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

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

Pentatomoidea in Michigan
- Acanthosomatidae - 3 species
- Cydnidae - 7
- Pentatomidae - 51
- Scutelleridae - 5
- Thyreocoridae - 12
**Rearing**

**Materials**

<table>
<thead>
<tr>
<th>Food</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lettuce</td>
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<td></td>
</tr>
<tr>
<td>Sunflower Seeds</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Carrots</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Potato</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Apple</td>
<td>X</td>
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<tr>
<td>Cucumber</td>
<td>X</td>
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</tbody>
</table>

**Cages**

**Standard Operating Procedures**

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

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

- **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.

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**Results**

**Acanthosomatidae**

- 3 species in Michigan.
- 1 species collected.

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

![Photo](http://bugguide.net/node/view/653483)

**Cydnidae**

- 7 species in Michigan.
- 2 species collected.

Characters:
- Tibiae armed with spines.
- Scutellum triangular.

**Sehirus cinctus cinctus**

- Palisot de Beauvois
- Egg Clusters
  - Avg. Cluster: 40.33
  - Approx. Hatch Rate: 62%
- Generations
  - Number of generations: 3
  - Avg. Days/Generation: 64.33

**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

**Thyreocoridae**

- 12 species in Michigan.
- 6 species collected.

**Characters:**
- Tibiae armed with spines.
- Scutellum greatly enlarged.

**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

**Pentatomidae**

- 51 species in Michigan.
- 27 species collected.

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

**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

*Last generation longer due to the winter season!*

**Low hatch rate!**

**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
**Coenus delius (Say)**

- Egg Clusters:
  - Normal egg cluster: 10
  - Avg. Cluster: 9.2
  - Approx. Hatch Rate: 37%
- Number of Generations: 2
- Avg. Days/Generation: 52

**Egg Clusters**
- Nymphs: 58.3%
- Adults: 24%
- Eggs: 22%

**Cosmopepla lintneriana (Kirkaldy)**

- Egg Clusters:
  - Avg. Cluster: 9.11
  - Approx. Hatch Rate: 58%
- Number of Generations: 4
- Avg. Days/Generation: 38.25

**Egg Clusters**
- Nymphs: 22.7%
- Adults: 38.6%
- Eggs: 49.7%

**Results**

- Pentatomidae

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

- Egg Clusters:
  - Avg. Cluster: 14.78
  - Approx. Hatch Rate: 61%
- Number of Generations: 5
- Avg. Days/Generation: 93.5

**Generations**
- Nymphs: 40.1%
- Adults: 42.2%
- Eggs: 17.7%

**Results**

- Pentatomidae

**Holcostethus limbolarius (Stål)**

- Egg Clusters:
  - Avg. Cluster: 10.24
  - Approx. Hatch Rate: 68%
- Number of Generations: 3
- Avg. Days/Generation: 58.67

**Generations**
- Nymphs: 38.9%
- Adults: 38.6%
- Eggs: 22.5%

**Results**

- Pentatomidae

**Podisus spp.**
- P. brevisspinus Thomas
- P. maculiventris (Say)

- Egg Clusters:
  - Avg. Cluster: 15.88
  - Approx. Hatch Rate: 64%
- Number of Generations: 2
- Avg. Days/Generation: 39 - 46.26

**Generations**
- Nymphs: 70.9%
- Adults: 17.7%
- Eggs: 11.4%

**Results**

- Pentatomidae

**Thyanta custator accerra McAtee**

- Egg Clusters:
  - Avg. Cluster: 24.62
  - Approx. Hatch Rate: 54%
- Number of Generations: 7
- Avg. Days/Generation: 49.33

**Generations**
- Nymphs: 25.56%
- Adults: 25.56%
- Eggs: 48.88%
Results

*Brochymena quadripustulata* Fabricius
*Parabrochymena arborea* (Say)

Started 8 times with no success

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: Platygastridae).
4. Added to distribution data of native and introduced Pentatomoidea.

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!

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Questions?