School Malaise Trap Program

Fall 2016
Program Report

The Fall 2016 School Malaise Trap Program was a huge success and your participation made it happen. This short report summarizes the program — its procedures and results — and all of the interesting discoveries from your work. Before we get to the results, let's review what the School Malaise Trap Program was all about and how we worked together to complete it.

The Biodiversity Institute of Ontario (BIO), at the University of Guelph, is a research institute dedicated to rapidly identifying and documenting life in Canada and in the world. This is no easy job since there are millions of different species of animals and plants across the globe, and about 100,000 of them occur in Canada. In addition, it's often difficult to separate closely related species by their appearance, even for experts. Fortunately, BIO has developed a new tool that makes identifying species quick and easy — it's called DNA barcoding. Just like a can of beans in a grocery store, where the barcode lets the cashier quickly know it is different from a can of peas, each species has a small piece of DNA that can be used to distinguish it from other species. BIO is assembling a DNA barcode reference library for all of the world's species, called Barcode of Life Data Systems, and we're doing it through a huge research project called the International Barcode of Life project. We need help to complete it, and that's where your class and the School Malaise Trap Program fit in.



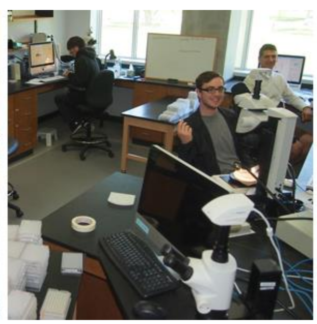

Collecting Specimens

In September 2016, we sent out Malaise trap kits to 62 schools and 5 outdoor education sites across Canada and the United States. Each kit included a Malaise trap and an instructional video that gave each class a lesson on biodiversity, DNA barcoding, and the star of our program — the Malaise trap. Because this tent-like apparatus is so effective at collecting insects we asked each school to set up its Malaise trap and collect insects during the same two weeks (September 19 – September 30). At the end of the two weeks, all traps and collection bottles were returned to BIO to allow analysis to begin.

Sorting Specimens

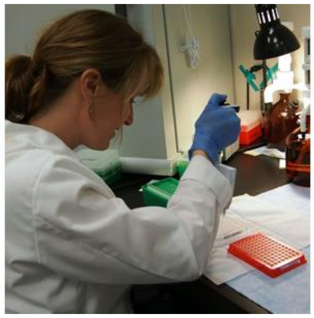
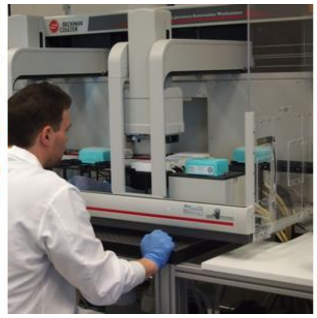
Once the collection bottles arrived, BIO staff recorded details on the collection locality from each bottle and compiled the weather data recorded by the students in each class. Next, the contents of each bottle were poured into a sorting dish, and, using a microscope, every specimen was counted in each trap. Our staff then attempted to pick as many different species as possible, selecting up to 190 animals to DNA barcode from each trap. Each selected specimen was then placed in an individual well of a DNA tissue plate. If a specimen was too large to fit in a well, one leg was removed and placed in the well. This process led to the assembly of 126 full plates and 1 partial plate, with each full plate containing tissue from 95 specimens for a total sample size of 12,029 individuals! Once these plates were ready, they were transferred to the molecular laboratory for the next phase of barcode analysis.






Sequencing Specimens

The first step in the laboratory was DNA extraction. All of the plates, each containing 95 specimens or legs, were incubated overnight in a special solution that extracts DNA out of the cells. The next day, the DNA was separated from other cell materials using one of our robots, lovingly called Franklin (after Rosalind Franklin, who helped to discover the structure of DNA in the 1950s). The second step in our analysis employed a clever technique called the polymerase chain reaction or PCR. By adding a cocktail of reagents to the DNA, then rapidly heating and cooling it several times, we created millions of copies of the DNA barcode region for the sample of DNA in each well. All these copies are necessary for the final laboratory step — DNA sequencing where each well was analyzed on one of our DNA sequencers that use a laser to read the letters (A, C, G, and T) of each DNA barcode. And there you have it, that's how we determined the DNA barcode for each insect (or other invertebrate) caught in your trap!


For a fun classroom activity that shows how to query a DNA barcode on Barcode of Life Data Systems, click here.

Analyzing the Sequences

Although the molecular work was complete, there was one more critical step – the analysis of your sequence results. Your DNA barcodes needed to be compared with the records in BOLD, the Barcode of Life Data Systems to obtain identifications. When one of your DNA barcodes matched a record in BOLD, we could confidently assign its source specimen to that species, for example, to the European garden spider (*Araneus diadematus*) or to the Eastern ash bark beetle (*Hylesinus aculeatus*). In other cases, BOLD indicated that your record derived from a distinct species, but it could only assign it to a group such as the ichneumon wasps (Ichneumonidae) or one genus of tortricid moths (*Acleris*). In some cases, your barcodes did not find a match; they were brand new DNA barcodes for BOLD! We will discuss some exciting discoveries later in this report. All of the identifications were then compiled for each trap to create the report that you are now reading. We're very excited to share the news, so let's get to the results.


European garden spider (*Araneus diadematus*)


Eastern ash bark beetle (*Hylesinus aculeatus*)


Ichneumon wasp (Ichneumonidae)


Tortricid moth (*Acleris sp.*)

Fall 2016 Program Results

Drumroll please! It's time to share results for the Fall 2016 School Malaise Trap Program. Let's begin with a general summary. The Fall program involved 67 sites in 57 cities, 86 classrooms, and 2,708 amazing students. Your classroom's trap was one of 67 traps deployed from September 19 to September 30, 2016. Overall, we had relatively warm weather across the participating sites, for both weeks of the trap deployment period. Average daytime temperatures were 20.1°C for Week 1, and 17.7°C for Week 2.

To check out where all the schools and traps were located, play with the interactive map here.
Click on each of the icons to see the school name.

The 67 traps collected an average of 386 specimens during Week 1, and 396 specimens in Week 2, for an average total of 783 specimens for the collecting period. The total number of specimens showed substantial variation among traps, from a low of 14 to a high of 5,960 specimens. It might surprise you that so many insects were collected in your schoolyard. If so, remember that you only collected for two weeks while insects fly in many regions of Canada for eight months of the year!

For an advanced classroom activity, it would be interesting to test these three hypotheses:

1) Were the number of individuals and species collected higher in Week 1 than in Week 2?

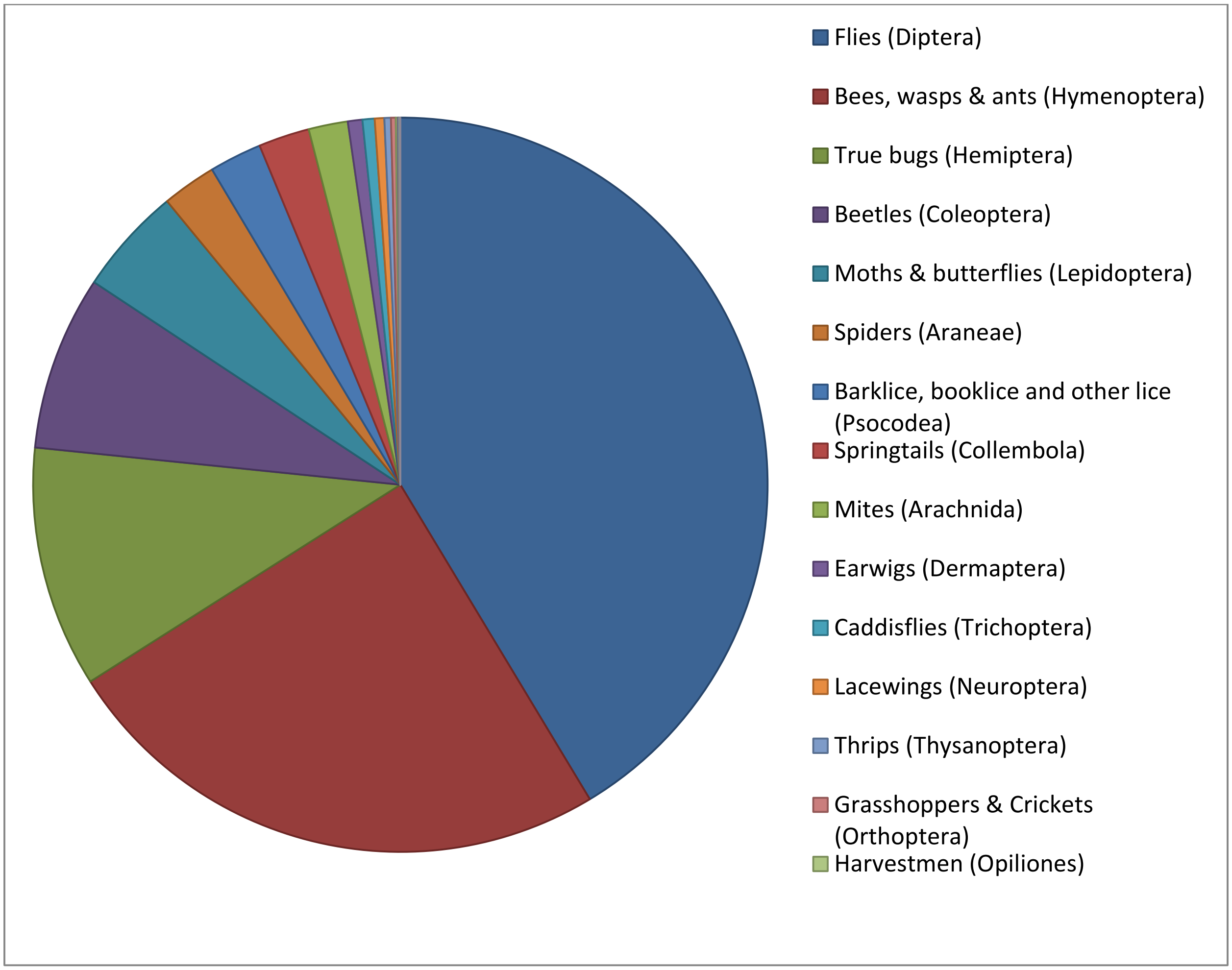
2) Were the number of individuals and species collected associated with the average daytime temperatures of the site?

3) Were the number of individuals and species collected associated with the population of the city/town where the trap was deployed?

The staff at BIO sorted the 52,447 specimens present in your 67 traps and selected 12,029 specimens for barcode analysis. When the molecular work was complete, 11,265 (94 %) of the specimens delivered a DNA barcode. Because we excluded a few short barcodes, the final dataset included 10,478 barcodes. The analysis of these barcodes revealed that you collected 3,301 species in just two weeks of sampling. That's very impressive because the estimated total number of terrestrial arthropod species found in Canada is 63,000, so you collected 5% of them. Some of these species were uncommon, with 2130 species only being collected in a single trap. More excitingly, your collecting efforts provided the very first records for 209 species.

Furthermore, we are pleased to announce that since its inception in 2013, the School Malaise Trap Program has recently attained several incredible milestones through reaching approximately 18,000 students and educators from across Canada, representing over 360 schools and 27 comparison sites. All seven of the programs considered, the School Malaise Trap Program Team has sorted through 374,561 specimens, barcoding a total of 97,756 selected specimens, which ultimately represented 11,420 species (this number does not include species overlap between programs). In total, 1,497 of these species were new to BIO's online barcode reference library, BOLD, and several species collected by the sites were new records for Canada and a few are possibly new species to science! You, as citizen scientists, have made an enormous and extremely valuable contribution to the International Barcode of Life Project as well as to your local community and school. Congratulations to you all!

Fall 2016 School Malaise Trap Program Overall Species Pie Chart



> To see a list of all 3301 species collected in the Fall 2016 School Malaise Trap Program, click here. To just see a picture of each species, click here.

Most of the 3301 species that you collected were arthropods — invertebrates with a hard external skeleton. If you look at the pie chart above, you'll notice that many (41%) of the species were flies (scientific name: Diptera). The most common fly was *Diplonevra nitidula* (Scuttle fly) found in 33 out of 67 traps. After flies, the next most species diverse group was the bees, wasps, and ants (Hymenoptera), followed by the true bugs (Hemiptera). Most of the species in these groups have wings, so it's not surprising that they were collected in your Malaise traps. However, you also collected some groups that don't fly such as springtails (Collembola), spiders (Araneae), and land snails and slugs (Stylommatophora). We found the highest diversity of species in bees, wasps, and ants (Hymenoptera) and flies (Diptera). There were 264 species of Ichneumonid wasps (Ichneumonidae), 261 species of midges (Chironomidae), as well as 156 species of Braconid wasps (Braconidae).

And now the section of the report that many of you have been waiting for — to see how your schoolyard compared with the other schools across Canada. There are many ways to measure biodiversity, but we have adopted four metrics for comparisons among the sites:

Click here to view the results from all 67 trap sites. In addition to the specimen counts, we've also compiled the weather and population data associated with each.

The simplest metric compares the number of specimens collected by each trap. The great advantage of this method is that anyone can do it — so long as you can count! In practice, it's not a very informative measure of biodiversity, since it can be affected by one or a few very common species. However, there was variation in the total number of specimens caught, ranging from a low of 14 individuals, to the winner for this category – John T. Tuck School in Burlington, Ontario, which had a catch of 5,960 specimens -- congratulations!

Number of Specimens Caught - Top 3:

School/Comparison Site	Province/Territory	Trap #	Total Specimens
John T. Tuck School	Ontario	EQP-CLL-919	5960
Queen of Peace Middle School	Newfoundland and Labrador	EQP-CLL-574	2046
W.O. Mitchell School	Alberta	EQP-CLL-556	1971

If you would like to see how your school ranked in these four categories, click here for tables of all the results.

The second way to compare biodiversity, and certainly one of the best ways, is to count the total number of species in a sample. By using DNA barcoding, we were able to quickly determine the number of species at each site, even if some could not be assigned to a particular species name. The total species count varied among sites. The winner for the most species collected, with an extraordinary 139, was Morning Star Middle School in Mississauga, Ontario.

Number of Species Caught - Top 3:

School/Comparison Site	Province/Territory	Trap #	Species Count
Morning Star Middle School	Ontario	EQP-CLL-517	139
Blueberry School	Alberta	EQP-CLL-564	138
Inglewood School	New Brunswick	EQP-CLL-863	136

A third way to compare biodiversity is to consider the rarity of the species that were collected. The Barcode of Life Data Systems (BOLD) has over 4.5 million DNA barcodes, including records for over 40,000 Canadian terrestrial arthropod species, so it is not very often that one is able to add coverage for a new species. As a result, we were amazed that 209 new species were detected in your collections. When we compared the number of new species detected at each site, the numbers were close — congratulations to our winner Mount San Jacinto College, Menifee Valley Campus in California, United States for collecting 14 species new to BOLD.

Number of New Species Added to DNA Barcode Library - Top 3:

School/Comparison Site	Province/Territory	Trap #	Species New for BOLD
Mount San Jacinto College, Menifee Valley Campus	California	EQP-CLL-739	14
St. Elizabeth Seton Elementary School	Ontario	EQP-CLL-852	10
Western Center Academy	California	EQP-CLL-714	9

Finally, biodiversity between sites can be compared by examining the overlap in species among sites. With 67 traps deployed for the same period, any species that was only collected in a single trap is certainly a 'rare' species. In total, there were 2,130 rare species. Mount San Jacinto College, Menifee Valley Campus in California, United States had the lead in collecting rare species with 74. Let's give them a big round of applause!

Number of Species Unique to Trap - Top 3:

School/Comparison Site	Province/Territory	Trap #	Species Unique to Trap
Mount San Jacinto College, Menifee Valley Campus	California	EQP-CLL-739	74
Queen of Peace Middle School	Newfoundland and Labrador	EQP-CLL-574	67
Western Center Academy	California	EQP-CLL-714	59





Did you know that the School Malaise Trap Program team is on Facebook and Twitter? Like or follow SMTP_Canada so you can share in the #bioSMTP experience.

The Fall 2016 School Malaise Trap Program Team

We would like to conclude by thanking all of the participants in the Fall 2016 School Malaise Trap Program. This project would not have succeeded without the enthusiasm, curiosity, and dedication of every student, teacher, and colleague. Please check our website periodically for updates, and we'll be in touch when we roll out the next program!

Some fun insect jokes to tell your friends in the schoolyard:

Q: Why did the fly never land on the computer?
A: He was afraid of the world-wide web!

Q: How do bees brush their hair?
A: With a honey comb!

Q: How do fireflies start a race?
A: Ready, Set, Glow!

Q: What do moths study in school?
A: Mothematics!

Q: What do you call a wasp?
A: A wanna-bee!

Q: Why wouldn't they let the butterfly into the dance?
A: Because it was a mothball.

Q: What creature is smarter than a talking parrot?
A: A spelling bee!

School Malaise Trap Program

Discoveries for Fall 2016

Wasps (Order: Hymenoptera)

The Hymenoptera are one of the largest orders of insects, comprising the sawflies, wasps, bees and ants. Over 150,000 species are recognized, with many more remaining to be described. The name refers to the wings of the insects, and is derived from the Ancient Greek ὑμήν (hymen): membrane and πτερόν (pteron): wing. During the Fall 2016 School Malaise Trap Program you collected 998 species of Hymenoptera across all participating schools. We have highlighted some of your interesting finds below.

Western Yellow jacket (*Vespula pensylvanica*)

When we think of wasps, we usually have in mind a small group of species that is also known as Yellow jackets. Yellow jacket is the common name of wasps in the two genera *Vespula* and *Dolichovespula*. Most of these wasps have a black and yellow striped pattern on their abdomen. Yellow jackets live in colonies and many people fear them because the females of all species are capable of stinging and, as opposed to bees, they can sting repeatedly.

Four species of *Vespula* are very common in Canada and all of them showed up in the School Malaise Trap samples. One of them is *Vespula alascens*is, which until 2010 was thought to be the common wasp (*Vespula vulgaris*). Actually, the common wasp is only found in Eurasia and has been introduced to Australia and New Zealand. Although it is often said to occur in North America as well, the North American populations are a separate species, *Vespula alascensis*.

The Eastern Yellow jacket (*Vespula maculifrons*) and the Western Yellow jacket (*Vespula pensylvanica*) are very common species in Eastern North America and we were able to find them in a few traps this fall. Even more abundant in our samples was the German wasp (*Vespula germanica*). As the name suggests this is a wasp that is native to Europe, but it was introduced and is now well-established in many other places such as North America (since 1975).

Bees (Order: Hymenoptera)

Bees, like ants, are actually a specialized form of wasp. They play an important role in pollinating flowering plants. In July 2013 the world's 20,000th bee species was officially described by a researcher from York University in Toronto. Your Malaise traps collected 15 species of bees and among those were the common Eastern bumble bee (*Bombus impatiens*) and the western honey bee (*Apis mellifera*).

But have you ever heard of sweat bees? This is the common name for any bees (Halictidae) that are attracted to the salt in human sweat. Believe it or not but there are about 2,000 species of sweat bees known to science and one of them was found in Sacred Heart Elementary School's schoolyard this fall, Pure Green sweat bee (*Augochlora pura*).

Pure Green Augochlora (*Augochlora pura)*

Not all bees live in large colonies. Actually there are many species that are solitary, such as the mining bees. One of them, the Hairy-banded Andrena (*Andrena hirticincta*) was found at Camp Heidelberg Nature Centre. These bees generally nest in the ground, often in paths or lawns and the entrance to their burrows is marked by a small mound of excavated soil.

Ants (Order: Hymenoptera)

The other big group of social Hymenoptera are the ants. Ants form colonies that can range in size from a few dozen individuals living in small natural cavities to highly organized colonies that may occupy large territories and consist of millions of individuals. Ant societies are often very sophisticated. They have division of labour, communication between individuals, and an ability to solve complex problems. Overall you collected 49 species of ants in your Malaise traps.

Ponera pennsylvanica

Ponera pennsylvanica is a species of ant that is usually found in forests in the Eastern United States. The species' nests are usually found in rotting stumps or logs, in acorns, in soil, and in leaf mold. These ant colonies are rather small with usually no more than 100 worker ants.

Brantford, Ontario's North Park Collegiate Institute was able to collect a species of false honey ant (*Prenolepis imparis*). This species is one of the few ants specialized for cold temperature foraging; they can be found foraging even at near-freezing temperatures, where they are often the only ants visibly active. However, their range does not extend into the far north, despite their cold tolerance. While winter ants won't pass up on the opportunity for a sugary snack, they actually prefer protein-packed food, nourishing on other insects unlucky enough to endure winter's chill.

Beetles (Order: Coleoptera)

Beetles are the largest group in the animal kingdom, representing 25% of all known animal species. While 400,000 species have been described so far, many scientists believe that there are as many as 1 million beetle species on Earth. Beetles have inhabited our planet for more than 300 million years which means they were around even before the dinosaurs.

Among the 209 beetle species caught in the Fall 2016 School Malaise Trap Program were quite a few pest beetle species, especially those of the leaf beetle family (Chrysomelidae), such as the two corn rootworm species (*Diabrotica virgifera* and *Diabrotica barberi*). The larvae of both species feed on corn and in the United States it was estimated that corn rootworms cause $1 billion in lost revenue each year.

Western corn rootworm (*Diabrotica virgifera*)

Cryptorhynchus lapathi

The Poplar and Willow borer (*Cryptorhynchus lapathi*) is an exotic weevil species originally from Eurasia but it is present in Canada especially in British Columbia for over 90 years. Its larvae bore in stems of poplar and willow trees. Usually, it has caused significant economic damage only when ornamental trees in urban areas have been attacked.

The well-known Harlekin or Halloween lady beetle (*Harmonia axyridis*) is actually native to eastern Asia, and was introduced to North America and Europe to control aphids. Unfortunately, this species has itself become a pest. For example in the autumn, these beetles can aggregate in large numbers in vineyards and, if they are harvested along with the grapes, they release a chemical compound with the complicated name methoxypyrazine that can spoil the aroma and taste of the wine. This species is also known to invade homes in October in preparation for winter, a phenomenon which earned it the common name of "Halloween lady beetle". Fittingly they are of orange colour with black spots. They try to overwinter indoors and there also have been reports that they occasionally bite humans.

Harmonia axyridis

True bugs (Order: Hemiptera)

True bugs are an insect order scientifically known as Hemiptera with about 80,000 species. You might know representatives such as cicadas, aphids, planthoppers, leafhoppers, and, most prominently, stink bugs and bed bugs. In the Fall 2016 School Malaise Trap Program, the leafhoppers (family Cicadellidae) were the most diverse group, with 122 species collected.

The family Cicadellidae is distributed all over the world and constitutes the second-largest hemipteran family, with at least 20,000 described species – 2,500 of which reside in North America.

Leafhoppers are plant feeders that suck on the sap from different kinds of grasses, trees, and shrubs with their straw-like beaks. However, you will need to look quite closely in order to spot these minute creatures before they hop away because they detected your presence.

White Apple Leafhopper
(*Typhlocyba pomaria*)

The White Apple Leafhopper (*Typhlocyba pomaria*) found at Dr. George Hall Public School in Ontario is the most common and serious of the leafhoppers found on apple. It is native to North America and appears throughout fruit growing regions of the United States and Canada. They cause stippling of the leaves and fruit spotting; the latter is the result of them depositing excrement on fruit which dries into dark brown spots.

Butterflies and moths (Order: Lepidoptera)

Another huge group of insects with perhaps 200,000 species worldwide are the moths and butterflies (together called Lepidoptera). Malaise traps are not the best traps for collecting lepidopterans, but a few always find their way into our traps. This fall, your traps collected 168 species! Interestingly, the most common family collected were the Noctuidae or owlet moths, which include more than 35,000 known species worldwide. Thirty-one Owlet moth species were collected at 33 different sites during the Fall 2016 School Malaise Trap Program and one of these is a very interesting find.

Pale Mottled willow
(*Caradrina clavipalpis*)

The pale mottled willow (*Caradrina clavipalpis*) is a species distributed across Europe and Asia but it has also been introduced to North America. So far, there had been two reports: It was first reported from Queens in New York City in 1993 and in 2009 it was found in Rochester, New York. So it appeared to be spreading towards Canada and now we have the very first confirmed record of this species found in Canada at Gordon A. Brown Middle School in Toronto.

Sweet Potato Leaf miner
(Bedellia somnulentella)

Another interesting lepidopteran collected during this program was the Sweet Potato Leaf miner (*Bedellia somnulentella),* a member of the small family Bedelliidae consisting of small, narrow-winged moths. The Bagworm moth family is fairly small, with about 1350 species described globally. The sweet potato leaf miner has a nearly cosmopolitan distribution. As per their name, it feeds on members of the plant family Convolvulaceae to which the sweet potato belongs. However, the species is considered a minor pest of sweet potato, and can only be a problem in newly planted crops. Unless infestations are unusually severe, the development of the tubers is not affected. On the other hand, it is also a potential agent for the biological control of bindweed on which it also feeds.
Specimens of *Bedellia somnulentella* were collected at Davenport Public School in Aylmer, Ontario.

True flies (Order: Diptera)

Scuttle fly (*Diplonevra nitidula)*

The Phoridae are a family of small, hump-backed flies resembling fruit flies. Phorid flies can often be identified by their escape habit of running rapidly across a surface rather than taking to the wing. This behaviour is a source of one of their alternate names, scuttle fly. A scuttle fly species (*Diplonevra nitidula*) was the most common insect during the Fall 2016 School Malaise Trap Program with specimens being found at 33 sites!

Phorid flies are found worldwide and their life histories are incredibly diverse. Larvae are found in the nests of social insects and in some aquatic habitats, in organic detritus such as dung, carrion, insect frass, and dead snails. Some have adapted to live close to humans. Some species feed on fungi or on living plants (sometimes as leaf miners). Some are predators or parasites of earthworms, snails, spiders, centipedes, millipedes, and insect eggs, larvae, and pupae. The adults feed on nectar, honeydew, and the juices exuding from fresh carrion and dung. Some adults feed on the body fluids of living beetle larvae and pupae, others prey on small insects. Several species have the common name coffin fly, because they breed in humans. For this reason, these species are important in forensic entomology. Most commonly, phorid flies feed on decaying organic matter. This also brings them frequently to unsanitary places, including drain pipes, and they may transport various disease-causing organisms to food material.

Robber flies, also called assassin flies, belong to the family Asilidae. They are powerfully built and have notoriously aggressive predatory habits. They feed mainly or exclusively on other insects and as a rule they wait in ambush and catch their prey in flight. These predators can be recognized by their usually bearded face and a concave top of the head between the eyes. Robber flies range in length from 1-5 cm, with the females being larger than males. The fly attacks its prey by stabbing it with its short, strong proboscis (straw-like mouth part) injecting the victim with saliva containing toxic enzymes which rapidly paralyze it and soon digest the insides; the robber fly then sucks the liquefied material through the proboscis. You might hear this species before you see it, as it departs its perch with a loud, buzzing flight, quickly landing again nearby, usually on a vertical branch or twig.

Robber fly (*Machimus sadyates)*

Only one species of robber fly (*Machimus sadyates*) was collected during the program at our reference site at the Royal Botanical Gardens in Burlington.

Spiders and their relatives (Class: Arachnida)

While Malaise traps are most useful for capturing flying species, 112 species collected in the Fall School Malaise Trap Program were spiders which certainly don't fly! These 112 spider species belonged to 60 different genera of 19 families - a very diverse group!

Zebra spider (*Salticus scenicus*)

One interesting find was find was the zebra spider (*Salticus scenicus*) which was collected at John T. Tuck School in Burlington, Ontario. This is a species of jumping spider which, as the name suggests, can jump on its prey through a sudden straightening of their fourth pair of legs. Their mean jumping speed is 0.64–0.79 m/s! Jumping spiders also exhibit an interesting behaviour during courtship with the male 'dancing' (waving his front legs and moving his abdomen) in an effort to impress the female. Take a look at this spider dance here!

Wolf spiders are members of the family Lycosidae, from the Ancient Greek word "λύκος" meaning "wolf". They are robust and agile hunters with excellent eyesight. They live and hunt alone. Some are opportunistic hunters pouncing upon prey as they find it or even chasing it over short distances. Some will wait for passing prey in or near the mouth of a burrow. Wolf spiders can get quite old (some up to 11 years). Wolf spiders are unique in the way that they carry their eggs. The egg sac, a round silken globe, is attached to end of the abdomen, allowing the spider to

Rustic wolf spider (*Trochosa ruricola*) carry her unborn young with her. Another aspect unique to wolf spiders is their method of infant care. Immediately after the spiderlings emerge from their protective silken case, they clamber up their mother's legs and crowd onto her abdomen. These spiders will inject venom if really bothered. Symptoms of their venomous bite include swelling, mild pain, and itching. However, most of them are so small that even a bite might be unnoticeable.

Overall, 7 different species of wolf spiders were found in your Malaise traps, including the very common rustic wolf spider (*Trochosa ruricola*).

Webspinner (Order: Embioptera)

This find is a first for the School Malaise Trap Program! We were quite surprised when sorting through your specimen bottles to come across a webspinner which was collected by our participants in California at the Mount San Jacinto College in Menifee.

Black webspinner (*Oligotoma nigra*)

Embioptera, are a small group of mostly tropical and subtropical insects. The name Embioptera means lively wings but that has not been considered to be particularly descriptive for this group of fliers. It seems more likely that it instead refers to their remarkable speed of movement both forward and backward. The group probably first appeared during the Jurassic and is well represented in Cretaceous amber. The common name webspinner comes from the insects' unique ability to spin silk from structures on their front legs. They use the silk to make a web-like pouch or gallery in which they live.

The black webspinner (*Oligotoma nigra*) has its origins in Asia and was likely brought to the United States in the late 1800's on a shipment of date palms shipped from Egypt or the Gulf Coast region.

Although they are not known to pose an ecological threat, they are considered a pest when present in large densities. The black webspinner is usually only seen by humans when it is attracted to lights in the house in urban areas. As a ground feeder *Oligotoma nigra* often prefers dead plant material or moss and lichen.

For a fun classroom activity, you could write similar descriptions for the interesting discoveries your classroom made.

Springtails (Class: Collembola)

Dicyrtomina ornata

Springtails are six-legged arthropods which are closely related to insects, but are not true insects. They are relatively small, generally less than 6 mm long, variously coloured, and are either round (globular springtail) or elongate (slender springtail). Most springtails have a long, forked appendage which can 'spring' them forward, propelling the creature into the air when threatened. If you have never seen these creatures before, take a look at the video below. Springtails are usually found in soil, moss, and leaf litter and they occur worldwide, often in very high numbers. It has been estimated that in one square metre of soil may possess up to 10,000 Collembola! Because of their abundance, Malaise traps often capture a very large numbers of springtails, but their species diversity tends to be low. Despite this, the School Malaise Trap Program led to the collection of 45 species of Collembola. For a clip on springtails from the documentary 'Life in the Undergrowth', click here. The images show two species that were collected this fall.

Ceratophysella denticulata





Fall 2016 School Malaise Trap Program Memorable Moments

Kola School, Kola MB

Ecole St. Patrick High School
Yellowknife, NWT

Fort Nelson Secondary School,
Fort Nelson, BC


Elizabeth Ziegler Public School,
Waterloo, ON

Fall 2016 School Malaise Trap Program Memorable Moments

Hamilton District Christian High School,
Hamilton, ON

Sacred Heart Elementary School,
Cornwall, ON

Oyama Traditional School,
Oyama, BC

Queen of Peace Middle School,
Happy Valley-Goose Bay, NL

Fall 2016 School Malaise Trap Program Memorable Moments

Mount Jacinto College, California, United States

Highlands School, Edmonton, AB

North Park Collegiate & Vocational School, Brantford, ON

Morning Star Middle School, Mississauga, ON

Fall 2016 School Malaise Trap Program Memorable Moments

Menihek High School, Labrador City, NL

Inglewood School,
Grand Bay-Westfield, NB