

REPRODUCTIVE BIOLOGY AND PHYSIOLOGY OF GLASSY-WINGED SHARPSHOOTER

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INTRODUCTION

Glassy-winged sharpshooter, *Homalodisca coagulata* (Say) (Homoptera: Cicadellidae), is a vector of Pierce's disease of grape. Glassy-winged sharpshooter (GWSS) also vectors other diseases, including phony peach, alfalfa dwarf, almond leaf scorch and oleander leaf scorch. All these diseases are caused by various strains of the bacterium, *Xylella fastidiosa* (Wells) (Purcell and Hopkins, 1996).

Although GWSS is an important vector of plant diseases, little is known about its reproductive biology. It has been reported that GWSS has two generations per year in Southern California (Blua et al., 1999). Oviposition occurs in late winter to early spring, and again in mid-to-late summer. Adult females live several months and lay small eggs side by side in groups of about 10, ranging from 1 to 27 (Turner and Pollard, 1959). The greenish, sausage-shaped eggs are deposited in the leaf epidermis of the host plants.

The morphology and anatomy of GWSS reproductive system has not been described. The first part of our research project is to study the structure and function of the female reproductive system.

OBJECTIVES

1. Collect and prepare GWSS specimens for studying the morphology and anatomy of female GWSS.
2. Study and describe the female genitalia focusing on the structure of the ovipositor.
3. Study the gross anatomy of the female reproductive organs.

RESULTS AND CONCLUSIONS

Female and male GWSS were collected in June, July, and August 2001. The total numbers of male and female GWSS collected were recorded (Figure 1). A subsample of female specimens were taken, dissected and examined under a stereomicroscope to study their reproductive system. Some dissected specimens were further treated with KOH and stained to observe the detailed structures.

The abdomen of the GWSS contains 11 segments. The first two and last two segments are reduced. Dorsally, the 1st abdominal tergum is folded beneath the 2nd and both of the 1st and 2nd tergites are hidden under the presternum. The 3rd tergum is clearly visible and is followed sequentially by the 4th through the 9th tergites. The 9th tergum is modified to form a pygofer. The pygofer extends ventrally to enclose the genitalia. Following the 9th tergum are the greatly reduced 10th and 11th tergites (Figure 2 a). Ventrally, the 1st and 2nd sternites are reduced in width. The 1st is hidden beneath the 2nd and both sternites are tucked into a fold at the base of the abdomen. The 3rd through 6th sternites follow sequentially after the 2nd sternum (Figures 2 b and c).

Modification of the genitalia begins with the 7th sternum, which is extended over the base of the ovipositor concealing it from view externally (Figures 2 b and c). The 7th sternum extends with v-shaped, tooth-like projections over the genital capsule and a part of the pygofer (Figures 2 b). The 8th sternum is reduced to a lip-like fold (Figure 2c). The genital

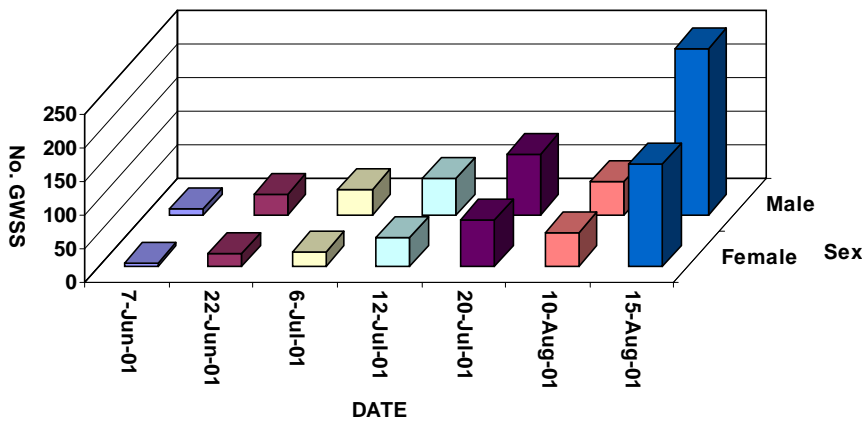
capsule appears to arise from the intersegmental membrane between the 7th and 8th sternites (Snodgrass, 1933; Tsai and Perrier, 1996). The valvulae arise from the intersegmental membranes between the 7th and 8th, and 8th and 9th sternites.

The 1st valvula articulates with the 1st valvifers. The 1st valvula is long and strap-like in appearance with a distinct tapering point at the posterior end (Figure 3). The pair of the 1st valvulae is connected anteriorly and become separated approximately one third down their length. The 2nd pair of valvulae is found internal to the 1st pair of valvulae. They articulate with the 2nd valvifers at one ramus. The articulation of the 2nd valvula with its valvifer is very close to that of the 1st valvula, and as a consequence, they lie very close to each other. The two pairs of valvulae are held together by a ridge. About a third down its length dorsally, the 2nd valvula takes the shape of a saw blade with approximately 35 teeth. The distal end of the 2nd valvula is somewhat rounded. The 3rd pair of valvulae is fused together by a membrane on the dorsal edge to enclose the 1st and 2nd valvulae. The 3rd valvula articulates with the 2nd valvifer anteriorly at a ramus opposite to that of the 2nd valvula. The 3rd valvula is darkly pigmented posteriorly and ventrally. Anteriorly and dorsally, it is membranous and connects to the pygofer. The pygofer is the outermost apparatus of the female genitalia. It is almost a ring-like structure and encloses the 3rd, 1st and 2nd valvulae in that order. Dorsally, it appears as one continuous tergum, but ventrally, it splits at a middle line exposing the ovipositor (1st and 2nd valvulae) and the 3rd valvulae. Ventrally, the pygofer articulates with the 2nd valvifers at one ramus.

The internal reproductive organs consist of a pair of ovaries (each consists of ca. 10 ovarioles/ovary), two lateral oviducts, a common oviduct, a spermatheca, accessory gland(s), and the genital chamber (Figure 4).

Currently, we are studying the morphology and anatomy of the male reproductive system. More research will be carried out to study oogenesis and spermatogenesis by histological and cytological methods.

Figure 1. Total Number of specimens of Glassy-winged sharpshooter collected on citrus at UCR in the summer of 2001.



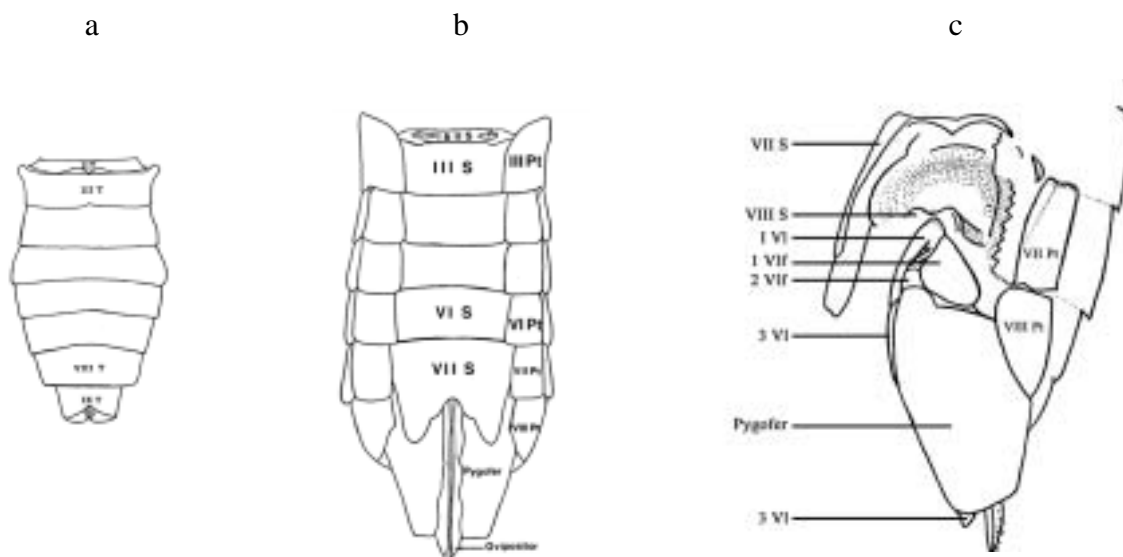


Figure 2. a. Dorsal view of the abdomen of a female GWSS. b. Ventral view. c. Lateral view to show the ovipositor.

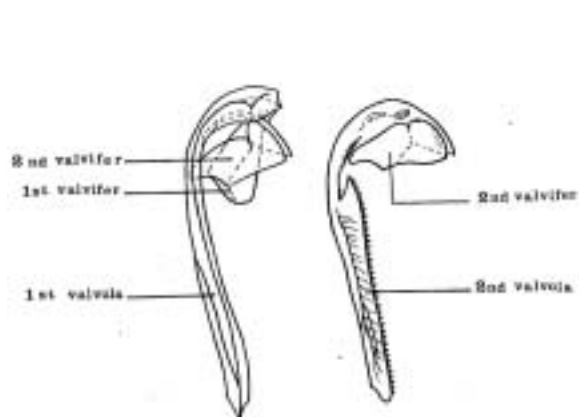


Figure 3. The ovipositor of a female GWSS.

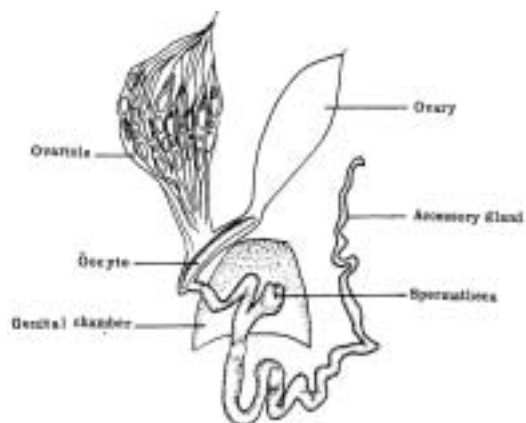


Figure 4. The reproductive organ of a female GWSS.

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