



**Israel's Heteroptera: Pentatomoidea:  
Pentatomidae Leach, 1815 and Scutelleridae Leach, 1815  
with an emphasis on economically important agricultural pests**

**Specialist Instructor:** Dr. Joseph Eger, Dow AgroSciences, Tampa, Florida,

Retired; Research Associate, Florida State Collection of Arthropods, Gainesville, Florida

**Guest Lecturer:** Dr. Zvi Mendel, Plant Protection, Entomology and the Nematology and Chemistry units,  
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**Israeli Hosts:** Dr. Tanya Novoselsky and Dr. Gal Ribak, Steinhardt Museum of Natural History, Tel Aviv  
University, Tel-Aviv 69978, Israel, and Dr. David Furth, Emeritus Collections Manager & Research Associate  
Department of Entomology, National Museum of Natural History, Smithsonian Institution, Washington.

**Dates:** 16-21, June 2019, in the first week of the 2<sup>nd</sup> semester exams,

**Hours:** Total 40 working course hours (in a workshop style: June 16-21 daily 9:00-17:00).

**Location:** Room 110 in the Sherman Building, Faculty of Life Sciences, Tel Aviv University.

**Prerequisites:** None, the course will be taught in English and Hebrew.

**Credit:** 3 academic points.

**Grading:** The final examination (70%) and participation in lab work, fieldwork and discussions (30%) will take  
place on the 21 Friday in June.

**INTRODUCTION:** The Pentatomoidea are a superfamily of insects in the Heteroptera suborder of the  
Hemiptera order. They are commonly referred to as shield bugs, chust bugs, and stink bugs. The roughly  
7000 species under Pentatomoidea are divided into 14 or 15 families.

The Pentatomidae are a family of insects belonging to the order Hemiptera, which are generally called stink  
bugs or shield bugs. The name Pentatomidae is from the Greek *pente* meaning five and *tomos* meaning  
section, which refers to the five segments of their antennae.

The Pentatomidae, representing the fourth largest family within Heteroptera, are one of the most diverse  
groups with about 47 genera and 122 species are included in five subfamilies in Israel. The Scutelleridae  
Leach, 1815 known as jewel bugs or shield-backed bugs. Composed of 8 genera and 15 species in Israel.

Another common name for pentatomids, the stink bugs, refers to unpleasant scent from a glandular  
substance released from pores in the thorax when the insects are disturbed. The chemicals involved include  
aldehydes, making the smell similar to that of coriander. In some species, the liquid contains cyanide  
compounds and a rancid almond scent, used to protect themselves and discourage predators.

Many stink bugs and shield bugs are considered agricultural pests, because they can grow into large  
populations that feed on crops (damaging production), and they are resistant to many pesticides. They pose  
a serious threat to cotton, corn, sorghum, soybeans, native and ornamental trees, shrubs, vines, weeds, and  
many cultivated crops.

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Some stink bugs are commonly eaten in Laos, and are regarded as delicacy due to their extremely strong odor. The insects are sometimes pounded together with spices and a seasoning to prepare *cheo*, a paste mixed with chilies and herbs.

### LEARNING OUTCOMES FOR STUDENTS AND ENTOMOLOGICAL STAFF

The students and entomological staff at the course will study the diversity of the two largest family in Pentatomoidea: Pentatomidae and Scutelleridae.

Upon completion of this course, students will be able to:

- Identify taxonomy characters that define Pentatomidae and Scutelleridae of major genera and species
- Apply the accumulated knowledge of characters to categorize taxa
- Identify pentatomids of major groups to family
- Recognize the key role of pentatomids identification for subsequent research fields
- Understand the basics of pentatomids curation and data management in a collection and laboratory environment
- Teach sampling and mounting and preparation techniques
- Identify important agri cultural pests in Israel

The students will be tested to evaluate their learning of the course material. The test will be partitioned to two

parts: theory and a practice. In the theoretical section, the students will need to answer questions about general morphological features that are important for Pentatomidae and Scutelleridae identification and systematics.

In the practical part of the exam, the students will need to identify five Pentatomidae and Scutelleridae bugs.

We expect students from diverse background. Thus, we will adjust the exam level to the experience level of the students.

**Target Audience:** Students from the third year at the undergraduate level, graduate students and professionals in the fields of biology, agriculture and entomology.

**Number of students:** The course is limited to 36 students.

**Registration:** Please fill out the enclosed form and send to: [tania@tauex.tau.ac.il](mailto:tania@tauex.tau.ac.il), [gribak@tauex.tau.ac.il](mailto:gribak@tauex.tau.ac.il)

### COURSE SYLLABUS

#### **Day 1. Introduction**

Morning (Joseph Eger):

9:00 Overview of Heteroptera and major families

10:00 Biology/Ecology: host-plant specialization, feeding strategies, life history strategies

11:00 What is a larval Pentatomoidea?

12:00 lunch break

Afternoon (Joseph Eger):

13:00 -17:00 Session in microscope lab Pentatomidae vs Scutelleridae:

[www.taxonomy.tau.ac.il](http://www.taxonomy.tau.ac.il)

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- morphological terminology
- morphological characters
- anatomy characters used in keys
- pentatomids classification
- taxonomy

### Day 2. Pentatomoidea agricultural pests in Israel

Morning: with guest speakers Zvi Mendel.

9:00 The true bugs Heteroptera as plant pests and natural enemies in Israel

12:00 lunch break

Afternoon (Joseph Eger):

13:00 Online resources on Pentatomoidea

14:00-17:00 A walk through Joseph Eger key

### Day 3. Field trip: Insect collection and demonstration of collection techniques (Joseph Eger)

8:00 -16:00 Field collection trip to a forest and/or TAU Botanical Garden

- manual techniques for collecting Pentatomoidea
- preparing and submitting a sample for expert diagnosis

### Day 4. Identification training using reference collections supplied from the University of Florida (see separate handout for details)

Morning (Joseph Eger):

9:00 Identification, collecting/research techniques; Taxonomy: use of keys for the genera and species in Israel

12:00 lunch break

Afternoon (Joseph Eger):

13:00 -17:00 Identification, collecting/research techniques; Taxonomy: use of keys for the genera and species in Israel

### Day 5. Course summary

Morning (Joseph Eger):

09:00 Personal collection identification

12:00 lunch break

Afternoon (Joseph Eger):

13:00 Personal collection identification

14:00 Optional: The other Pentatomoidea

15:00 Questions, comments, course evaluation

### Day 6. Examination

Morning (Joseph Eger):

09:00 written exam (multiple choice) followed by practical identification exam

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