

Field Collection and Laboratory Rearing of Pentatomoidea for Host-Specificity Testing



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Overview

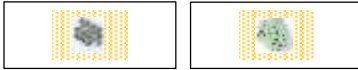
1. Introduction to Pentatomoidea of Michigan
2. Collecting Methods
3. Rearing Methods
4. Life History Results
5. Conclusions
6. Future Work



Introduction

Why Collect and Rear Pentatomoidea?

Host-Specificity Testing



Introduction

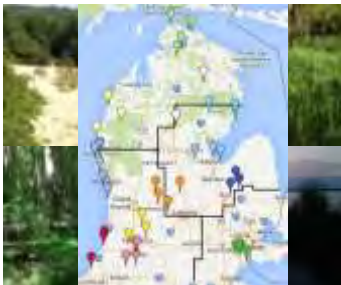
Pentatomoidea in Michigan

- Acanthosomatidae - 3 species
- Cydnidae - 7
- Pentatomidae - 51
- Scutelleridae - 5
- Thyreororidae - 12



Collecting

Collecting Localities



We mapped 8,000 Pentatomoidea specimens in the MSU Department of Entomology's A.J. Cook Arthropod Research Collection to determine locations for field collection.

Collecting

Methods

- Sweeping
- Beating
- Black lighting
- Trapping

Total Collected: 38 species!





Rearing



Materials

Food

	Yes	No
Lettuce	X	
Sunflower Seeds	X	
Carrots	X	
Potato		X
Apple		X
Cucumber		X


Cages

Rearing

Standard Operating Procedures




Egg

- Checked daily.
- Approx. nymph hatch.
- Moved into nymph colonies.

Environmental chambers

- 25 °C.
- 60-80% RH.
- 16:8 L:D cycle.



Nymph

- Food changed twice per week.
- Checked twice per week for adults.

Adult

- Food changed twice per week.
- Checked for eggs daily.

*** Predatory stinkbugs are fed live food three times per week ***

We maintained up to 28 native species of Pentatomoidea in colony at the same time!

Results

Acanthosomatidae

- 3 species in Michigan.
- 1 species collected.

Characters:

- Tibiae not armed with spines.
- Scutellum triangular.
- Tarsi 2-segmented.

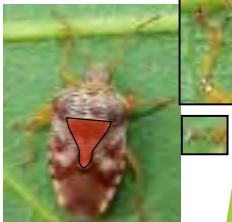


Photo by: Brandon Woo
http://bugguide.net/node/view/933483


Results

Cydnidae

- 7 species in Michigan.
- 2 species collected.

Characters:

- Tibiae armed with spines.
- Scutellum triangular.



Results

Cydnidae

Sehirus cinctus cinctus Palisot de Beauvois




Lays eggs in masses.

Egg Clusters

- Avg. Cluster: 40.33
- Approx. Hatch Rate: 62%

Generations

- Number of generations: 3
- Avg. Days/Generation: 64.33



Results

Scutelleridae

- 5 species in Michigan.
- 2 species collected.

Characters:

- Tibiae not armed with spines.
- Scutellum greatly enlarged.

Results
Scutelleridae

***Eurygaster alternata* (Say)**


Egg Clusters

- Avg. Cluster: 7.11
- Approx. Hatch Rate: 78%

Generations

- N: 0
- Eggs to Nymphs: 8.6 days
- Nymphs to Adults: 47 days

Difficulty getting 2nd Generation adults to lay eggs.



Results

Thyreocoridae


- 12 species in Michigan.
- 6 species collected.

Characters:

- Tibiae armed with spines.
- Scutellum greatly enlarged.

Corimelaena

Galgapha



Results
Thyreocoridae

***Corimelaena* spp.**

C. agrella McAtee
C. lateralis lateralis (Fabricius)
C. nigra Dallas
C. obscura McPherson and Sailer
C. pulicaria (Germar)

Egg Clusters


- Avg. Cluster: 1.00
- Approx. Hatch Rate: 85%

Generations

- No 2nd generation eggs
- Egg to Nymph: 11.23 days
- Nymph to Adult: 38.33 days

Lays eggs singly.

Note: The data and photo are from the species with the scientific name boxed.



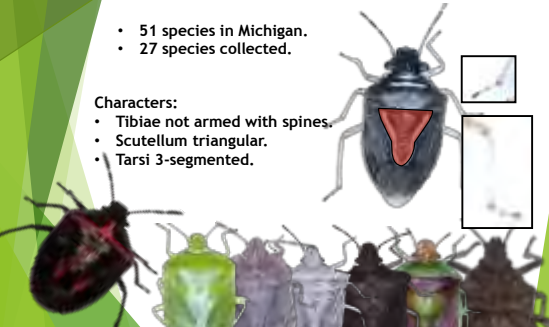
Results

Pentatomidae

- 51 species in Michigan.
- 27 species collected.

Characters:

- Tibiae not armed with spines.
- Scutellum triangular.
- Tarsi 3-segmented.



Results
Pentatomidae

***Banasa* spp.**

B. dimidiata (Say)
B. sordida (Uhler)

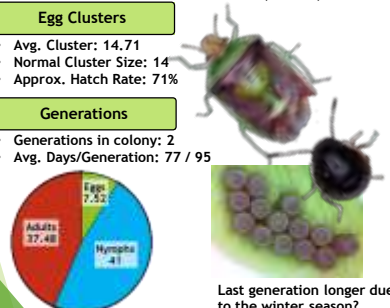
Egg Clusters

- Avg. Cluster: 14.71
- Normal Cluster Size: 14
- Approx. Hatch Rate: 71%

Generations

- Generations in colony: 2
- Avg. Days/Generation: 77 / 95

Low hatch rate!



Last generation longer due to the winter season?

Results
Pentatomidae

***Chinavia* spp.**

C. hilaris (Say)
C. pennsylvanica (Say)

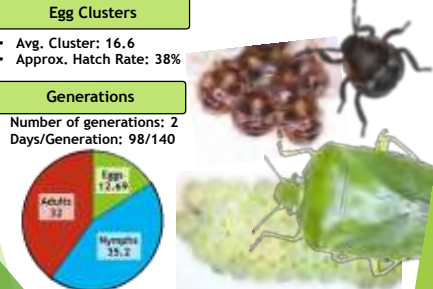
Egg Clusters

- Avg. Cluster: 16.6
- Approx. Hatch Rate: 38%

Generations

- Number of generations: 2
- Days/Generation: 98/140

Low hatch rate!



Results

Pentatomidae

Coenus delius (Say)

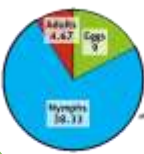
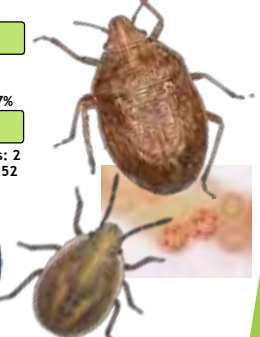
Individuals lay eggs quickly after final molt.

Egg Clusters

- Normal egg cluster: 10
- Avg. Cluster: 9.2
- Approx. Hatch Rate: 37%

Generations

- Number of Generations: 2
- Avg. Days/Generation: 52

Results

Pentatomidae

Cosmopepla lintneriana (Kirkaldy)


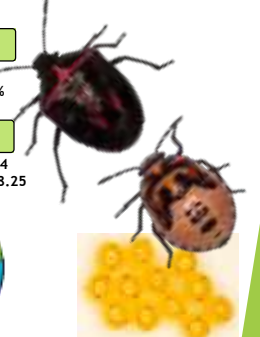
Quickest generation time at 38 days.

Egg Clusters

- Avg. Cluster: 9.11
- Approx. Hatch Rate: 58%

Generations

- Number of Generations: 4
- Avg. Days/Generation: 38.25

Results

Pentatomidae

Euschistus spp. *E. servus* Vollenhoven *E. tristigma luridus* Dallas *E. variolarius* Palisot de Beauvois *E. Ictericus* (Linnaeus)

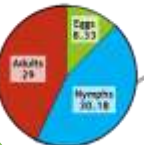

Reared for five generations and still going strong!

Egg Clusters

Avg. Cluster: 14.78
Approx. Hatch Rate: 61%

Generations

Number of Generations: 5
Avg. Days/Generation: 93.5

Results

Pentatomidae

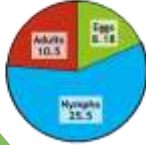
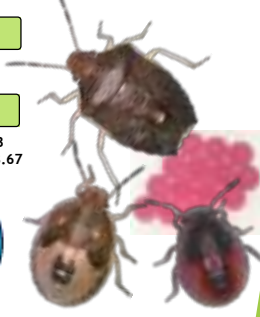
Holcostethus limbolarius (Stål)

Number of Generations: 3
Avg. Days/Generation: 58.67

Egg Clusters

Avg. Cluster: 10.24
Approx. Hatch Rate: 68%

Generations

Results

Pentatomidae

Podisus spp. *P. brevispinus* Thomas *P. maculiventris* (Say)



Only predatory genus successfully reared!

Egg Clusters

Avg. Cluster: 15.88
Approx. Hatch Rate: 64%

Generations

Number of Generations: 2
Avg. Days/Generation: 39 - 46.26

Results

Pentatomidae

Thyanta custator accerra McAtee



Spring / Fall Color morphs.

Egg Clusters

Avg. Cluster: 24.62
Approx. Hatch Rate: 54%

Generations

Number of generations: 7
Avg. Days/Generation: 49.33

Results

Pentatomidae

Brochymena quadripustulata Fabricius
Parabrochymena arborea (Say)



Discussion

Outcomes to Date:

1. Developed successful rearing conditions for the majority of the known Pentatomidae and Cydnidae in Michigan.
2. Worked on rearing conditions for the Acanthosomatidae, Thyreocoridae, and Scutelleridae.
3. Provided native stink bug eggs for use in host-specificity testing of the first potential biological control agent for BMSB, the egg parasitoid *Trissolcus japonicus* (Ashmead) (Hymenoptera: Platygasteridae).
4. Added to distribution data of native and introduced Pentatomidae.

Future Work

Next Steps:

1. Develop rearing systems for the species with which we had difficulties.
2. Create life tables for species that we are able to successfully rear.
3. Compare the life cycles and generation times of native stink bugs to the brown marmorated stink bug to determine interactions between them.

THANK YOU!

Thanks to our terrific Undergraduate Research Assistants: Zachary Johnson, Heather L. Leech, Megan A. Lowlor, Brooke E. Merrill, Ryan L. Paul, and Omar Tenorio-Leyva; Laboratory Manager Gary L. Parsons; and Post-doctoral Research Associate Paul S. Botch. Special thanks to Paul for presenting this paper for us at the BMSB Working Group Meeting.

Funding from USDA-APHIS Farm Bill Grant No. 11-13-8130-024 CA (Principal Investigator Ernest S. Delfosse) is gratefully acknowledged.

We are particularly appreciative to all of our BMSB Citizen Scientists who helped collect stink bugs for us this summer!

Questions?

