anamorphic phase the so-called larvae add extra pairs of legs at successive moults. In the epimorphic phase the post-larval stadia show a progressive development of the genital region and an increase in the number of antennomeres, ocelli and of coxal pores.

Eason (1964) assigned specimens of *L. variegatus* to a post-larval stadium on the basis of the number of coxal pores on leg pairs 12, 13, 14 and 15. In the first post-larval stadium there are two pores on each coxa of the twelfth pair of legs and one on each of the coxae of legs 13, 14 and 15. This is denoted 2,1,1,1. In the second post-larval stadium there are 3,2,2,2, and so on. In the two mature stadia (the fifth and sixth) there are almost invariably 6,5,5,5 and 7,6,6,6 respectively. The post-larval stadia 1-4 are also known as the agenitalis, immaturus, praematurus, and pseudomaturus, the mature stadia as the maturus or maturus junior and the maturus senior. The regular increment of pores means that the stadia are easy to distinguish rendering *L. variegatus* very suitable for life history studies. Eason & Serra (1986) stated that there are never more than 7,6,6,6 pores in *British L. variegatus* but a further seventh post-larval stadium occurs very rarely in some populations (see below).

MATERIALS AND METHODS

The population at Muchcare Wood was studied. This is a mature stand of beech (*Fagus sylvatica* L.) on a SE facing slope of Lydeard Hill near Bishops Lydeard, Somerset at an altitude of 320 to 330 m (grid reference: ST 183339). Samples were taken at approximately monthly intervals, hand-collected from beneath stones and the bark of rotten logs by successive groups of sixth form pupils from Taunton School, Somerset. Where possible, samples of 40-45 specimens were collected and on return to the laboratory, were sexed, weighed, the body length measured and the coxal pore formula recorded. Larval stadia were rarely collected and the investigation was restricted to post-larval stadia.

RESULTS

Figure 1 shows the number of each post-larval stadium collected from January 1987 to December 1990. Figure 2 gives the data for January 1991 to July 1994 and Figure 3 those for April 2002 to April/May 2003. Figure 4 shows the total numbers of stadia 1 to 4 collected from 1987 to 1994. A clear succession of stadia is seen from stadium 1 in autumn, winter and spring with peak numbers in December and January, through stadium 2 with peaks in December and February. Stadium 3 was present in spring and summer with peak numbers in June and stadium 4 peaked in June and July.

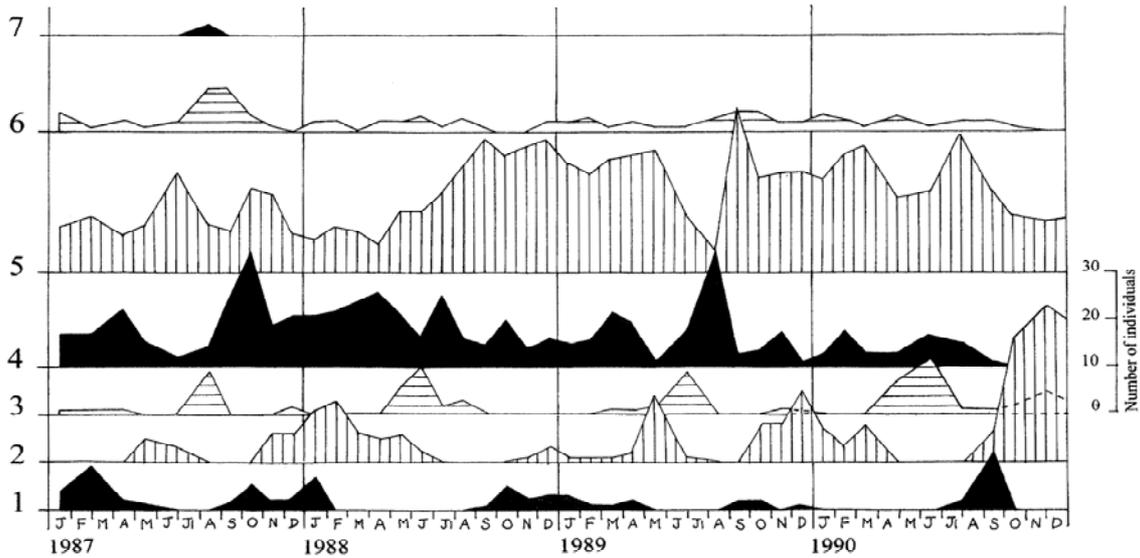


Figure 1: The occurrence of the post-larval stadia of *Lithobius variegatus* in Muchcare Wood, Somerset between January 1987 and December 1990

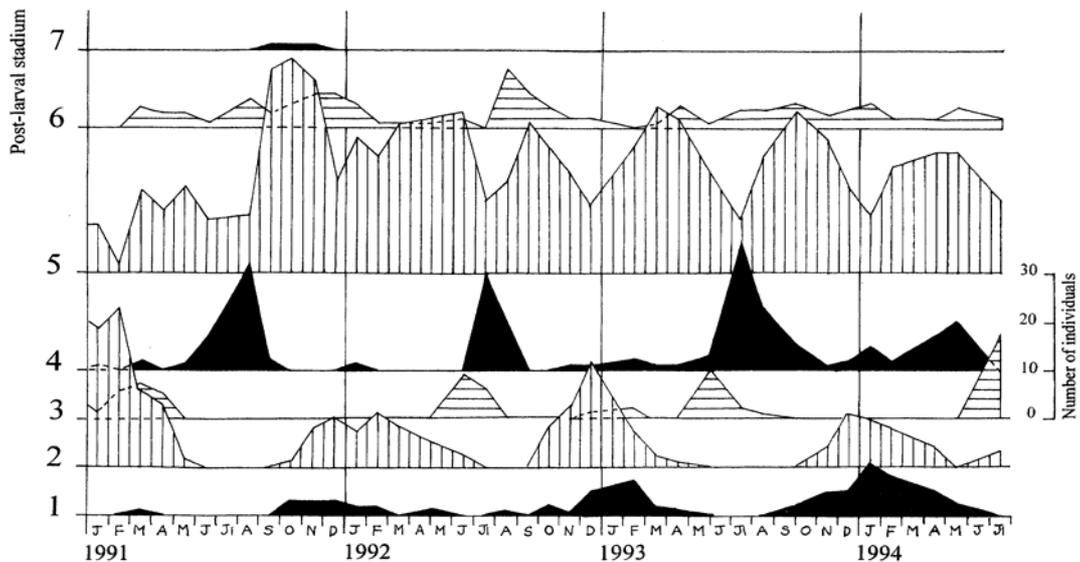


Figure 2: The occurrence of the post-larval stadia of *Lithobius variegatus* in Muchcare Wood, Somerset between January 1991 and July 1994

Maturus juniors were present throughout the year and maturus seniors were present in low numbers in almost all months. One stadium 7 specimen was collected in August 1987 and three in 1991, one in each of the months September, October and November. The general pattern of succession remained much the same throughout the sampling period of 16 years. There were, however, differences in some years most notably in 1990 (Figure 1) when stadium 1 was only present from July to September rather than in autumn, winter and spring. Stadium 4 individuals were present throughout the year from 1987 to September 1990, but were found almost exclusively in June, July and August in 1991 and 1992 (Figures 1 & 2). Numbers were also very low in 2002-2003 except in June/July and August (Figure 3). Maturus senior individuals formed 15 per cent of the population of mature individuals in 1987-1994, 28 per cent in 2002-2003.

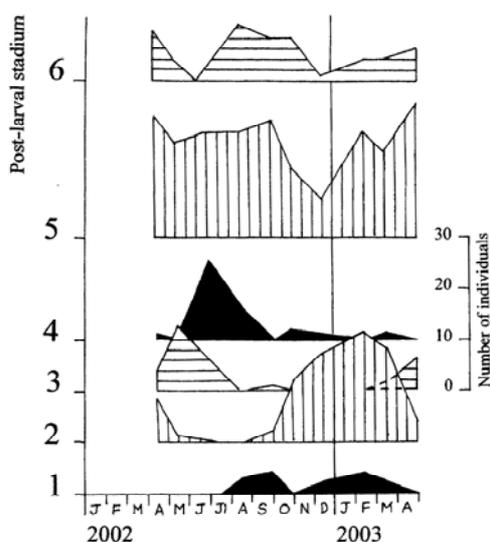


Figure 3: The occurrence of the post-larval stadia of *Lithobius variegatus* in Muchcare Wood, Somerset between April 2002 and April/May 2003

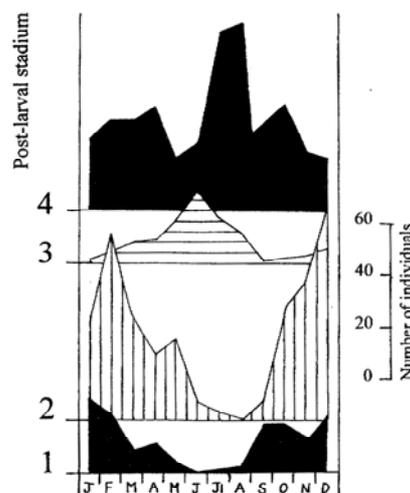


Figure 4: The total monthly numbers of post-larval stadia 1-4 of *Lithobius variegatus* collected in Muchcare Wood, Somerset from 1987 to 1994

DISCUSSION

Roberts (1957) postulated that the main period of oviposition for *L. variegatus* in Burley Wood, Hampshire was early summer (May), the first larval stadia occurring in mid-summer. The later larval stadia follow and the anamorphic stage of development is completed by September. The early epimorphic stadia then, 'hibernate' through the first winter emerging in the following spring. During the succeeding (second summer) the immature stadia pass through a number of moults to grow to maturity in approximately 15 months. In this, the second autumn, mating occurs. Oviposition takes place the following spring and the majority of the adult population dies. The length of life is therefore approximately two years in most cases. Roberts suggested that maturus senior (most of which were taken in the winter) results from a moult which occurs in the late summer – probably August.

In Shipley Glen, Yorkshire (Lewis, 1965) no post-larval stadium 1 were collected but stadium 2 was found from September to May peaking in November, December and January. Stadium 3 was found from October to June peaking in January and February and stadium 4 from June to September peaking in June and July (Figure 5). It was concluded that stadium 4 moulted to the maturus junior

stadium in August and September and that eggs were laid through much of the year with a peak in spring. This suggests a two-year life cycle similar to that of the Hampshire population.

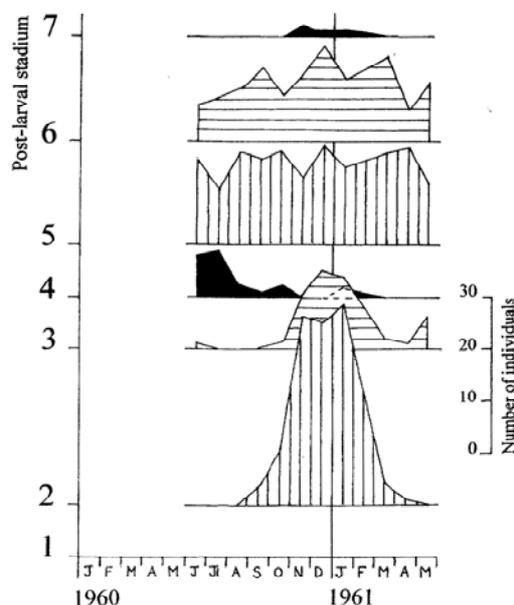


Figure 5: The occurrence of the post larval stadia of *Lithobius variegatus* in Shipley Glen Yorkshire between June 1960 and May 1961.

The succession of epimorphic stadia 2, 3 and 4 in Somerset is similar to that seen in Robert's Hampshire population, but post-larval stadium 1 was most common in August and September in Hampshire whereas in Somerset they were most common between September and February. This suggests that stadium 1 moulted to stadium 2 earlier in Hampshire than in Somerset.

In the Yorkshire population stadium 3 peaked in winter as opposed to late spring and summer in Hampshire and Somerset. Maturus senior individuals formed a much larger proportion (40 per cent) of the population of mature animals than in Somerset (15 or 28 percent) or Hampshire ("never numerous, small numbers taken in autumn, winter and spring"). Such differences could be ascribed to climatic differences, however, there can be differences between geographically close populations thus Lewis (1994) showed that there were marked differences between three populations in a small area of the Quantock Hills in Somerset within an overall distance of 5.2 km and all at an altitude of about 300m. Sampled in late February and early March 1991, in two localities the majority of post-larval stadia were at stadium 2 in the third they were at stadium 3. There were also differences in the occurrence of maturus junior and maturus senior stadia.

With a peak of egg-laying in spring, post-larval stadium 1 appearing in the autumn, stadium 4 the following summer or early autumn and the maturus juniors in the autumn to lay eggs the following year, then there will be a two year life cycle in the Somerset population. There are no data on the time of moult to the maturus senior but if it is after a year then matures juniors must survive into a third year and maturus seniors into a fourth.

SUMMARY

Populations of *Lithobius variegatus* in Yorkshire, Hampshire and Somerset appear to have a two-year life cycle but some individuals may survive into a fourth year.

ACKNOWLEDGEMENTS

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