

VARIATION IN BODY SHAPE, NUMBER OF OCELLI  
AND NUMBER OF SECONDARY ANTENNAL RHINARIA  
OF WINGLESS MALES OF *APHIS SEDI*  
(HOMOPTERA: APHIDIDAE)

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ABSTRACT

In a collection of sexual forms of *Aphis sedi* Kalténbach, wingless males were found with alate-like bodies and others with apterous-like bodies. These individuals varied in the presence or absence of ocelli and in the number of secondary rhinaria on the antenna.

RESUMEN

Al coleccionar las formas sexuales de *Aphis sedi* Kalténbach, se encontraron machos sin alas con cuerpo similar a el de los machos alados y otros con cuerpo similar a el de los machos sin alas. Se diferencio en estos especimenes la presencia y la ausencia del ocelo y el numero de rhinaria secundaria en la antena.

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In the sub-family Aphidinae, most male aphids are alate and most oviparous females are apterous (Hille Ris Lambers 1966). Alate morphs possess 3 ocelli, both primary and secondary compound eyes and secondary rhinaria on the antennae. Apterous individuals lack ocelli, may lack secondary compound eyes and may also lack or have fewer secondary antennal rhinaria (Hille Ris Lambers 1966, Miyazaki 1987). Secondary rhinaria are important in mate location (in males) and host plant location (in females) (Anderson & Bromley 1987). In many of these species, the alate male is born on one plant species and must locate oviparous females born on another. In a smaller number of species, both sexes lack wings and are produced on the same plant. Males of the Aphidinae that lack wings often are referred to as intermediate or apterous males. These wingless males sometimes have the body shape of alate aphids and are not intermediate in male structures. True apterous males differ in body shape from alate aphids in that they do not have a distinct thorax. Neither of these terms is satisfactory.

Do these wingless males, which cannot make effective use of host or mate-locating organs, lack or have fewer ocelli or secondary antennal rhinaria? The answer to this question is not in descriptions of these aphid species in the literature. However, it could be expected that wingless males might lack ocelli, since in the species *Macrosiphoniella sanborni* Gillette, the determination and differentiation of ocelli of the alate viviparous female is related to the development of wings and wing muscles (Kitzmiller 1950).

*Aphis sedi* Kalténbach, a species rare in New England, occurs year-round on *Sedum* sp. or *Sempervivum* sp. At this latitude (New Haven, CT, USA) apterous oviparous females and wingless males can appear on infested plants in October. These mate and

the females deposit the overwintering eggs. There is no known alternate host (Kring 1955).

Here we describe the occurrence of ocelli and secondary antennal rhinaria on wingless males of *A. sedi* and relate this information to the characters of other morphs of this species (Kring 1955, Theobald 1927).

#### METHODS AND MATERIALS

The aphids described here were collected from *Sedum* sp. in October in Branford, CT. Over 100 adults were examined. Aphids were killed in 70% ethyl alcohol, macerated for 24 hours in cold 10% NaOH and then gradually dehydrated with increasing concentrations of ethyl alcohol. The specimens were cleared in clove oil. The clove oil was gradually mixed with the mounting medium diaphane to reduce shrinkage. They were preserved in pure diaphane on glass slides under cover glasses. These aphids were examined under a compound microscope, and the number of ocelli and secondary antennal rhinaria were recorded.

#### RESULTS AND DISCUSSION

The general body characteristics of one of the wingless males of *A. sedi* (Fig. 1A) are those of an alate aphid. There is a distinct prothorax and a fused meso- and metathorax. The thorax of this *A. sedi* male is about the same width as the head and is distinct from both the head and the abdomen. In the apterous aphid (Fig. 1B), it is difficult to distinguish these sections of the body and there is a rapid increase in the width of the body posterior to the metathoracic legs. The meso- and the metathoracic tergal plates in these wingless males do not appear to be as distinct, nor as divided, as those of the alate aphid.

Among the nine male individuals examined from this collection some males lacked ocelli and others possessed one, two or three. Examples were selected to illustrate the observed variation (Table 1). When only one ocellus was present, it was the medial ocellus. When two were present, they were the medial and the left dorsal ocellus. If all three were present the right ocellus was sometimes reduced (Fig. 1A). Some individuals lacking ocelli had an indentation where the medial ocellus should be located. If all three were absent the body was apterous shaped. Individuals having a reduced number of ocelli also showed differences in body shape. The thorax of these insects were indistinct and wing muscles were absent.

Wingless *A. sedi* males and alate viviparous females possess both primary and secondary rhinaria on the antennae. Apterous oviparous and viviparous females have only primary rhinaria on the antennae, one on antennal segment V and one on antennal segment VI (Kring 1955). Alate viviparous females possess these primary rhinaria, and in addition 5 to 8 secondary rhinaria per antenna, usually all located on segment III (Theobald 1927). These wingless males have the primary rhinaria and also 19 to 36 secondary rhinaria per antenna, on segments III, IV and V (Table 1). The antenna of the wingless male is longer than that of the oviparous or viviparous female. Those males lacking or having a reduced number of ocelli also have fewer secondary rhinaria on their antennae (Table 1).

The information presented here describes some of the polymorphism that can occur among males in *A. sedi*. This is the first report that shows reduction in the number of ocelli on a male aphid and relates this loss to diminished numbers of secondary rhinaria on the antennae and changes in body shape.

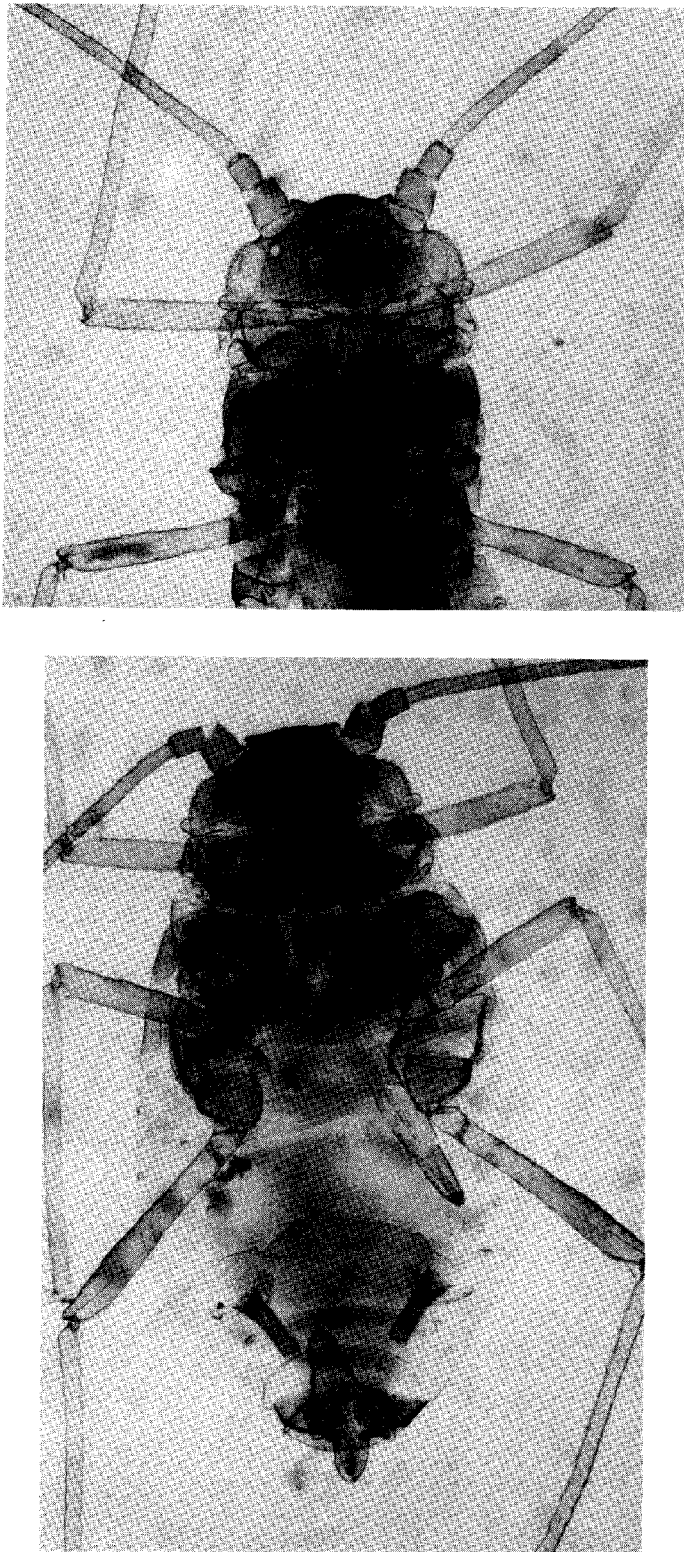


Fig. 1. Wingless males of *Aphis sedi*. A. Male with alate body shape and reduced ocelli. B. Male with apterous body shape, without ocelli.

TABLE 1. NUMBER OF OCELLI AND OF SECONDARY ANTENNAL RHINARIA OF SELECTED WINGLESS MALES OF *APHIS SEDI*.

Specimen	Ocelli			Right (R) or Left (L)	Secondary rhinaria/segment						Total
	Medial	Left dorsal	Right dorsal		Antenna	III	IV	V	VI		
1	Normal	Normal	Reduced	R L	18 16	13 13	4 3	0 0	35 32		
2	Reduced	Much Reduced	Absent	R L	17 18	9 13	4 5	0 0	30 36		
3	Indentation	Absent	Absent	R L	12 11	9 9	3 3	0 0	24 23		
4	Absent	Absent	Absent	R L	8 10	12 8	3 1	0 0	23 19		

## ACKNOWLEDGMENTS

We thank Dr. Dave Schuster, GCREC, University of Florida and anonymous reviewers for their suggestions. This is Florida Agricultural Experiment Station Journal Series No. R-01140. Please address reprint requests to second author.

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THE PREDACEOUS MIDGE GENUS *ALLOHELEA* KIEFFER  
IN THE WESTERN HEMISPHERE (DIPTERA:  
CERATOPOGONIDAE)

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## ABSTRACT

Redescriptions and figures are presented for the two previously known American species of *Allohelea* Kieffer, *nebulosa* (Coquillett) and *johannseni* (Wirth), and distribution records and misidentifications are corrected. Five new species are described: *bottimeri* from Texas, *distortifemur*, *pedicellata* and *weemsi* from Florida, and *neotropica* from the Caribbean, Central America and northern South America. A revised diagnosis is given for the genus *Allohelea*, and a key is presented for the western hemisphere species.

## RESUMEN

Se presentan nuevas descripciones y figuras de 2 especies americanas las cuales eran conocidas previamente como *Allohelea* Kieffer *nebulosa* (Coquillett) y *johannseni* (Wirth), y se corrige la informacion sobre su distribucion e identificaciones previas. Se describen 5 especies nuevas: *baltimeri* de Texas, *distortifemur*, *pedicellata* y *weemsi* de Florida y *neotropica* del Caribe, Centromamerica y la parte norte de Sur America.

