Purdue University
Department of Entomology
Undergraduate Capstone
Project Summary

Name of Student:

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Name of Mentor:

Dr. Catherine Hill

Name of Academic Advisor:

Dr. Tom Turpin

Project Title:

A Revision of Siverly's Key to Adult Female Mosquito Genera of Indiana with Updated Information

Background

Since May of 2010 I have been an intern for the Elkhart Co. Environmental Health Dept. during the summer. My responsibilities have varied depending on what and where I was needed during that time but my main task has always been the collection and identification of mosquitoes to recognize potential vectors in the county. Included with this has been regular visits to over 100 larval development sites, complaint investigations, evaluating potential new sites, treatment of larvae when deemed necessary, and the maintaining of a digital record for the county. In addition all larvae and adult female mosquitoes collected from traps and samples in the field are sorted and identified to genus and species.

When in the lab indentifying mosquitoes my primary source has been the keys found in Siverly's Mosquitoes of Indiana, published in 1972. Even after so many years it is still quite reliable in many respects and the only source with keys for the larvae and adult females found in the state. However it does have its limitations and even with several years of experience using it, can still be frustrating to use at times.

Issues with Siverly's Mosquitoes of Indiana (1972):

- ☐ Changes in species nomenclature & taxonomy (i.e. Aedes/Ochlerotatus debate)
- ☐ Introduction of arboviruses (i.e. West Nile) and newly confirmed vector species.
- ☐ Illustrations are limited in the amount of detail provided for adult keys or nonexistent with some topics covered (i.e. Oviposition behavior)

With all this taken into consideration it looked like an update to the material for public health officials to use throughout the state would be beneficial. While not everything needed to be overhauled such as the keys for larvae, there were still areas that could be addressed within a reasonable timeframe. Additional target audiences would include extension specialists and the material would be presented in such a way as to make it easy to use by the general public too.

Methods

Background Research began during the summer of 2011 and after discussing the project further with Drs. Hill and MacDonald it was determined the greatest contribution within the timeframe was to revise the key to adult female genera while including accurate photos from collection specimens.

Course of Action:

- ☐ Reviewed 6 different taxonomic keys of mosquito genera in planning the revision to Siverly
- ☐ Search and review of primary literature available in print and online (20+)
- ☐ Taken (30+) photos with the camera mounted microscope recently purchased by the department using specimens in the medical entomology collection here at Purdue
- ☐ Consulted with sources such as the Canadian Journal of Arthropod Identification, the University of Florida's Medical Entomology Lab, and the Walter Reed Biosystematics Unit.

Several drafts later, the key looks to use simple and practical characteristics to make the identification of the mosquito genera as simple and easy as possible.

Revisions to the Key (figure 1 & 2):

- ☐ Kept several core elements such as the inclusion of the monotypic genera within the larger genera key.
- ☐ Removed wing venation and several characteristics that deal with scales, bristles, and hairs.
- ☐ Photos allow for a better description of some features and clarification on others that were confusing in the past.

Proposed Format of the Key

This is the current layout of the material in its proposed form but as some things are still being developed and reviewed this is subject to change. Upon completion this project will be made available in a pdf format online where it can be accessed through the Purdue Entomology Extension website (http://extension.entm.purdue.edu/). The expected date of publication will be during the summer of 2012. Overall the material will cover all 10 genera of mosquitoes found in the state which have been spit into those with only a single representative species and those with more than one but the format (figure 3) in which they are covered is the same. In addition to this is an overview of the mosquito life cycle, a section containing terms to know, and additional resource links.

Publish Summer 2012 as a PDF on the Purdue Entomology Extension website

- ☐ Introductory Text
  - ◘ Mosquito life cycle overview (i.e. Oviposition behavior)
  - ◘ Terms to know and additional links (i.e. Purdue Extension, CDC, Walter Reed Biosystematics Unit)
- ☐ Key to Adult Female Genera (10)
- ☐ Profiles of Genera
  - ◘ *Aedes*/*Ochlerotatus*
  - ◘ *Anopheles*
  - ◘ *Culex*
  - ◘ *Culiseta*
  - ◘ *Psorophora*
- ☐ Profiles of Monotypic Genera
  - ◘ *Coquillettidia perturbans*
  - ◘ *Orthopodomyia signifera*
  - ◘ *Toxorhynchites r. septentrionalis*
  - ◘ *Uranotaenia sapphirina*
  - ◘ *Wyeomyia smithii*
- ☐ References

Acknowledgements

- ☐ Purdue Entomology Department
- ☐ Dr. Catherine Hill
- ☐ Dr. John MacDonald
- ☐ Elkhart Co. Environmental Health Department
- ☐ Consulting Sources

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Figure 1

Siverly Key

7. Wing scales narrow, majority of scales dark (Fig. 2-38) 8
7. Wing scales broad, conspicuously dark and light intermixed (Fig. 2-39) 9

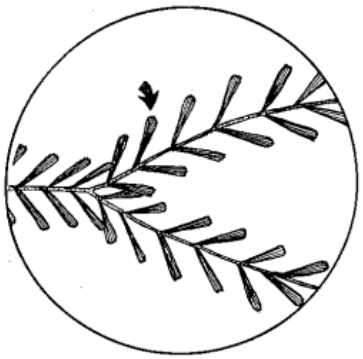

Figure 2-38.

Figure 2-39.

Figure 2

Revised Key

7(5'). Scales on wings narrow with the majority of them dark in coloration (figure 1). → **8**

7'. Scales on the wings broad, a mixture of pale and dark scales giving the wings a salt-and-pepper appearance (figure 2). → **9**

Figure 1

Figure 2

Figure 3

Toxorhynchites rutilus septentrionalis Profile Template

Genus/Species: *Toxorhynchites rutilus septentrionalis* (*abbreviated T. r. septentrionalis*)

Oviposition Behavior: Direct hatching eggs

Overwintering Strategies: Late instar larvae are the mode of overwintering for this species.

Number of Generations/year:

Multiple generations occur with up to five being recorded in parts of the southern United States.

Larval Habitat:

T. r. septentrionalis develop in tree-hole environments but can just as easily be found in artificial containers too.

Activity:

Both males and females of all species within this genus are nectar feeders by day and do not bite humans.

Medical Importance:

This species is of no recognized medical importance

Nuisance Species:

This species is not considered a nuisance

General Information on Biology of the Genus/Species:

T. r. septentrionalis is as big if not bigger than *P. ciliata* but not nearly as common. The larvae are veracious predators of other mosquito species and have even been used as biocontrol for them in the past. Interestingly the larvae do not attack anything unless it is moving. With such characteristics one might easily draw a parallel between it and the *T. rex* from the Jurassic Park films.

Additional Notes on Identification:

With the combined characters of the key and the uniqueness of the species in Indiana it would be very hard to misidentify anything but a severely damaged *T. r. septentrionalis*. However loss of the bent proboscis would be an example in this instance where misidentification might occur.

Photo by John Diller

Photo Credit: Patrick Coin