MAINTAINING AND EVALUATING QUARANTINE CULTURES OF *GONATOCERUS* SPP., PROMISING EGG PARASITOIDS FROM ARGENTINA AND MEXICO, FOR THE CLASSICAL BIOLOGICAL CONTROL OF THE GLASSY-WINGED SHARPSHOOTER IN CALIFORNIA

Project Leaders:
Mark S. Hoddle and Serguei Triapitsyn
Department of Entomology
University of California
Riverside, CA 92521

Cooperators:
David J. W. Morgan
CDFA, PDCP
Mt. Rubidoux Field Station
Riverside, CA

Guillermo A. Logarzo
USDA, ARS
South American Biological Control Laboratory
Washington, D.C.

Reporting Period: The results reported here are from work conducted July 1, 2005 to September 29, 2005.

ABSTRACT
This is a new project, which is expected to be completed within one year. Cultures of two species of mymarid (Hymenoptera: Mymaridae) egg parasitoids of proconiine sharpshooters (Hemiptera: Cicadellidae; Proconiini) of Argentina origin (*Gonatocerus tuberculifemur* (Ogloblin) and *Gonatocerus* "sp. 6") as well as of two species of *Gonatocerus* of Mexico origin (*G. morrilli* (Howard) and *G*. new sp. near *morrilli*) are being maintained in a UC Riverside quarantine laboratory. Basic biological data are being collected on these species, which are candidate agents for "classical" biological control against the glassy-winged sharpshooter (GWSS), *Homalodisca coagulata* (Say).

INTRODUCTION
Recommendation 3.12 of the National Research Council report on research priorities for Pierce's disease (NRC 2004, p. 74) suggests that support for "classical" biological control is preferred over augmentation if inoculative releases result in self-sustaining populations and can be shown to be less costly than augmentation. Currently, we have two candidate species of *Gonatocerus* for classical biological control of GWSS in California, *Gonatocerus tuberculifemur* (Ogloblin) and *Gonatocerus* "sp. 6", both of Argentina origin (Jones 2001; Logarzo et al. 2003; Pilkington 2004). These species were collected in Argentina by G. Logarzo and sent to S. Triapitsyn and are being held in the UC Riverside quarantine. Their colonies were successfully established using GWSS eggs as a host. We are continuing to rear these parasitoids until appropriate release permits are received; then the cultures will be turned over to the CDFA GWSS Biological Control Program for mass-rearing and inoculative releases in California against GWSS. Both parasitoids are very promising, aggressive natural enemies of GWSS, its fictitious host under the quarantine lab conditions. In their native range, *G. tuberculifemur* occurs both in the temperate South and the arid, hot North-West of Argentina. Both species readily and effectively attack GWSS eggs of almost any age. Biology of *G. tuberculifemur* was studied both in Argentina (Virla et al. 2005) and under quarantine conditions in the United States (Jones et al. 2005), who also studied its host range for non-target impact studies.

Additionally, two different species of *Gonatocerus*, *G. morrilli* (Howard) and *G.* new species near *morrilli* (Howard), were collected by L. Pilkington and S. Triapitsyn during the spring of 2005 in the course of our foreign exploration in Mexico (Hoddle & Triapitsyn 2004); their cultures were then established in UC Riverside quarantine. These Mexican species may also be promising agents for the "classical" biological control program against GWSS in California (Hoddle & Triapitsyn 2004).

OBJECTIVES
This project has two main objectives:
1. Maintain quarantine cultures of two species of egg parasitoids of GWSS of Argentina origin (*Gonatocerus tuberculifemur* and *G.* "sp. 6") as well as two species of *Gonatocerus* of Mexico origin (*G. morrilli* and *G*. new sp. near *morrilli*); and
2. Collect basic biological data on these species for their initial evaluation, necessary for obtaining necessary permits for their release and potential establishment in California.

The following experimental procedures are being used to accomplish these objectives, respectively: (1) Two species of *Gonatocerus* from Argentina and two species of the same genus from Mexico are being maintained in cages at UC Riverside quarantine facility. Fresh egg masses of the host (GWSS) in *Euonymus* leaves are supplied by D. Morgan. (2) Collected are data on the biological traits on these species of *Gonatocerus*, necessary for obtaining proper State and Federal release

permits. Alternate leafhopper hosts (e.g., eggs of *Homalodisca liturata* Ball, a native sharpshooter in California) may be tested to determine their potential host ranges.

RESULTS

Currently, we are at the beginning stage of this project. The Mexican cultures have been identified taxonomically as *G. morrilli* and *G.* new species near *morrilli*. The latter has a partially white, partially brown fifth funicle segment of the female antenna. Quarantine cultures of these two species, as well as of *G. tuberculifemur* and *G.* "sp. 6" from Argentina, have been successfully maintained by the quarantine technician employed by this project, Vladimir Berezovskiy, using GWSS eggs as a host.

Experiments conducted in quarantine revealed the negative role of superparasitism of the same egg mass on the egg parasitoid colonies, particularly on *G. tuberculifemur*, in which different female funicle segments may fuse under intense larval competition for resources. Vladimir Berezovskiy also discovered that in *G. tuberculifemur*, superparasitism of the few available eggs of GWSS by numerous, competing females may also result in low quality progeny (such as a much lower survival rate and often smaller size of the emerging adult wasps) than in cases when females have an abundant supply of host eggs and competition for hosts is not intense.

CONCLUSIONS

This research project would be of benefit primarily to the CDFA GWSS Biological Control Program as well as to other biocontrol specialists and agencies conducting projects against GWSS in California such as the USDA. Ultimately, this project may be beneficial to California's agriculture.

REFERENCES

Hoddle, M. S. and S. V. Triapitsyn. 2004. Searching for and collecting egg parasitoids of the glassy-winged sharpshooter and other *Homalodisca* species in southeastern and southwestern Mexico, pp. 339-341. *In*: Proceedings of the 2004 Pierce's Disease Research Symposium, December 7-10, 2004, Coronado Island Marriott Resort, Coronado, California. Copeland Printing, Sacramento, California, 391 p.

Jones, W. A. 2001. Classical biological control of the glassy-winged sharpshooter, pp. 50-51. *In*: Proceedings of the Pierce's Disease Research Symposium, December 5-7, 2001, Coronado Island Marriott Resort, San Diego, California. California Department of Food and Agriculture, Copeland Printing, Sacramento, California, 141 pp.

Jones, W. A., Logarzo, G. A., Triapitsyn, S. V., Casas, M., Virla, E. G. and Purcell, A. H. 2005. Biology and host range of 2 South American egg parasitoids (Hymenoptera: Mymaridae), possible biocontrol agents for Glassy-Winged Sharpshooter, *Homalodisca coagulata* (Say) (Hemiptera: Cicadellidae; Proconiini). Submitted Papers T7-T8. *In*: Submitted Papers T1-T21, 12th International Auchenorrhyncha Congress and 6th International Workshop on Leafhoppers and Planthoppers of Economic Significance, University of California, Berkeley, 8-12 August 2005. Available online (.pdf) at http://nature.berkeley.edu/hoppercongress/.

Logarzo, G., S. V. Triapitsyn and W. A. Jones. 2003. New host records for two species of *Gonatocerus* (Hymenoptera: Mymaridae), egg parasitoids of proconiine sharpshooters (Hemiptera: Clypeorrhyncha: Cicadellidae), in Peru. Florida Entomologist 86 (4): 486-487.

NRC. 2004. California Agricultural Research Priorities: Pierce's Disease. National Research Council of the National Academies, National Academies Press, Washington, D.C. 161 pp.

Pilkington, L. J., N. Irvin, E. A. Boyd, M. S. Hoddle, S. Triapitsyn, B. G. Carey and D. J. W. Morgan. 2004. Biological control of glassy-winged sharpshooter in California, pp. 133-136. *In*: [Proceedings] California Conference on Biological Control IV, held July 13-15, 2004 at UC Berkeley, California (M. S. Hoddle, Ed.), 152 pp.

Virla, E. G., G. A. Logarzo, W. A. Jones and S. Triapitsyn. 2005. Biology of *Gonatocerus tuberculifemur* (Hymenoptera: Mymaridae), an egg parasitoid of the sharpshooter, *Tapajosa rubromarginata* (Hemiptera: Cicadellidae). Florida Entomologist 88 (1): 67-71.

FUNDING AGENCIES

Funding for this project was provided in part by the CDFA Pierce's Disease and Glassy-winged Sharpshooter Board.