I. PROJECT TITLE

VOUCHERING SPECIMENS OF EGG PARASITOIDS OF THE GLASSY-WINGED SHARPSHOOTER COLLECTED BY THE CDFA PIERCE'S DISEASE BIOLOGICAL CONTROL PROGRAM IN CALIFORNIA AND TEXAS A&M IN TEXAS

II. PRINCIPAL INVESTIGATORS AND COOPERATORS

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Reporting Period: The results reported here are from work conducted from 1 July 2011 to 29 February 2012.

III. LIST OF OBJECTIVES AND DESCRIPTION OF ACTIVITIES CONDUCTED TO ACCOMPLISH EACH OBJECTIVE

OBJECTIVES
(1) Check the taxonomic identities of all the specimens of GWSS egg parasitoids from California; pull out specimens of taxonomic and voucher interest.

More than 7,500 vials with GWSS egg parasitoids were received, in batches (Photo 1), from the CDFA Mt. Rubidoux Field Station in Riverside and their identities were checked, and necessary determinations were made by the PI. The list with the determination was submitted to the CDFA personnel for their files. Specimens of taxonomic interest were pulled out and mounted properly on points and/or slides.

(2) Transfer of the bulk of the voucher specimens from Texas into leak-proof vials for long-term storage; label properly (using archival, acid-free paper) and database all the vials using barcodes with unique numbers. Fully identify and catalog approximately 7,000 GWSS parasitoids collected by Texas A&M in the native range of GWSS.

930 vials with GWSS egg parasitoids were received (Photo 2) from Texas AgriLife Research and Extension Center at Stephenville along with files with the information on them. All parasitoids in these vials (usually multiple specimens and often species in each vial) were identified by the PI to species or, in rare instances when the specimens are poorly preserved, to genus.

(3) Prepare valuable representatives of each species (at least 10% of all the specimens) that will be dried from ethanol using a critical point dryer, point-mounted as museum quality vouchers, labeled, and databased.

Not yet accomplished, work on this objective will begin in May 2012 because technician's time has not been available.

IV. SUMMARY OF MAJOR RESEARCH ACCOMPLISHMENTS AND RESULTS FOR EACH OBJECTIVE

(1) Check the taxonomic identities of all the specimens of GWSS egg parasitoids from California; pull out specimens of taxonomic and voucher interest.

More than 7,500 vials with GWSS egg parasitoids were received, in batches, from the CDFA Mt. Rubidoux Field Station in Riverside and their identities were checked, and necessary determinations were made by the PI, particularly all determinations of the Trichogrammatidae (numerous *Ufens ceratus*, *Ufens principalis*, and a few *Pseudoligosita* new species). The Mymaridae identified or whose identities were confirmed included numerous *Gonatocerus ashmeadi, G. fasciatus, G. incomptus, G. morgani, G. morrilli,*

G. novifasciatus, *G. triguttatus*, and *G. walkerjonesi*). The list with the determination was submitted to the CDFA personnel for their files. Specimens of taxonomic interest (ca. 50 from 12 vials) were pulled out and mounted properly on points and/or slides.

(2) Transfer of the bulk of the voucher specimens from Texas into leak-proof vials for long-term storage; label properly (using archival, acid-free paper) and database all the vials using barcodes with unique numbers. Fully identify and catalog approximately 7,000 GWSS parasitoids collected by Texas A&M in the native range of GWSS.

930 vials with GWSS egg parasitoids were received (from Texas AgriLife Research and Extension Center at Stephenville along with electronic files with the information on them. All parasitoids in these vials (usually multiple specimens and often species in each vial) were identified by the PI to species or, in rare instances when the specimens are poorly preserved, to genus. The species identified included numerous *G. ashmeadi*, *G. triguttatus*, and some *G. morrilli* and *G. incomptus* (Mymaridae), and also numerous *Burksiella spirita* and *Ufens ceratus* (Trichogrammatidae). Supplies for their transfer to proper, leak-proof vials have been already purchased, and transferring, labeling, and databasing of the vials will be conducted starting 5/1/2012 because technician's time has not been available.

(3) Prepare valuable representatives of each species (at least 10% of all the specimens) that will be dried from ethanol using a critical point dryer, point-mounted as museum quality vouchers, labeled, and databased.

Not yet accomplished, work on this objective will begin in May 2012 because technician's time has not been available.

V. PUBLICATIONS OR REPORTS RESULTING FROM THE PROJECT

Triapitsyn, S.V. 2011. Vouchering specimens of egg parasitoids of the glassy-winged sharpshooter collected by the CDFA Pierce's Disease Biological Control Program in California and Texas A&M in Texas 2011. In: *Proceedings of the 2011 Pierce's Disease Research Symposium, December 13–15, 2011, Sheraton Grand Sacramento Hotel, Sacramento, California, organized by California Department of Food and Agriculture* (Esser, T., Chief Ed., West, D., Associate Ed.). Time Printing, Inc., Sacramento, California, pp. 17-18. Available online at http://www.cdfa.ca.gov/pdcp/Research_Symposium_Index.html.

VI. PRESENTATION ON RESEARCH

The PI made a presentation, as a speaker, at the 2011 Pierce's Disease Research Symposium, December 13–15, 2011, Sheraton Grand Sacramento Hotel, Sacramento, California, organized by California Department of Food and Agriculture, entitled: "Egg parasitoids of sharpshooters in the New World".

VII. RESEARCH RELEVANCE STATEMENT

Recently (since 1997), major efforts have been undertaken by the CDFA GWSS Biological Control Program to survey for egg parasitoids of GWSS in California and to release several egg parasitoid species (*Anagrus epos* Girault, *Gonatocerus* spp.) from other states in the USA and also northeastern Mexico as part of the classical biological control effort (CDFA 2011).
It is well known that the taxonomic impediment in identification of natural enemies may adversely affect the biological control efforts against agricultural pests. In the case of the GWSS, early misidentifications (due to objective reasons, such as partially inaccurate existing keys) of one of the species of the California native egg parasitoids of GWSS (as *Gonatocerus morrilli* (Howard)) resulted in the inability of biological control practitioners to distinguish them from the introduced "real" *G. morrilli* from Texas and northwestern Mexico. Therefore, contamination of the colonies in the mass-rearing program was noticed only after the molecular methods distinguished them as two genetically different entities. The "California *G. morrilli*" was later described taxonomically as a new species, *Gonatocerus walkerjonesi* Triapitsyn, based on the combination of molecular evidence and some morphological differences that are difficult to observe without special preparation of the specimens. Another native species, *Gonatocerus morgani* Triapitsyn, was also described from Orange Co., CA; it is now being mass-produced and released in other parts of California infested with GWSS. As proper part of the ongoing biological control program against GWSS, the CDFA GWSS Biological Control Program has conducted extensive pre- and post-surveys of the egg parasitoids of GWSS in California from 2001. These surveys, which also included egg parasitoids of the native sharpshooter in California, the smoke-tree sharpshooter *Homalodisca liturata* Ball, have resulted in collection of about 10,000 specimens of egg parasitoids (Mymaridae and Trichogrammatidae) which are stored, along with voucher specimens of the numerous colonies of GWSS egg parasitoids maintained by the CDFA, in more than 7,500 vials at the CDFA Mt. Rubidoux Field Station in Riverside, CA. Also, Dr. Forrest L. Mitchell has kindly donated to the CDFA GWSS Biological Control Program 930 vials of GWSS parasitoids collected in Fredricksberg Co., TX, by Texas A&M staff. These insects were collected during 2005-2007, each vial containing parasitoids that have emerged from a single egg mass (ca. 8 individuals per vial, but often many more). We are curating these collections to preserve the invaluable voucher specimens for further analyses (including molecular, distributional, taxonomic, biological, etc.), thus making them available. The specimens and information on them will be useful for the California Department of Agriculture GWSS/PD Biological Control Program and biological control research practitioners in this state and beyond.

VIII. LAY SUMMARY OF CURRENT YEAR'S RESULTS

Important, irreplaceable, and numerous voucher specimens of the GWSS egg parasitoids from California and Texas were identified to species (several representatives of the families Mymaridae and Trichogrammatidae) and are being curated in the course of this one-year project. Museum-quality specimens have been and will be prepared and preserved. Its main objectives are to label (using archival paper and unique plastic database numbers), identify, database (including georeferencing), preserve, and partially dry from ethanol and point-mount specimens among at least 17,000 voucher specimens of mymarid and trichogrammatid egg parasitoids of GWSS. These were either collected (reared) by the CDFA GWSS Biological Control Program personnel in California since 2001 in the course of pre- and post-release surveys, are irreplaceable vouchers of the colonies of the biological control agents that were released in California (both exotic and native), or were collected by staff of Texas A&M in Texas since 2005. Taxonomic identifications were checked and, when necessary, specimens were identified by the PI for the California material (more than 7,500 vials). Specimens from Texas (in 930 vials) were all identified to species and will be transferred into leak-proof vials with good stoppers to prevent alcohol leakage, labeled properly using acid-free archival paper, and databased using UC Riverside Entomology Research Museum numbering system which then can be made available online if desired. Valuable representatives of each species (at least 10% of all the specimens) will be dried from ethanol using a critical point dryer and point-mounted as museum quality vouchers, and also will be labeled and databased. Most voucher specimens from Texas will be submitted to the CDFA Mt. Rubidoux Field Station in Riverside to be eventually transferred for storage the California State Collection of Arthropods (CDFA) in Sacramento, its permanent depository; some duplicate representatives and a few taxonomically important specimens will be also deposited in the UC Riverside Entomology Research Museum.

IX. STATUS OF FUNDS.

As of 2/8/2012, $23,087 remained available, with only a small portion of the funds spent to order necessary supplies (vials and proper stoppers) to accomplish Objective 3. No funds have been spent for salaries (the bulk of the budget), because technician's time will not be available until 5/1/2012. To complete this project using existing funds, the PI is applying for a no-cost extension until 12/31/2012.

X. SUMMARY AND STATUS OF INTELLECTUAL PROPERTY PRODUCED DURING THIS RESEARCH PROJECT.

Not applicable.

Photo 1. A tray of vials with CDFA’s voucher specimens of GWSS egg parasitoids from California

Photo 2. Vials with Texas A&M University’s voucher specimens of GWSS egg parasitoids from Texas