

**PREPARING AND SUBMITTING FOR PUBLICATION A PICTORIAL, ANNOTATED KEY TO *GONATOCERUS* SPECIES AND OTHER GENERA AND SPECIES OF MYMARIDAE (HYMENOPTERA) – EGG PARASITOIDS OF *HOMALODISCA* SPP. AND OTHER PROCONIINE SHARPSHOOTERS IN NORTH AMERICA, WITH EMPHASIS ON THE SPECIES NATIVE OR INTRODUCED TO CALIFORNIA**

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**Reporting Period:** The results reported here are from work conducted from July 1, 2004 to October 6, 2004.

**ABSTRACT**

We are at the first stage of this project (preparatory and curatorial work with voucher and other museum specimens).

**INTRODUCTION**

In North America, egg masses of proconiine sharpshooters (Hemiptera: Clypeorrhyncha: Cicadellidae: Cicadellinae: Proconiini), which are known or potential vectors of *Xylella fastidiosa*, are parasitized by various Mymaridae and Trichogrammatidae. An illustrated, annotated key to the genera and species of such Trichogrammatidae was already published (Triapitsyn 2003). However, a pictorial key, which could be used by non-taxonomists for recognition of the genera and species of Mymaridae, which are largely responsible for native biological control of proconiine sharpshooters in California, is lacking. In addition to the native mymarid parasitoids, several exotic species of *Gonatocerus* have been released recently in California as part of a classical biological control program against the glassy-winged sharpshooter (GWSS), *Homalodisca coagulata* (Say), conducted by University of California, Riverside, CDFA, and USDA researchers. The proposed key will be a useful tool to distinguish them from other species of the same genus with similar host associations.

Moreover, because of the easy availability of proconiine sharpshooter eggs in California due to the establishment and outbreak of GWSS, there is a real possibility of non-intentional introductions of exotic egg parasitoids from countries in Central and South America. Recently, Dr. David Morgan (pers. comm.) reared from GWSS eggs in Irvine (Orange County) and submitted for identification an apparently undescribed species of *Gonatocerus* which is morphologically similar to some Central American taxa. This species has neither been known before from North America nor has been used in any biological control program. The proposed key (in which it will be described as a new taxon) will facilitate recognition of such species in California should they appear. Two new species of *Gonatocerus* from eastern Mexico ("*G. nr. ashmeadi*" and "*G. nr. morrilli*") will also be described, as they are perspective agents for introduction in California against GWSS.

Egg masses of the closely related *Homalodisca* and *Oncometopia* species, including GWSS, are parasitized by many species of *Gonatocerus*, all of which are members of the *ater* species group (Triapitsyn, 2002a, 2002b; Triapitsyn, Bezark & Morgan 2002). *Acmopolynema* is the other mymarid genus that parasitizes eggs of *Homalodisca* (Triapitsyn, Hoddle & Morgan 2002). A species of *Anagrus* has been recently discovered as yet another genus of Mymaridae capable of parasitizing eggs of proconiine sharpshooters (Hoddle & Triapitsyn 2004). All mymarids, including *Gonatocerus*, are difficult to determine to species without expensive and labor-intensive preparation procedures such as critical point drying and slide-mounting, and their males are not easily recognizable at present. Consequently, a key to both sexes is being prepared that will be richly illustrated with color photographs of the main diagnostic characters as well as whole digital images of the species involved. Such a key will make it possible to correctly identify the most common mymarid parasitoids of *Homalodisca* and other proconiine sharpshooters directly in ethanol.

The material for this project has been accumulated mostly since 1997, with the beginning of surveys of egg parasitoids of GWSS in California and elsewhere in North America (Triapitsyn et al. 1998).

**OBJECTIVES**

This proposal has one main objective:

1. Prepare and submit for publication a pictorial, annotated key to mymarid egg parasitoids (mainly *Gonatocerus* spp.) of proconiine sharpshooters in North America, with emphasis on the species native or introduced to California. This key will also be made available on-line. The following experimental procedures are and will be used to accomplish this objective:

1. Preparatory and curatorial work. Egg parasitoids of GWSS and other proconiine sharpshooters were discovered through survey activities in California during 1996-2003 (Triapitsyn & Phillips 1996; Triapitsyn et al. 1998, Phillips et al. 2001, and S. Triapitsyn, unpublished) as well as elsewhere in the United States and Mexico conducted in 1997 (Triapitsyn et al. 1998), southeastern Texas in 1999 (Triapitsyn & Phillips 2000), Louisiana, northern Florida, southern Georgia, and southeastern Texas in 2000 (Morgan et al. 2000 and S. Triapitsyn, unpublished), throughout Florida and in Texas in 2001 (Triapitsyn and Hoddle 2001), in Georgia, Illinois, Louisiana, Kentucky, Mississippi, North Carolina, South Carolina, and Tennessee in 2002-2004 (Triapitsyn & Hoddle 2002; Hoddle & Triapitsyn 2003, 2004; Triapitsyn et al., 2003), and in Mexico during 1999-2003 (Triapitsyn & Phillips 2000, Triapitsyn, Bezark & Morgan 2002). Many of the discovered parasitoids were imported into UC Riverside quarantine, propagated, and their cultures turned over to CDFA and USDA researchers who released them in California under appropriate permits for biological control of GWSS. All mymarid parasitoids resulting from those surveys and laboratory and insectary colonies were preserved in 70% ethanol and deposited in the Entomology Research Museum at UC Riverside, California. Hundreds of such specimens of *Gonatocerus* and other Mymaridae are curated in the course of this project, and additional specimens will be made available from collections made in California by David Morgan. These are critically point-dried from ethanol, point- or card-mounted, labeled, and identified to species. Then representatives of each species (of both sexes) are selected, dissected, and slide-mounted. This is necessary for making digital photographs of the main distinguishing characters of each species.

2. Preparation of the illustrations and the key. After preparatory work with the specimens is complete, the three new species of *Gonatocerus* will be described taxonomically. Then we will take digital photographs (using AutoMontage digital technology) of the diagnostic features of each species as well as images of the habitus of females and males of each species. An illustrated key will be prepared, annotated with the diagnoses as well as data about host associations and distribution of all the species included in the key.

## RESULTS

Currently, we are at the first stage of this project (preparatory and curatorial work with voucher and other museum specimens). Principal Museum Preparator at the UC Riverside Entomology Research Museum (V. V. Berezovskiy) extracts egg parasitoids of proconiine sharpshooters from alcohol samples and point- and slide-mounts them. The specimens then get proper labels. All identifications are made by S. V. Triapitsyn. A genetic analysis of *G. "nr. ashmeadi"* from Mexico has been made by Danel Vickerman, and this species is ready to be described as a new taxon ( a separate publication is in preparation).

## CONCLUSIONS

Research resulting from this project will be of significant benefit to biological control (especially to the CDFA/PD Biological Control Program) specialists, ecologists, and vineyard supervisors that manage the Pierce's disease threat posed by GWSS. When completed, this key will enable even non-taxonomists to quickly identify both sexes of mymarid egg parasitoids of *Homalodisca* spp. in California, differentiate native vs. introduced species of *Gonatocerus*, provide information on candidate species of Mymaridae for introduction as part of biological control programs, facilitate surveys for assessing levels of egg parasitism of *H. coagulata* in the vineyards and orchards in California, and indicate all known host associations of the mymarid species important for native or classical biological control of glassy-winged sharpshooter and related species and genera of sharpshooters.

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#### **FUNDING AGENCIES**

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