

Abstract

I developed the insect section of the ECOS Guide to the Ecology of the Northern Rockies, an on-line field guide. This involved developing a key, selecting the species to be drawn for the key, writing descriptions for 15 insect orders and 10 families, developing introductory sections on arthropods in general, why we should care about insects, what is an insect?, how insects develop, how to find and observe insects in the field, a glossary and instructions on how to use the key.

Insect Key

Insect identification can be a challenging task. Even the "easiest" keys use confusing terminology and require the user to look for characteristics on insects that are difficult, if not impossible to see. In order to simplify the task I've combined two methods of identification: a dichotomous key and matching the organism with a picture. Furthermore, the key is designed to be less intimidating than other keys.

The key is a traditional dichotomous key but instead of just a drawing to illustrate the characteristic described, pictures of ALL possible orders of insects or "answers" that fit the characteristic are provided. This is

possible because the key only goes to the order level and the number of possibilities is not too large.

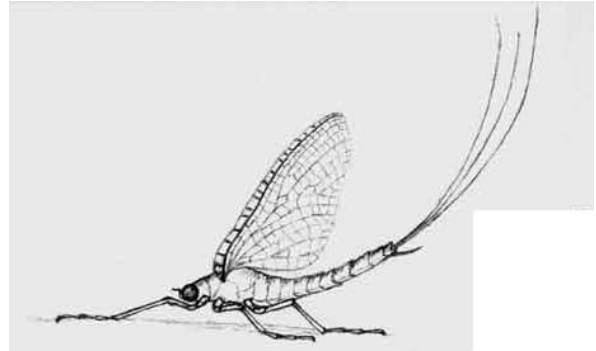
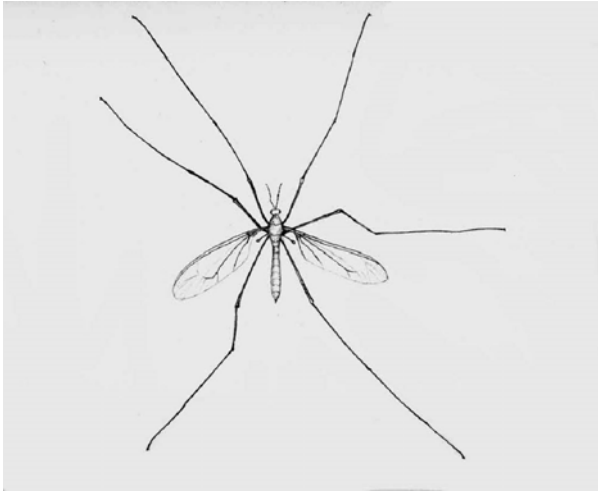
There are several benefits to combining a key with pictures. First, it increases the likelihood of success, even for elementary school users. The structures on insects are difficult to see but an insect can't be identified without considering these structures. By providing illustrations of all possible choices, the user can select the correct answer based on the general body shape of the insect they are trying to identify, and move forward in the key. Second, if the user wants to examine an insect to look at some identifying characteristics, they might have to kill the insect. By having a key with pictures the user can identify a live insect or use sketches or photographs taken in the field. So why not just use pictures to identify the insect? The user will learn about different characteristics of the insect by reading through the key. The key is meant to be the primary means of identification and the illustrations can help the process when needed.

The design of the key is based on one by CSIRO Entomology in Australia (http://www.ento.csiro.au/education/key/couplet_01.html). This is a dichotomous key but doesn't look like one in that the user is only presented with two simple options at a time. The user will make the most appropriate choice and be presented with 2 more choices rather than requiring the user

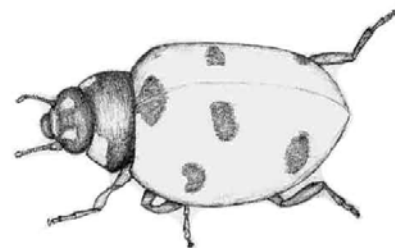
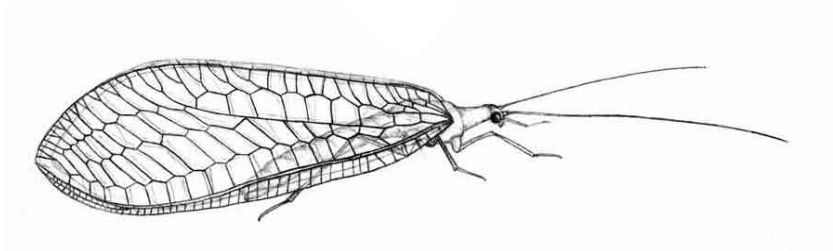
to scroll down and find the next step. "Breadcrumbs" or the steps the user has taken will be on the screen so the user can easily back up at any time.

A rough diagram of the layout is shown in Figure 1.

Insect has 1 pair of wings



Insect has 2 pairs of wings



Previous steps:

Figure 1. Example of a step in the ECOS on-line key to insect orders. Not all illustrations are shown.

Many different paths can be taken to identify an insect correctly. I tried out several keys and made deliberate choices that I thought would be easiest to interpret and increase the chances of success. For example, the first option in the key is to choose if the insect was found in water or on land. Many keys offer this choice later in the process but I wanted the user to experience success with the key immediately.

I chose to include 15 orders present in western MT. Extremely small or uncommon orders were not included. Many "easy" keys only include winged adults or sometimes all adults. I originally hoped to include all adults, aquatic larvae and terrestrial nymphs and larvae but the terrestrial larvae proved to be too difficult. I was able to include terrestrial nymphs (immature insects that go through incomplete metamorphosis) but not terrestrial larvae (immature insects that go through complete metamorphosis). Pupae were not included in the key.

Introductory Sections

Several introductory sections have been written in order to provide information that will hopefully increase people's interest in insects and increase the likelihood of successful identification.

Introductory sections include:

Why We Should Care About Insects - makes the argument that insects are a necessary part of our lives

What is an Insect? - provides a diagram with labels and some relevant definitions

Growing Pains - describes insect development

What to look for when you see an insect in the field - encourages people to observe insects in their natural habitat and describes the characteristics to note for later identification

Introduction to the key - provides instructions on how to use the key and includes an example

Sustainability

While there are many sustainable components of ECOS, the website and on-line field guide is one of the most visible. The inquiries and resources available on the field guide will always be available for teachers and other interested people. But it is crucial that the website is easy to find when people search for information on the Internet. I have requested that Josh add several terms to our website so when teachers inquire about many different topics, they will find the inquiries or field guide.

The insect field guide is almost complete. We are still waiting for pictures to be added to the key. The images are a crucial step for this key to be successful for younger users. While we can get images from other

sources, I hope all our line drawings can come from the same source which will lend continuity to the key and make it more visually attractive.

While the existing field guide is usable, more information could always be added. Additions that would make the key to orders more complete include adding silverfish, bristletails, scale insects and some of the exceptions-to-rules such as wingless stoneflies and aquatic moths. Keys to some of the more common families of insects would also be a realistic task and very beneficial.

Another useful addition would be curriculum to help teachers teach students to use the key in the classroom and incorporate it into outdoor explorations.

Appendix 1

Curricula

- *Is That an Insect? - Jen Marangelo
- *Classification Using Insects - Jen Marangelo
- *Tackling Taxonomy: Which one of these is not like the others - Sarah Bisbing and Jen Marangelo
- *Insect Needs and Feeds - Alison Perkins and Jen Marangelo (Alison has the final version)
- *Busy Little Bees: Insects working hard in your schoolyard - Sarah Bisbing and Jen Marangelo
- *What's Bugging You?: An introduction to plant-pollinator interactions - Sarah Bisbing and Jen Marangelo