

Fall 1991

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Recommended Citation

Jass, J., K. Zandi, and B. Klausmeier. 1991. Life cycle information from a Wisconsin population of *Porcellio spinicoris*, the dark-headed isopod. *Field Station Bulletin* 24(2): 21-26.

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Life Cycle Information From A Wisconsin Population of *Porcellio spinicornis*, the Dark-Headed Isopod

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Abstract

Detailed life cycle information is lacking for Wisconsin terrestrial isopod crustaceans. We measured head-widths of a local population of *Porcellio spinicornis* and compiled data on size-frequencies, sex ratio and gravidity. Females were larger and formed a majority of the population. Gravidity showed a definite seasonal pattern; percentages of gravid females ranged from zero in March and April to near 80% in late May and early June.

Introduction

We previously reported the results of a survey of the UWM Field Station for terrestrial isopods (Jass and Klausmeier, 1987). We found *Porcellio spinicornis* prevalent in the vicinity of the Field Station buildings. It is distinctive in its preference for sites with concrete, gravel or some other source of limestone. We also presented some preliminary information on the life cycle patterns of the isopod species found, but were unable to give a complete picture because of the fragmentary nature of our data. In this paper, we detail the Wisconsin life cycle pattern for *Porcellio spinicornis* based on data from a local study population.

Size and weight as correlates of age have been the tools for prior investigations of isopod populations. McQueen (1976) used weight as the indicator of growth in an Ontario population of *Porcellio spinicornis*. Prior investigators such as Hatchett (1947) felt it was practicable to accurately measure whole body length only to the nearest whole millimeter because of

contraction and relaxation between body segments. Sutton (1980) reported that head-width measurements correlate well with overall size and, because of the influence of other morphological features on apparent body length, actually give a better indication of relative size for preserved specimens.

Methods

Isopods were found in accumulated plant debris around the concrete foundation of a suburban brick home in Milwaukee County, Wisconsin. Collections were made during the 1989 growing season on days when humidity and temperature conditions produced aggregations of animals. Specimens were collected by hand and subsequently preserved and stored in 70% ethanol. Measurements were made using a stereomicroscope, fitted with 20X eyepieces and an eyepiece graticule. Graticule units were converted to the nearest 0.1 mm. Sex was determined by microscopic examination. Males differ from females in having external genitalia.

Results

Size-frequencies

In this Wisconsin population, the period of activity for *Porcellio spinicornis* was observed to be from March through September. Table 1 shows size variation in terms of head-width measurements for each collection from these months.

In March, there were no very large individuals; the population was composed of small and medium-sized individuals that had survived the winter. In April, these survivors had grown and matured, and the size distribution had shifted toward the upper end of the table. By May, the largest individuals had disappeared from the population and the young that were born in spring were appearing in the smaller size classes. Beginning with the June collection, these growing young came to dominate the population, since most of the parents that had over-wintered from the prior year died following the completion of their reproductive cycle. Size increases of this new generation over the summer were noted in the last collections of the season, as reflected in the September data. Some subsequent late fall and early spring growth would be required to account for the predominantly mid-range measurements from the earliest

collections we made in mid-March. The general pattern of size distribution through the season is also reflected in the means of head-width measurements (mm) for the population.

Some prior investigators (e.g. Hatchett 1947) have noted a sexual dimorphism in size, with females being the larger sex. Figure 1 shows the relative frequencies of head-widths for our males and females at each of the 0.1 mm size increments. Females predominate in the largest size classes and males in the smallest. The appearance of several peaks in the figure is due to totaling all the data from our seasonal size distributions.

Table 1. Frequency of head-width measurements during six months of the 1989 growing season.

Head Width(mm)	Number of individuals collected during the month					
	March	April	May	June	July	September
1.3	14			1		28
1.4	8		1	3		20
1.5	13		2	3		19
1.6	41		8	28	3	25
1.7	9	2	7	18	6	5
1.8	7	2	4	22	5	2
1.9	3	3	5	32	9	7
2.0	10	5	10	100	23	4
2.1	8	1	2	24	11	6
2.2	9	1	5	26	10	8
2.3	17	7	3	41	21	28
2.4	3	2		5	2	1
2.5	3	3		5	2	1
2.6	2	4	1	3	2	2
2.7	3	1	1	4		2
2.8		1		1		
2.9						
3.0		1				2
3.1		1				2
3.2		1				
Mean Head-Width	1.8	2.3	1.9	2.0	2.1	1.8

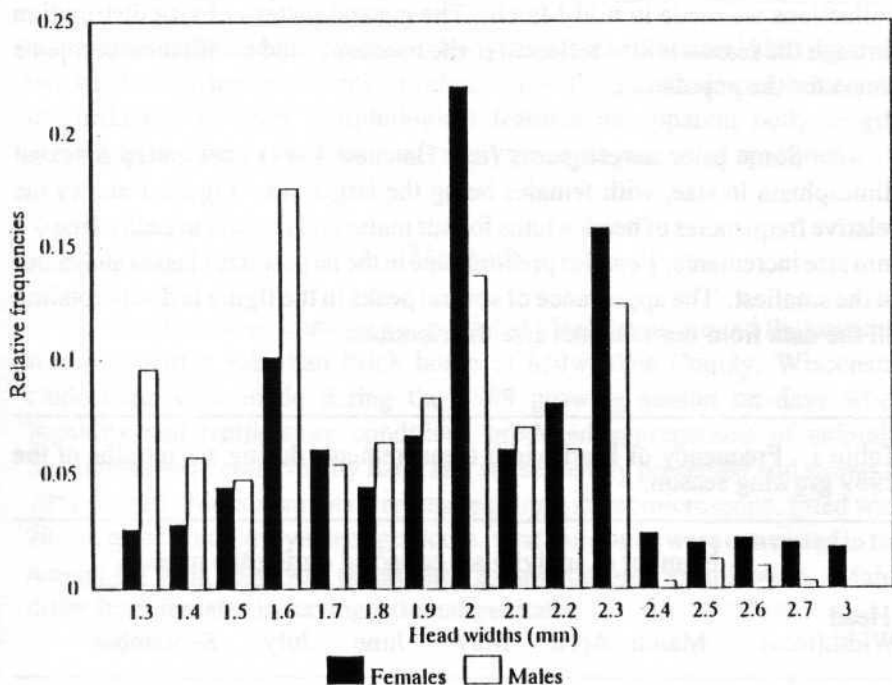


Figure 1. Relative frequencies of head-widths in male and female *Porcellio spinicornis* collected over one growing season. Note the overwhelming predominance of females in the size classes greater than 2.4 mm.

Sex Ratio

The measured individuals of this population were 60.9% female and 39.1% male. Investigators of other isopod species also found females to be more numerous than males: Howard (1940) for *Armadillidium vulgare*, Hatchett (1947) for *Cylisticus convexus*, and Geiser (1934) for *Trachelipus rathkei*. The two latter species were among those found in our preliminary survey of the UWM Field Station.

Gravidity

We observed the seasonal pattern in the percent of gravid females (those with eggs or young in the brood-pouch). Table 2 matches our 1989 Wisconsin study with comparable percentage figures from McQueen's Toronto, Ontario population of *Porcellio spinicornis* (1976).

Table 2. Percent gravid females of *Porcellio spinicornis* during a growing season.

Wisconsin	Percentages		Ontario
14 March	0%	no data	March, April
16 April	0%	4%	16 May
30 May	84%	42%	31 May
16 June	77%	86%	19 June
09 July	60%	70%	27 June
21 July	45%	42%	05 July
08 September	0%	9%	08 August

In general, our Wisconsin population appears to be two to three weeks more advanced than the Ontario population.

Discussion

These data show most clearly the life-history pattern for 1-year-old animals which dominate the population. McQueen (1976) states that 80-90% of a population dies during the first year. In an intensive study of survivorship based on mark-recapture data, McQueen found that only 1% of the *Porcellio spinicornis* population studied were alive at the end of the spring of their second year. However, since there is the potential for a 4-year life span (McQueen 1976), the small number of older individuals in the population can produce the variation seen in data points outside of the central pattern.

Additional intensive species-specific studies such as this will be necessary in order to reveal the variations in life cycle patterns for other Wisconsin terrestrial isopods.

Acknowledgments

We are grateful to Ray Sullivan for collecting the isopods.

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