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Biodiversity inventories in high gear: DNA barcoding facilitates a rapid biotic survey of a temperate nature reserve

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Abstract

Background

Comprehensive biotic surveys, or ‘all taxon biodiversity inventories’ (ATBI), have traditionally been limited in scale or scope due to the complications surrounding specimen sorting and species identification. To circumvent these issues, several ATBI projects have successfully integrated DNA barcoding into their identification procedures and witnessed

acceleration in their surveys and subsequent increase in project scope and scale. The Biodiversity Institute of Ontario partnered with the **rare Charitable Research Reserve** and delegates of the 6th International Barcode of Life Conference to complete its own rapid, barcode-assisted ATBI of an established land trust in Cambridge, Ontario, Canada.

New information

The existing species inventory for the **rare Charitable Research Reserve** was rapidly expanded by integrating a DNA barcoding workflow with two surveying strategies – a comprehensive sampling scheme over four months, followed by a one-day bioblitz involving international taxonomic experts. The two surveys resulted in 25,287 and 3,502 specimens barcoded, respectively, as well as 127 human observations. This barcoded material, all vouchered at the Biodiversity Institute of Ontario collection, covers 14 phyla, 29 classes, 117 orders, and 531 families of animals, plants, fungi, and lichens. Overall, the ATBI documented 1,102 new species records for the nature reserve, expanding the existing long-term inventory by 49%. In addition, 2,793 distinct Barcode Index Numbers (BINs) were assigned to genus or higher level taxonomy, and represent additional species that will be added once their taxonomy is resolved. For the 3,502 specimens, the collection, sequence analysis, taxonomic assignment, data release and manuscript submission by 100+ co-authors all occurred in less than one week. This demonstrates the speed at which barcode-assisted inventories can be completed and the utility that barcoding provides in minimizing and guiding valuable taxonomic specialist time. The final product is more than a comprehensive biotic inventory – it is also a rich dataset of fine-scale occurrence and sequence data, all archived and cross-linked in the major biodiversity data repositories. This model of rapid generation and dissemination of essential biodiversity data could be followed to conduct regional assessments of biodiversity status and change, and potentially be employed for evaluating progress towards the Aichi Targets of the Strategic Plan for Biodiversity 2011–2020.

Keywords

DNA barcoding, species identification, biodiversity assessment, biotic inventory, Barcode Index Numbers, Operational Taxonomic Units, *rare* Charitable Research Reserve

Introduction

It is now universally accepted that we have entered a period of unprecedented global biodiversity loss (Simberloff 1996, Pimm et al. 1995, Pimm et al. 2014), and quantifying this diversity rapidly and on a massive scale is required to begin the challenging process of halting this trend. The completion of biodiversity inventories at various geographic and time scales can contribute to national and international assessments of biodiversity knowledge, deemed necessary by the newly established Intergovernmental Science-Policy Platform on

Biodiversity and Ecosystem Services (Díaz et al. 2015). These assessments are fundamental for evaluating progress towards – and potentially reaching – the Convention on Biological Diversity's Aichi Targets of the Strategic Plan for Biodiversity 2011–2020 (<http://www.cbd.int/sp/targets/>). Specifically, biodiversity inventories address a component of Aichi target 19, to improve and disseminate biodiversity knowledge, particularly its status and trends.

Even prior to the concept's introduction (Janzen and Hallwachs 1994), several 'all taxon biodiversity inventories' (ATBI) and similar initiatives emerged to document large blocks of life in a circumscribed region or protected area. These comprehensive biotic surveys, particularly those in tropical locales, have traditionally been mired at the stage of specimen sorting and species identification. The taxonomic impediment – the shortage of taxonomic information and the gaps in our taxonomic knowledge – have severely limited and slowed the sorting and naming of collected material (Janzen 1993, Lawton et al. 1998, Janzen 2004). The integration of DNA barcoding however, has simplified, accelerated, and democratized this task (Hebert et al. 2003, Packer et al. 2009, Cristescu 2014, Joly et al. 2014). Several ATBI projects have now successfully integrated DNA barcoding into their identification procedures, observed this acceleration, and in many cases, even increased the scope or scale of their project as a result. A few notable ATBIs that have incorporated DNA barcoding for species identification include projects in the Área de Conservación Guanacaste, Costa Rica (Janzen et al. 2009), Churchill, Canada (Zhou et al. 2009), Great Smoky Mountains, United States (Zhou et al. 2011), Madang, Papua New Guinea (Novotny et al. 2007), Moorea, French Polynesia (Check 2006), Zackenberg, Greenland (Wirta et al. 2015), and Mount Kinabalu, Malaysia (Merckx et al. 2015).

Following this model, the present study introduces DNA barcoding to a long-term biotic inventorying effort being conducted in a temperate nature reserve. The objective is to gauge the effect of adding this tool, in terms of both acceleration and increase of taxonomic scope, while concurrently constructing a reference DNA barcode library to facilitate future research and monitoring at this site. The existing inventory is expanded by employing two surveying strategies – a longer and comprehensive invertebrate trapping scheme, followed by a concentrated effort involving taxonomic experts in the form of a bioblitz (Lundmark 2003). In both cases, DNA barcoding is employed to sort the material rapidly into operational taxonomic units (OTUs), provide taxonomic assignment at varying levels of resolution depending on the taxon group, and organize the OTUs and linked specimen vouchers for examination by experts. The results demonstrate the speed at which barcode-assisted surveys can be completed, the role that barcoding plays in limiting and optimizing valuable taxonomic specialist time, and ultimately, a scalable model for rapid biotic surveys and dissemination of the rich biodiversity data captured. The product is not merely a comprehensive biotic inventory, but also a rich dataset of fine-scale occurrence and sequence data, all stored and cross-linked in several public biodiversity data repositories.

Materials and methods

Study Site and Existing Species Inventory

The **rare Charitable Research Reserve** is a 365+ hectare land reserve which was set aside in 2001 to preserve the cultural history and ecological integrity of the area, while providing opportunities for scientific research and public education within the context of an urbanized region. It is located at the confluence of the Speed and Grand Rivers in Cambridge, Ontario, Canada (43.381128, -80.357807), where the Carolinian and Northern Hardwood forests also meet. The reserve contains a diversity of habitats including existing and reclaimed agricultural lands, wetlands, floodplains, shrub thickets, limestone cliffs and alvars, cold-water creeks, and old growth forest. Due to these diverse habitats, as well as the organization's mandate to facilitate scientific research, **rare** has been the site of a variety of innovative research studies, including studies on fern genetics (Henry et al. 2014), prairie community establishment (Harvey and MacDougall 2014), and pollination services (Woodcock et al. 2014). For the present study, we chose sampling sites to encompass a wide range of habitats within the area. In advance of the bioblitz, sampling was conducted within an alvar, reclaimed agricultural fields, forest edges, and a wetland (Fig. 1). Six additional sites were sampled for the bioblitz: terrestrial and aquatic sampling was performed at the Grand River, Blair Flats Wetland, and Cruickston Creek; terrestrial sampling was conducted at an alvar, a cedar stand, and a silver maple wetland (Fig. 1). The wetlands on the reserve are part of the Barrie's Lake Bauman Creek Wetland Complex, which has been classified as a Provincially Significant Wetland by the Ontario Ministry of Natural Resources. Much of the property is also considered locally significant by the Regional Municipality of Waterloo.

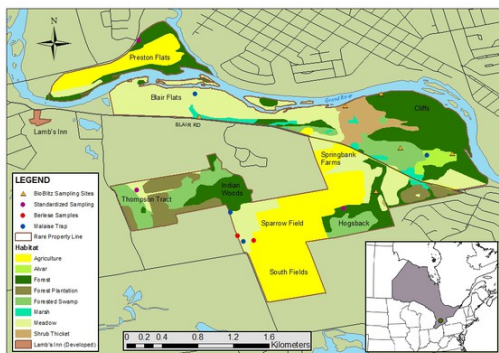


Figure 1.

Map indicating habitat types and sampling sites for the 2015 biotic survey conducted at **rare Charitable Research Reserve** in Cambridge, Ontario, Canada.

Prior to this study, 2,246 species had been recorded at **rare**, including birds (231), mammals (37), insects (832), plants (836), mosses (63) and lichens (21) (Suppl. material 1; note that 218 species still require confirmation, denoted by parentheses). These observations have come from a variety of sources including **rare** staff and advisors, citizen scientists, and academic researchers, some of whom have made notable contributions to this inventory, such as Woodcock et al. 2014 who added 150 species of pollinators. Others have provided observations of rarely encountered species, such as the rove beetles *Xantholinus elegans* (Olivier, 1795) (first record for North America) and *Xantholinus linearis* (Olivier, 1794) (previously known from the east coast of Canada, now present in Ontario) (Brunke and Majka 2010). The **rare** reserve also hosts several species that fall on the [provincial](#) or [national](#) lists of conservation concern: 1% of the total have a status ranging from special concern, threatened or endangered (15, 6 and 7 species, respectively), while 1.5% have an undefined status of rare or uncommon (15 and 19 species, respectively). Several of these species, such as the barn swallow [*Hirundo rustica* (Linnaeus, 1758)], which has been nationally listed as threatened since 2011, are the subjects of active recovery projects at **rare**. Similar to many species inventories, **rare's** list is evidently more complete for charismatic and well-studied taxa, such as birds, butterflies and vascular plants. The observations for these groups would be enabled by excellent field guides and the disproportionate interest of citizen scientists; the opposite would be the case for most invertebrate taxa, and **rare's** inventory reflects this. If it is assumed that the proportions of major taxonomic groups inhabiting this reserve resemble those for similar temperate sites (e.g., Great Smoky Mountains: Sharkey 2001) or the Canadian terrestrial and freshwater biota in general (Mosquin et al. 1995), this inventory is deficient in several major groups such as insects, arachnids, nematodes, fungi and lichens. The supporting data for most species entries are also lacking, such as specific locality, date or identifier of each observation. In addition, the bioblitz has highlighted errors in the inventory which may have been present due to the compilation of observations from a variety of sources including non-experts. Furthermore, nearly all observations are not supported by voucher specimens or images to permit verification (Bortolus 2008).

Survey Strategies and Specimen Collection

Two strategies were employed in an effort to maximize the diversity of organisms inventoried. The first was a comprehensive collecting scheme executed over a period of approximately four months (May to August 2015). It involved a variety of targeted taxa and techniques, but heavily favoured the collection of terrestrial arthropods by passive trapping. Four Malaise traps were set up in various habitats around the **rare** property (Fig. 1) and were serviced weekly. Three pitfall traps were set up in close proximity to each Malaise trap and serviced in parallel. From May 25-31 and July 6-12, 2015, 'standardized sampling' procedures developed by the Biodiversity Institute of Ontario were employed at three different sites at **rare** (Fig. 1). Standardized sampling includes 20 pitfall traps, 10 pan traps, three litter and/or soil samples for Berlese funnels, one flight intercept trap and one Malaise trap – all deployed for a total of seven days. Standardized sampling also includes 60 total minutes of sweep netting, which is performed in three sessions with four collectors sweep netting for five consecutive minutes simultaneously. Each session is pooled into one

sample and preserved in 95% ethanol. Passive traps (pitfall, pan, intercept) were deployed with soapy water and serviced every two days, while the Malaise trap used 95% ethanol and ran for the duration of the collecting period. All specimens collected through this standardized sampling routine were consolidated into individual jars for each technique. From July 23 to Aug 13, 2015, at least two ultraviolet light traps were deployed for one night per week; each trap was left overnight using ethyl acetate as a killing agent. On August 5, 2015, several aquatic samples were collected using stable dip nets for surber sampling, deploying hand nets along the stream banks and selective turning of stones to recover macroinvertebrates hiding below. Then the sample was passed through a 50 μ m mesh net to capture the smaller invertebrates. All specimens collected from these samples were preserved in 95% ethanol. This first strategy of comprehensive sampling over several months was conducted by technical staff, including undergraduate students, and completed on Aug 15, 2015.

The second strategy for surveying the reserve was a more concentrated effort and involved taxonomic experts – the execution of a bioblitz (Lundmark 2003). Termed the '**rare** BioBlitz', the event involved 113 participants from 31 institutions and coincided with the 6th International Barcode of Life Conference (Adamowicz 2015). Collection efforts at the bioblitz were focused on six sites selected based on habitat diversity, proximity, and potential species diversity (Fig. 1). Sampling efforts were concentrated between 1-3 pm and 9-11 pm and targeted taxa that fell within the expertise of the participants and in groups underrepresented in the **rare** inventory (e.g., spiders, parasitic wasps, mites, nematodes, fungi, and lichens). Various methods for collecting both terrestrial and aquatic arthropods were employed, including dip nets, seine nets, sweep netting, and plankton netting. Small teams surveyed the property and adjacent rivers for taxonomic groups not collected in the four previous months, including fungi, lichens, and vascular plants. Since the inventory is fairly complete for vascular plants (836 species), an effort was made to barcode all species of Blair Flats, a tall grass prairie site that is an active research site (e.g., Harvey and MacDougall 2014). For these taxa, specimens were collected in the field into bags and processed afterward (e.g., pressed and dried onto herbarium sheets). Fungal specimens were collected and processed in a similar manner. Several taxa were targeted for sightings only, where no voucher specimens were collected; these groups included fish, birds, bats, herptiles and odonates (for bat sightings protocol, see Suppl. material 2). All collected specimens were sorted and identified to the lowest taxonomic level possible by the appropriate expert, both on site and following the event from August 16-20, 2015. Vertebrates, plants, fungi and lichens were almost all identified to species, while most invertebrate specimens were assigned to order or family prior to analysis. Invertebrate specimens were either stored in 95% ethanol or pinned after collection. For all invertebrate, plant, and fungal taxa, voucher specimens were collected where possible and deposited in the Biodiversity Institute of Ontario's natural history collection ([BIOUG](#)) or herbarium ([BIO-OAC](#)) for permanent storage (Schilthuizen et al. 2015).

DNA Barcode Analysis

Both surveying strategies provided a large number of specimens that were sorted and prepared for subsequent DNA barcode analyses at the Canadian Centre for DNA barcoding (CCDB; www.ccdb.ca). A total of 25,287 specimens were sequenced from collection efforts from May to August 2015, followed by 3,502 specimens directly following the *rare* BioBlitz on Aug 16, 2015. Tissue samples were prepared in 96-well plate format and when necessary, the whole specimen proceeded through lysis and was recovered as voucher from the filter plate (Porco et al. 2010). Tissue lysis and DNA extraction varied slightly for different taxa (Suppl. material 3), but followed standard CCDB procedures (Ivanova et al. 2006, deWaard et al. 2008, Ivanova et al. 2008, Ivanova et al. 2011, Fazekas et al. 2012).

One or more standard DNA barcode markers were targeted for each major group of organisms: for animals, the mitochondrial gene *cytochrome oxidase subunit 1* (COI) (Hebert et al. 2003); for plants, the plastid marker *rbcl* (Hollingsworth et al. 2009) and the nuclear ribosomal internal transcribed spacer 2 (ITS2) marker (Hollingsworth 2011, Schoch et al. 2012); and for fungi and lichens (where only the fungal component was targeted), the internal transcribed spacer (ITS) marker (Schoch et al. 2012). PCR amplification, cycle sequencing and sequence analysis followed typical CCDB protocols (Ivanova and Grainger 2006, Kuzmina and Ivanova 2011). The primer cocktails used for PCR and sequencing are detailed in Suppl. material 3. The sequences were manually assembled and edited before upload to in the Barcode of Life Data Systems (BOLD, www.boldsystems.org) (Ratnasingham and Hebert 2007). The DNA extracts for all specimens are stored in the DNA Archive of the CCDB where they are available for additional study.

Barcode Index Numbers and Taxonomic Assignment

For the sequences derived from animal specimens, the records were assigned operational taxonomic units (OTUs) called Barcode Index Numbers (BINs) by the Refined Single Linkage (RESL) algorithm implemented on BOLD (Ratnasingham and Hebert 2013). For the sequences that have at least 500 bp coverage of the barcode region, < 1% ambiguous bases, and no stop codon or contamination flags, the RESL algorithm calculates the number of clusters and their membership (see Ratnasingham and Hebert 2013). The RESL algorithm runs weekly on all qualifying barcode sequences in BOLD, which as of August 2015, includes 5M specimens and 420K BINs. The BIN system is accessible through public, individual 'BIN pages' and permits rapid diversity assessments, even in the absence of taxonomic information. BINs show a high concordance with traditional taxonomic species names and can be used as a reliable proxy for species.

For each specimen that was assigned an existing BIN, the record received the existing identification of the BIN to the lowest level that did not have taxonomic conflict. For each specimen assigned a new BIN for BOLD, the sequence was queried through the BOLD Identification Engine (BOLD-ID Engine; http://www.boldsystems.org/index.php/IDS_OpenIdEngine). Identifications were applied based on sequence similarity (<15% for family, <5%

for genus) if the query sequence fell within a monophyletic cluster of BINs assigned to this family or genus. For animal records that did not receive BINs (<500bp), the sequence was similarly queried through the BOLD-ID Engine, but used a <2% similarity cutoff for assignment to species, in addition to the genus and family thresholds. Following this, a neighbour-joining tree was constructed and examined for unexpected placements which might indicate overlooked contamination events or analytical error. Finally, specimens and images were inspected morphologically to check for errors and refine the assigned taxonomy where possible.

Data resources

Collection data, taxonomic assignment, sequence, electropherograms and primer details for each specimen record, and often a high resolution image, are available on BOLD in the public dataset, "**rare** BioBlitz 2015 [DS-RBB15]" (<http://dx.doi.org/10.5883/DS-RBB15> or http://boldsystems.org/index.php/MAS_Management_OpenDataSet?datasetcode=DS-RBB15). The sequence data for each successfully barcoded specimen were deposited to GenBank by using the 'Submit to GenBank' function in the BOLD workbench (see Suppl. material 4 for accession numbers).

With the 'Data Spreadsheets' function in the BOLD workbench, the complete dataset was downloaded and reformatted into a Darwin Core Archive (Suppl. material 5) for upload to the Canadensys repository (<http://www.canadensys.net>), Canada's national node for the Global Biodiversity Information Facility (<http://www.gbif.org>). The online resource (<http://doi.org/10.5886/hh6td9jn>) contains all records of the 2015 inventory, including human observations. The citation for the resource is as follows:

Telfer A, Young MR, Quinn J, Perez K, Sobel CN, Sones JE, Levesque-Beaudin V, Derbyshire R, Fernandez-Triana J, Rougerie R, Hebert PDN, deWaard JR and contributors* (2015+). Inventory and BioBlitz Records from **rare Charitable Research Reserve**. 28,916 records. Online at http://data.canadensys.net/ipt/resource.do?r=rare_inventory, <http://doi.org/10.5886/hh6td9jn>, and <http://www.gbif.org/dataset/09e90dfb-5b1b-4dd9-a796-e2fba53d26f0>, released on 2015-08-20, version 1. GBIF key: 09e90dfb-5b1b-4dd9-a796-e2fba53d26f0.

* See Suppl. material 6 for complete list of contributors, institutions and email addresses

Checklist of species observed or collected at the *rare* Charitable Research Reserve in Cambridge, Ontario, Canada. The first of five checklists for Kingdom Animalia, this checklist contains members of Phylum Annelida and Phylum Arthropoda (Class Arachnida and Class Insecta up to Order Dermaptera).

Kingdom Animalia

Phylum Annelida

Class Clitellata

Order Arhynchobdellida

Family Erpobdellidae

Erpobdella punctata Leidy, 1870

Order Haplotaxida

Family Lumbricidae

Lumbricus terrestris Linnaeus, 1758

Phylum Arthropoda

Class Arachnida

Order Araneae

Family Agelenidae

Agelenopsis potteri Blackwall, 1846

Family Amaurobiidae

Callobius bennetti Blackwall, 1846

Notes: [BOLD:AAB8212](#)

Family Anyphaenidae

Anyphaena celer Hentz, 1847

Anyphaena pectorosa L. Koch, 1866

Notes: [BOLD:AAD6926](#)

Hibana gracilis Hentz, 1847

Notes: [BOLD:AAN6394](#)

Wulfila saltabundus Hentz, 1847

Notes: [BOLD:AAC6924](#)

Family Araneidae

Acanthepeira stellata Walckenaer, 1805

Notes: [BOLD:AAD7855](#)

Araneus diadematus Clerck, 1757

Notes: [BOLD:AAA4125](#)

Araneus trifolium Hentz, 1847

Notes: [BOLD:AAB8544](#)

Araniella displicata Hentz, 1847

Notes: [BOLD:AAA8399](#)

Argiope aurantia Lucas, 1833

Notes: [BOLD:AAB7933](#)

Argiope trifasciata Forsskål, 1775

Eustala anastera Walckenaer, 1841

Notes: [BOLD:AAL4913](#)

Eustala cepina Walckenaer, 1841

Notes: [BOLD:AAB7935](#)

Eustala emertoni Banks, 1904

Hypsosinga pygmaea Sundevall, 1831

Notes: [BOLD:ABX6180](#)

Hypsosinga rubens Hentz, 1847

Notes: [BOLD:AAN6264](#)

Larinioides cornutus Clerck, 1757

Notes: [BOLD:AAA8999](#)

Larinioides patagiatus Clerck, 1757

Mangora gibberosa Hentz, 1847

Notes: [BOLD:AAB7330](#)

Mangora maculata Keyserling, 1865

Mangora placida Hentz, 1847

Notes: [BOLD:AAI4456](#)|[BOLD:ACE4103](#)

Neoscona arabesca Walckenaer, 1841

Notes: [BOLD:AAA4123](#)

Family Clubionidae

Clubiona abboti L. Koch, 1866

Notes: [BOLD:AAD1564](#)

***Clubiona bryantae* Gertsch, 1941**

***Clubiona johnsoni* Gertsch, 1941**

Notes: [BOLD:AA4847](#)

***Clubiona maritima* L. Koch, 1867**

Notes: [BOLD:AA4085](#)

***Clubiona obesa* Hentz, 1847**

Notes: [BOLD:AA5417](#)

***Clubiona pallidula* Clerck, 1757**

Notes: [BOLD:AA4087](#)

Family Dictynidae

***Cicurina brevis* Emerton, 1890**

Notes: [BOLD:AA8284](#)

***Cicurina itasca* Chamberlin & Ivie, 1940**

Notes: [BOLD:AA4031](#)

***Cicurina pallida* Keyserling, 1887**

Notes: [BOLD:AA3046](#)

***Dictyna bellans* Chamberlin, 1919**

Notes: [BOLD:AA6249](#)

***Dictyna bostoniensis* Emerton, 1888**

Notes: [BOLD:AA1061](#)

***Dictyna brevitarsa* Emerton, 1915**

Notes: [BOLD:AA2306](#)

***Dictyna foliacea* Hentz, 1850**

Notes: [BOLD:AA6247](#)

***Dictyna volucripes* Keyserling, 1881**

Notes: [BOLD:AA1638](#)[BOLD:ACE2869](#)

***Emblyna annulipes* Blackwall, 1846**

***Emblyna hentzi* Kaston, 1945**

Notes: [BOLD:AA6251](#)

***Emblyna manitoba* Ivie, 1947**

Notes: [BOLD:AA9209](#)

***Emblyna sublata* Hentz, 1850**

Notes: [BOLD:AA7272](#)

Family Gnaphosidae

***Drassyllus depressus* Emerton, 1890**

Notes: [BOLD:AAD8676](#)

***Drassyllus niger* Banks, 1896**

Notes: [BOLD:AAI9037](#)

***Gnaphosa parvula* Banks, 1896**

Notes: [BOLD:AAC3779](#)

***Haplodrassus signifer* C. L. Koch, 1839**

Notes: [BOLD:AAD0462](#)

***Herpyllus ecclesiasticus* Hentz, 1832**

Notes: [BOLD:AAF2106](#)

***Micaria pulicaria* Sundevall, 1831**

Notes: [BOLD:AAC6612](#)

***Sergiolus ocellatus* Walckenaer, 1837**

Notes: [BOLD:ACV6055](#)

***Zelotes hentzi* Barrows, 1945**

Notes: [BOLD:AAA8914](#)

***Zelotes pseustes* Chamberlin, 1922**

Family Hahniidae

***Neoantistea agilis* Keyserling, 1887**

Notes: [BOLD:ACV5090](#)

***Neoantistea gosiuta* Gertsch, 1934**

Notes: [BOLD:AAG9583](#)

Family Linyphiidae

***Agyneta fabra* Keyserling, 1886**

Notes: [BOLD:AAE3860](#)

***Agyneta micaria* Emerton, 1882**

Notes: [BOLD:AAN6265](#)

***Agyneta unimaculata* Banks, 1892**

Notes: [BOLD:AAH0003](#)

***Bathyphantes brevis* Emerton, 1911**

Notes: [BOLD:AAC5851](#)

Bathyphantes pallidus* Banks, 1892**Notes: [BOLD:AAC9112](#)Centromerus sylvaticus* Blackwall, 1841**Notes: [BOLD:AAA4132](#)***Ceraticelus atriceps* O. P.-Cambridge, 1874**Notes: [BOLD:AAI3701](#)***Ceraticelus similis* Banks, 1892**Notes: [BOLD:AAF1318](#)***Ceratinella brunnea* Emerton, 1882**Notes: [BOLD:AAD2101](#)***Ceratinops crenatus* Emerton, 1882**Notes: [BOLD:ACF8798](#)***Ceratinops latus* Emerton, 1882**Notes: [BOLD:AAI5447](#)***Ceratinopsis auriculata* Emerton, 1909**Notes: [BOLD:ACR6338](#)***Ceratinopsis labradorensis* Emerton, 1925**Notes: [BOLD:ACV5182](#)***Collinsia plumosa* Emerton, 1882**Notes: [BOLD:AAM9146](#)***Eridantes erigonoides* Emerton, 1882**Notes: [BOLD:AAH0004](#)***Erigone atra* Blackwall, 1833**Notes: [BOLD:ACE5877](#)***Erigone autumnalis* Emerton, 1882**Notes: [BOLD:AAH0001](#)***Erigone blaesa* Crosby & Bishop, 1928**Notes: [BOLD:ACE9601](#)***Frontinella communis* Hentz, 1850**Notes: [BOLD:AAE0825](#)***Grammonota angusta* Dondale, 1959**Notes: [BOLD:AAD1498](#)

Grammonota inornata* Emerton, 1882**Notes: [BOLD:ACV5737](#)Hypomma marxi* Keyserling, 1886**Notes: [BOLD:AAB9520](#)***Hypselistes florens* O. P.-Cambridge, 1875**Notes: [BOLD:AAB4233](#)***Mermessus index* Emerton, 1914**Notes: [BOLD:ACL4554](#)***Mermessus trilobatus* Emerton, 1882**Notes: [BOLD:AAC8898](#)***Microlinyphia mandibulata* Emerton, 1882**Notes: [BOLD:AAF4994](#)***Nerienne clathrata* Sundevall, 1830**Notes: [BOLD:AAA8358](#)[BOLD:AAB7327](#)***Nerienne montana* Clerck, 1757*****Nerienne variabilis* Banks, 1892*****Pityohyphantes costatus* Hentz, 1850*****Pityohyphantes subarcticus* Chamberlin & Ivie, 1943*****Pocadicnemis americana* Millidge, 1976**Notes: [BOLD:AAC9060](#)***Tennesseeillum formica* Emerton, 1882**Notes: [BOLD:AAG5631](#)***Tenuiphantes zebra* Emerton, 1882**Notes: [BOLD:AAI8098](#)***Walckenaeria directa* O. P.-Cambridge, 1874**Notes: [BOLD:AAH8313](#)***Walckenaeria fallax* Millidge, 1983**Notes: [BOLD:AAH8314](#)***Walckenaeria pinocchio* Kaston, 1945**Notes: [BOLD:ACT1115](#)***Walckenaeria spiralis* Emerton, 1882**Notes: [BOLD:AAH8314](#)

Family Lycosidae

***Arctosa emertoni* Gertsch, 1934**

Notes: [BOLD:ACW1682](#)

***Pardosa distincta* Blackwall, 1846**

Notes: [BOLD:AAC7802](#)

***Pardosa milvina* Hentz, 1844**

Notes: [BOLD:AAB7668](#)

***Pardosa modica* Blackwall, 1846**

Notes: [BOLD:AAA5090](#)

***Pardosa moesta* Banks, 1892**

Notes: [BOLD:AAB0863](#)

***Pardosa saxatilis* Hentz, 1844**

Notes: [BOLD:AAB7667](#)

***Pirata piraticus* Clerck, 1757**

Notes: [BOLD:AAB6784](#)

***Pirata praedo* Kulczynski, 1885**

Notes: [BOLD:AAC5349](#)

***Piratula cantralli* Wallace & Exline, 1978**

Notes: [BOLD:ABZ5613](#)

***Piratula minuta* Emerton, 1885**

Notes: [BOLD:AAE4247](#)

***Schizocosa avida* Walckenaer, 1837**

Notes: [BOLD:AAD3880](#)

***Schizocosa crassipalpa* Roewer, 1951**

Notes: [BOLD:AAC4687](#)

***Schizocosa mccoeki* Montgomery, 1904**

Notes: [BOLD:AAH0055](#)

***Schizocosa ocreata* Hentz, 1844**

Notes: [BOLD:AAA7232](#)

***Trochosa ruricola* De Geer, 1778**

Notes: [BOLD:AAB0726](#)

***Trochosa terricola* Thorell, 1856**

Notes: [BOLD:AAB0727](#)

Family Mimetidae

***Mimetus epeiroides* Emerton, 1882**

Notes: [BOLD:AAG5658](#)

***Mimetus haynesi* Gertsch & Mulaik, 1940**

Notes: [BOLD:AAK6284](#)

***Mimetus notius* Chamberlin, 1923**

Family Philodromidae

***Philodromus cespitum* Walckenaer, 1802**

Notes: [BOLD:AAB3836](#)

***Philodromus imbecillus* Keyserling, 1880**

Notes: [BOLD:AAI2838](#)

***Philodromus praelustris* Keyserling, 1880**

Notes: [BOLD:AAD2665](#)

***Philodromus rufus* subsp. *vibrans* Dondale**

***Thanatus coloradensis* Keyserling, 1880**

Notes: [BOLD:AAM7986](#)

***Tibellus maritimus* Menge, 1875**

Notes: [BOLD:AAA7188](#)

***Tibellus oblongus* Walckenaer, 1802**

Notes: [BOLD:AAA7188](#)

Family Phrurolithidae

***Phrurotimpus borealis* Emerton, 1911**

Notes: [BOLD:AAC7234](#)

***Scotinella pugnata* Emerton, 1890**

Notes: [BOLD:AAK7452](#)

Family Pisauridae

***Dolomedes striatus* Giebel, 1869**

Notes: [BOLD:ACI5773](#)

***Dolomedes tenebrosus* Hentz, 1844**

***Pisaurina mira* Walckenaer, 1837**

Notes: [BOLD:AAI2721](#)

Family Salticidae

***Eris militaris* Hentz, 1845**

Notes: [BOLD:AAA5654](#)

***Evarcha hoyi* Peckham & Peckham, 1883**

Notes: [BOLD:AAC0342](#)[BOLD:ACL8050](#)

***Habronattus decorus* Blackwall, 1846**

***Marpissa formosa* Banks, 1892**

Notes: [BOLD:AAG0312](#)

***Naphrys pulex* Hentz, 1846**

Notes: [BOLD:AAC2433](#)

***Neon nelli* Peckham & Peckham, 1888**

Notes: [BOLD:AAD9221](#)

***Pelegrina galathea* Walckenaer, 1837**

Notes: [BOLD:AAB2930](#)

***Pelegrina insignis* Banks, 1892**

Notes: [BOLD:AAB2928](#)

***Pelegrina proterva* Walckenaer, 1837**

***Phidippus audax* Hentz, 1845**

***Phidippus clarus* Keyserling, 1885**

***Salticus scenicus* Clerck, 1757**

***Sitticus floricola* subsp. *palustris* Peckham and Peckham, 1883**

***Synageles noxiosus* Hentz, 1850**

Notes: [BOLD:ACL8115](#)

***Tutelina harti* Peckham, 1891**

Notes: [BOLD:AAW8769](#)

***Tutelina similis* Banks, 1895**

Notes: [BOLD:AAF6387](#)

***Zygoballus nervosus* Peckham & Peckham, 1888**

Notes: [BOLD:ACA1490](#)

Family Tetragnathidae

***Leucauge venusta* Walckenaer, 1841**

Notes: [BOLD:AAB8714](#)

***Pachygnatha dorothea* McCook, 1894**

Notes: [BOLD:AAE5304](#)

***Pachygnatha tristriata* C. L. Koch, 1845**

Notes: [BOLD:AAF1571](#)

Pachygnatha xanthostoma* C. L. Koch, 1845**Notes: [BOLD:ACO7247](#)[BOLD:ACP5884](#)[BOLD:ACU5364](#)Tetragnatha caudata* Emerton, 1884**Notes: [BOLD:AAE3958](#)[BOLD:ACN4034](#)[BOLD:AAP3715](#)***Tetragnatha extensa* Linnaeus, 1758*****Tetragnatha guatemalensis* O. P.-Cambridge, 1889*****Tetragnatha laboriosa* Hentz, 1850**Notes: [BOLD:AAA6381](#)[BOLD:ACR6860](#)***Tetragnatha shoshone* Levi, 1981**Notes: [BOLD:AAB7995](#)***Tetragnatha straminea* Emerton, 1884**Notes: [BOLD:AAD7095](#)***Tetragnatha viridis* Walckenaer, 1841**Notes: [BOLD:AAG5659](#)[BOLD:AAN6335](#)**Family Theridiidae*****Dipoena nigra* Emerton, 1882**Notes: [BOLD:AAF4974](#)***Enoplognatha caricis* Fickert, 1876**Notes: [BOLD:AAQ3896](#)***Enoplognatha ovata* Clerck, 1757**Notes: [BOLD:AAA6910](#)***Euryopsis funebris* Hentz, 1850**Notes: [BOLD:AAJ0542](#)***Hentziectypus globosus* Hentz, 1850**Notes: [BOLD:AAN6263](#)***Neospintharus trigonum* Hentz, 1850**Notes: [BOLD:AAB0273](#)***Neottiura bimaculata* Linnaeus, 1767**Notes: [BOLD:AAK8332](#)[BOLD:ACN7831](#)***Parasteatoda tabulata* Levi, 1980*****Parasteatoda tepidariorum* C. L. Koch, 1841**Notes: [BOLD:AAC0175](#)

Theridion albidum* Banks, 1895**Notes: [BOLD:AAV3042](#)Theridion differens* Emerton, 1882**Notes: [BOLD:AAC3269](#)***Theridion glaucescens* Becker, 1879**Notes: [BOLD:AAG1794](#)***Theridion murarium* Emerton, 1882**Notes: [BOLD:AAC6350](#)***Theridula emertoni* Levi, 1954**Notes: [BOLD:AAD2291](#)***Thymoites unimaculatus* Emerton, 1882**Notes: [BOLD:AAE7853](#)***Yunohamella lyrica* Walckenaer, 1841**Notes: [BOLD:AAG4815](#)**Family Thomisidae*****Mecaphesa asperata* Hentz, 1847**Notes: [BOLD:ACE7683](#)***Misumena vatia* Clerck, 1757**Notes: [BOLD:AAA6275](#)***Misumenoides formosipes* Walckenaer, 1837*****Misumessus oblongus* Keyserling, 1880*****Ozyptila americana* Banks, 1895*****Ozyptila praticola* C. L. Koch, 1837**Notes: [BOLD:AAC7413](#)***Tmarus angulatus* Walckenaer, 1837**Notes: [BOLD:ABY7475](#)***Xysticus bicuspis* Keyserling, 1887**Notes: [BOLD:AAJ9685](#)***Xysticus discursans* Keyserling, 1880**Notes: [BOLD:AAJ9718](#)|[BOLD:ACV2014](#)|[BOLD:ACV5078](#)***Xysticus elegans* Keyserling, 1880**Notes: [BOLD:AAC1568](#)

Xysticus emertoni* Keyserling, 1880**Notes: [BOLD:AAB4300](#)Xysticus funestus* Keyserling, 1880*****Xysticus luctans* C. L. Koch, 1845**Notes: [BOLD:AAF8190](#)***Xysticus punctatus* Keyserling, 1880**Notes: [BOLD:AAD2346](#)***Xysticus winnipegensis* Turnbull, Dondale & Redner, 1965**Notes: [BOLD:AAM6956](#)**Family Uloboridae*****Uloborus glomus* Walckenaer, 1841**Notes: [BOLD:AAJ7823](#)**Order Mesostigmata****Family Ascidae*****Arctoseius cetratus* Sellnick, 1940**Notes: [BOLD:ACF8021](#)**Family Rhodacaridae*****Rhodacarellus silesiacus* Willmann, 1935****Order Opiliones****Family Phalangidae*****Oligolophus tridens* C. L. Koch, 1836**Notes: [BOLD:AAM8194](#)***Phalangium opilio* Linnaeus, 1758**Notes: [BOLD:AAI4346](#)***Platybunus triangularis* Herbst, 1799**Notes: [BOLD:ABW0506](#)**Family Sclerosomatidae*****Leiobunum aldrichi* Weed, 1893**Notes: [BOLD:AAH7061](#)***Leiobunum ventricosum* Wood, 1868****Order Sarcoptiformes****Family Euzetidae*****Euzetes globulus* Nicolet, 1855**Notes: [BOLD:AAF9090](#)

Family Gustaviidae

Gustavia microcephala Nicolet, 1855

Notes: [BOLD:ACE3149](#)

Family Liacaridae

Dorycranosus acutidens Aoki, 1965

Notes: [BOLD:AAF9274](#)

Family Mochlozetidae

Podoribates pratensis Banks, 1895

Notes: [BOLD:AAF9173](#)

Family Mycobatidae

Punctoribates punctum Koch, 1839

Notes: [BOLD:AAH6516](#)|[BOLD:ACB6310](#)

Family Oppiidae

Oppia nitens Koch, 1836

Notes: [BOLD:AAF0868](#)

Family Oribatulidae

Oribatula tibialis Nicolet, 1855

Notes: [BOLD:ACI4357](#)

Family Scheloribatidae

Scheloribates clavilanceolatus Ewing, 1907

Notes: [BOLD:AAF9097](#)

Family Tectocepheidae

Tectocepheus sarekensis Trägårdh, 1910

Notes: [BOLD:AAM3402](#)|[BOLD:AAM4355](#)

Order Trombidiformes**Family Arrenuridae**

Arrenurus reflexus Marshall, 1908

Notes: [BOLD:AAE6722](#)

Class Branchiopoda**Order Diplostraca****Family Bosminidae**

Bosmina liederii De Melo and Hebert, 1994

Family Eurycercidae

Eurycercus longirostris Hann, 1982

Class Chilopoda**Order Geophilomorpha****Family Schendylidae**

Schendyla nemorensis C.L.Koch, 1837

Notes: [BOLD:AAG8560](#)

Order Lithobiomorpha**Family Lithobiidae**

Lithobius microps Meinert, 1868

Notes: [BOLD:AAH6432](#)

Class Collembola

Entomobrya atrocincta Schott, 1896

Notes: [BOLD:ACE5102](#)

Family Entomobryidae

Entomobrya nivalis Linnaeus, 1758

Notes: [BOLD:ACL6239](#)

Lepidocyrtus paradoxus Uzel, 1891

Orchesella villosa Linnaeus, 1767

Notes: [BOLD:AAA8726](#)

Pseudosinella octopunctata Boerner, 1901

Notes: [BOLD:AAA9292](#)

Family Isotomidae

Parisotoma notabilis Schaffer, 1896

Order Poduromorpha**Family Hypogastruridae**

Ceratophysella bengtssoni Ågren, 1904

Notes: [BOLD:AAI3738](#)

Order Symphypleona**Family Dicyrtomidae**

Dicyrtomina minuta Fabricius, 1783

Family Katiannidae

Sminthurinus elegans Fitch, 1862

Notes: [BOLD:AAB3495](#)[BOLD:AAB3496](#)

Brachyiulus pusillus Leach, 1815

Notes: [BOLD:AAM7944](#)

Family Julidae

Cylindroiulus caeruleocinctus Wood, 1864

Notes: [BOLD:AAH7472](#)

Julus scandinavicus Latzel, 1884

Notes: [BOLD:AAH7469](#)

Ophiulus pilosus Newport, 1843

Class Insecta**Order Coleoptera****Family Anobiidae**

Caenocara sp.

Ptilinus ruficornis Say, 1823

Family Anthicidae

Malporus formicarius LaFerté-Sénéctère, 1849

Notes: [BOLD:ACF8552](#)

Notoxus desertus Casey, 1895

Notes: [BOLD:ABX0657](#)

Stricticomus tobias Marseul, 1879

Notes: [BOLD:AAQ1028](#)

Family Anthribidae

Anthribus nebulosus Forster, 1770

Notes: [BOLD:AAO1339](#)

Ormiscus walshii LeConte, 1876

Notes: [BOLD:AAU7341](#)

Family Buprestidae

Agrilus sulciollis Lacordaire, 1835

Family Byrrhidae

Simplocaria semistriata Fabricius, 1801

Notes: [BOLD:ABW1696](#)

Family Byturidae

Byturus unicolor Say, 1823

Family Cantharidae

Cantharis rufa Linnaeus, 1758

Chauliognathus pensylvanicus DeGeer, 1774

Rhagonycha fulva Scopoli, 1763

Rhaxonycha carolina Fabricius, 1801

Family Carabidae

Agonoleptus conjunctus Say, 1823

Notes: [BOLD:AAE9008](#)

Agonum fidele Casey, 1920

Agonum gratiosum Mannerheim, 1853

Amara angustata Say, 1823

Amara rubrica Haldeman, 1843

Notes: [BOLD:AAM7658](#)

Bembidion frontale LeConte, 1847

Notes: [BOLD:AAU7150](#)

Bembidion obtusum Audinet-Serville, 1821

Notes: [BOLD:AAP9490](#)

Calleida punctata LeConte, 1846

Carabus granulatus Linnaeus, 1758

Carabus nemoralis Müller, 1764

Chlaenius tricolor Dejean, 1826

Clivina fossor Linnaeus, 1758

Notes: [BOLD:AAH0274](#)

Colliuris pensylvanica Linnaeus, 1758

Dyschirius setosus LeConte, 1857

Elaphrus clairvillei Kirby, 1837

Lebia fuscata Dejean, 1825

Notes: [BOLD:AAH0212](#)

Lebia solea Hentz, 1830

Lebia viridis Say, 1823

Notes: [BOLD:AAH0141](#)

Platynus hypolithos Say, 1823

Pterostichus melanarius Illiger, 1798

Family Cerambycidae

Acalymma vittata Barber, 1947

Astylopsis macula Say, 1826

Astylopsis sexguttata Say, 1826

Bellamira scalaris Say, 1826

Calligrapha californica subsp. *coreopsivora* Brown

Chaetocnema sp.

Charidotella sexpunctata subsp. *bicolor* Fabricius, 1798

Chrysochus auratus Fabricius, 1775

Chrysolina hudsonica Brown, 1938

Cicindela punctulata subsp. *punctulata* Olivier

Cicindela sexguttata Fabricius, 1775

Clytus ruricola Olivier, 1795

Crepidodera sp.

Cyrtophorus verrucosus Olivier, 1795

Notes: [BOLD:AAD4513](#)

Deloyala guttata Olivier, 1790

Dibolia sp.

Epitrix sp.

Euderces picipes Fabricius, 1787

Gaurotes cyanipennis Say, 1824

Notes: [BOLD:AAI7042](#)

Longitarsus sp.

Mantura floridana Crotch, 1873

Megacyllene robiniae Forster, 1771

Molorchus bimaculatus Say, 1824

Notes: [BOLD:AAH0019](#)

Neoclytus acuminatus subsp. *acuminatus* Fabricius

Oberea tripunctata Swederus, 1787

Obrium rufulum Gahan, 1908

Oulema palustris Blatchley, 1913

Paria sp.

Phyllotreta sp.

Phymatodes amoenus Say, 1824

Plagioderma versicolor Laicharting, 1781

Psylliodes punctulata Melsheimer, 1847

Pyrrhalta sp.

Systema blanda F. E. Melsheimer, 1847

Tetraopes tetrophthalmus Forster, 1771

Tetrops praeusta Linnaeus, 1758

Notes: [BOLD:AAE9431](#)

Trigonarthris proxima Say, 1824

Trirhabda sp.

Typocerus velutinus subsp. *velutinus* Olivier

Urgleptes querci Fitch, 1858

Xylotrechus convergens LeConte, 1873

Xylotrechus gemellus Casey, 1893

Zeugophora varians Crotch, 1873

Family Cerylonidae

Philothermus glabriculus LeConte, 1863

Notes: [BOLD:ABX9329](#)

Family Chrysomelidae

Altica chalybea Illiger, 1807

Altica sp.

Cassida rubiginosa Müller, 1776

Notes: [BOLD:AAO0522](#)

Crepidodera heikertingeri Lazorko, 1974

Notes: [BOLD:AAG4462](#)

Dibolia borealis Chevrolat in Guérin-Méneville, 1834

Notes: [BOLD:AAL0908](#)

Epitrix cucumeris Harris, 1851

Notes: [BOLD:ABA9101](#)

Exema canadensis Pierce, 1940

Helocassis clavata Fabricius, 1798

Microrhopala vittata Fabricius, 1798

Neogalerucella californiensis Linnaeus, 1767

Notes: [BOLD:AAL2945](#)

Ophraella conferta J. L. LeConte, 1865

Notes: [BOLD:ACF8270](#)

Paria fragariae Wilcox, 1954

Notes: [BOLD:ABA3960](#)|[BOLD:ACF6671](#)

Phyllotreta striolata Fabricius, 1801

Notes: [BOLD:AAL5267](#)

Plagiodera versicolora Laicharting, 1781

Psylliodes affinis Paykull, 1799

Notes: [BOLD:AAU6967](#)

Psylliodes napi Fabricius, 1792

Psylliodes picinus Marsham, 1802

Pyrrhalta viburni Paykull, 1799

Trirhabda borealis Blake, 1931

Notes: [BOLD:AAG4458](#)

Xanthonia decemnotata Say, 1824

Notes: [BOLD:ABA6335](#)|[BOLD:ACJ0239](#)

Family Ciidae

Ceracis thoracicornis Ziegler, 1845

Family Cleridae

Cymatodera bicolor Say, 1825

Notes: [BOLD:AAU6910](#)

Enoclerus nigripes Say, 1823

Notes: [BOLD:AAU6970](#)

Enoclerus rosmarus Say, 1823

Isohydnocera curtipennis Newman

Phyllobaenus verticalis Say, 1835

Placopterus thoracicus Olivier, 1795

Notes: [BOLD:AAP8584](#)

Zenodosus sanguineus* Say, 1835**Notes: [BOLD:ABA6311](#)**Family Coccinellidae**Coccinella septempunctata* Linnaeus, 1758*****Coleomegilla maculata* De Geer, 1775**Notes: [BOLD:AAD7604](#)***Coleomegilla maculata* subsp. *lengi* Timberlake*****Didion punctatum* Melsheimer, 1847*****Harmonia axyridis* Pallas, 1773**Notes: [BOLD:AAB5640](#)***Hippodamia glacialis* Fabricius, 1775**Notes: [BOLD:AAH3305](#)***Hippodamia variegata* Goeze, 1777*****Hyperaspis binotata* Say, 1826*****Hyperaspis* cf. *binotata******Propylaea quatuordecimpunctata* Linnaeus, 1758**Notes: [BOLD:AAF6935](#)***Propylea quatuordecimpunctata* Linnaeus, 1758*****Psyllobora vigintimaculata* subsp. *maculata* Say*****Scymnus* sp.*****Stethorus punctillum* Weise, 1891**Notes: [BOLD:AAN6149](#)**Family Corylophidae*****Orthoperus scutellaris* LeConte, 1878**Notes: [BOLD:AAU7040](#)***Sericoderus lateralis* Gyllenhal, 1827**Notes: [BOLD:ABA2914](#)**Family Cryptophagidae*****Atomaria ehippiata* Zimmermann, 1869****Family Curculionidae*****Acoptus suturalis* LeConte, 1876**Notes: [BOLD:AAU6930](#)***Barypeithes pellucidus* Boheman, 1834**Notes: [BOLD:AAG5192](#)

***Hylesinus aculeatus* Say, 1824**

Notes: [BOLD:AAU7331](#)

***Hypera zoilus* Scopoli, 1763**

***Isochnus sequensi* Stierlin 1894**

Notes: [BOLD:ACA3052](#)

***Madarellus undulatus* Say, 1824**

Notes: [BOLD:AAy6533](#)

***Monarthrum mali* Fitch, 1855**

Notes: [BOLD:ACD0202](#)

***Orchestes alni* Linnaeus 1758**

Notes: [BOLD:AAM7726](#)

***Phyllobius oblongus* Linnaeus, 1758**

Notes: [BOLD:AAF9187](#)

***Pityogenes hopkinsi* Swaine, 1915**

Notes: [BOLD:ABW5076](#)

***Polydrusus impressifrons* Gyllenhal, 1834**

Notes: [BOLD:AAO4332](#)

***Sitona lineellus* Bonsdorff, 1785**

***Tychius meliloti* Stephens, 1831**

Notes: [BOLD:AAM7740](#)

***Xyleborinus alni* Niiijima 1909**

Notes: [BOLD:AAB2754](#)

***Xyleborinus saxeseni* Ratzeburg, 1837**

Notes: [BOLD:AAB9578](#)

***Xyleborus dispar* Fabricius, 1792**

Notes: [BOLD:AAD0158](#)

***Xylosandrus germanus* Blandford, 1894**

Notes: [BOLD:AAF7523](#)

Family Dytiscidae

***Desmopachria convexa* Aubé, 1838**

Family Elateridae

***Aeolus mellillus* Say, 1836**

***Ampedus areolatus* Say, 1823**

Notes: [BOLD:ACM2015](#)

Ampedus linteus* Say, 1839**Notes: [BOLD:AAU7141](#)Ampedus nigricollis* Herbst, 1801**Notes: [BOLD:AAH2376](#)***Ampedus oblessus* Say, 1833**Notes: [BOLD:ACA3849](#)***Ampedus protervus* LeConte, 1853**Notes: [BOLD:ACR3975](#)***Athous brightwelli* Kirby, 1837*****Corymbitodes tarsalis* Melsheimer, 1844**Notes: [BOLD:ACV5201](#)***Ctenicera cylindricollis* Herbst, 1806**Notes: [BOLD:AAH2370](#)***Dalopius vagus* Brown, 1934*****Hemicrepidius memnonius* Herbst, 1806*****Melanotus castanipes* Paykull, 1800**Notes: [BOLD:AAH2378](#)**Family Endomychidae*****Mycetina perpulchra* Newman, 1838*****Phymaphora pulchella* Newman, 1838**Notes: [BOLD:ACI7114](#)**Family Erotylidae*****Triplax flavicollis* Lacordaire, 1842*****Triplax thoracica* Say, 1825*****Tritoma pulchra* Say, 1826*****Tritoma sanguinipennis* Say, 1825****Family Eucnemidae*****Dirrhagofarsus lewisi* Fleutiaux, 1900*****Hylis terminalis* LeConte, 1866*****Isorhipis obliqua* Say, 1836*****Microrhagus* sp.**

Microrhagus subsinuata LeConte

Microrhagus triangularis Say, 1823

Family Gyrinidae

Dineutus assimilis Kirby, 1937

Family Haliplidae

Haliphus immaculicollis Harris, 1828

Family Hydrophilidae

Anacaena lutescens Stephens, 1829

Cercyon haemorrhoidalis Fabricius, 1775

Notes: [BOLD:ABV1545](#)

Enochrus ochraceus Melsheimer, 1844

Tropisternus natator Orchymont, 1938

Family Kateretidae

Brachypterolus pulicarius Linnaeus, 1758

Family Lampyridae

Ellychnia corrusca Linnaeus, 1767

Notes: [BOLD:ACV4844](#)

Lucidota atra G. Olivier, 1790

Photinus sp.

Pyractomena sp.

Pyropyga nigricans Say, 1823

Family Languriidae

Acropteroxys gracilis Newman 1838

Family Latridiidae

Corticicara gibbosa Herbst, 1793

Notes: [BOLD:AAI8935](#)

Family Leiodidae

Anisotoma obsoleta Horn, 1880

Notes: [BOLD:AAR3435](#)

Anisotoma sp.

Catops paramericanus Peck and Cook, 2002

Notes: [BOLD:AAH3504](#)

Catops sp.

Lionothus sp.

Nemadus sp.

Prionochaeta opaca Say, 1825

Notes: [BOLD:AAP6949](#)

Ptomophagus sp.

Sciodrepoides fumatus subsp. *terminans* LeConte

Family Melandryidae

Dircaea liturata LeConte, 1866

Epicauta pensylvanica De Geer, 1775

Melandrya striata Say, 1824

Notes: [BOLD:AAK7242](#)

Family Meloidae

Epicauta murina LeConte, 1853

Meloe impressus Kirby, 1837

Family Melyridae

Collops quadrimaculata Fabricius, 1798

Hypebaeus apicalis Say, 1825

Notes: [BOLD:AAN5932](#)

Family Mordellidae

Mordellina infima LeConte, 1862

Mordellistena andreae LeConte, 1862

Mordellistena bifasciata Ray, 1936

Mordellistena cervicalis LeConte, 1862

Mordellistena cf. lutea

Mordellistena ornata Melsheimer, 1845

Mordellistena picilabris Helmuth, 1864

Mordellistena sp.

Mordellochroa scapularis Say, 1824

Notes: [BOLD:AAU6912](#)

Paramordellaria triloba Say, 1824

Tomoxia lineela LeConte

Family Mycetophagidae

Mycetophagus pluripunctatus LeConte, 1856

Family Nitidulidae

Carpophilus sayi Parsons, 1943

Conotelus obscurus Erichson, 1843

Glischrochilus fasciatus Olivier, 1790

Glischrochilus quadrisignatus Say 1835

Glischrochilus sanguinolentus subsp. *sanguinolentus* Olivier, 1790

Omosita colon Linnaeus, 1758

Stelidota octomaculata Say, 1825

Notes: [BOLD:AAH0115](#)

Family Pedilidae

Pedilus lugubris Say

Family Phalacridae

Acylomus pugetanus Casey, 1916

Notes: [BOLD:AAH0135](#)

Olibrus semistriatus LeConte, 1856

Stilbus apicalis Melsheimer, 1844

Notes: [BOLD:AAH0134](#)

Family Psephenidae

Psephenus herricki DeKay, 1844

Family Ptilodactylidae

Ptilodactyla sp.

Family Ptinidae

Hadrobregmus notatus Say, 1825

Notes: [BOLD:AAP8586](#)

Family Pyrochroidae

Dendroides canadensis Leconte

Schizotus cervicalis Newman, 1838

Family Rhipiphoridae

Pelecotoma flavipes Melsheimer, 1846

Ripiphorus fasciatus Say, 1824

Family Scarabaeidae

Amphimallon majale Razumowski, 1789

Aphodius granarius Linnaeus, 1767

Ataenius strigatus Say, 1823

Calamosternus granarius Linnaeus, 1767

Notes: [BOLD:AAM7733](#)

Onthophagus orpheus subsp. *canadensis* Fabricius, 1801

Osmoderma scabra Palisot de Beauvois, 1805

Phyllophaga futilis LeConte, 1850

Notes: [BOLD:AAD1098](#)

Phyllophaga rugosa Melsheimer, 1845

Notes: [BOLD:AAJ2312](#)

Popillia japonica Newman, 1841

Rhyssalus germanus Linnaeus, 1767

Trox scabrosus Beauvois, 1805

Family Scirtidae

Cyphon laevipennis Tournier, 1868

Notes: [BOLD:AAG3633](#)

Cyphon obscurus Guérin and Mémerville, 1834

Notes: [BOLD:AAG7259](#)

Cyphon pusillus LeConte

Notes: [BOLD:AAP7021](#)

***Scirtes tibialis* Guerin**

Family Scolytidae

***Hylurgopinus rufipes* Eichhoff, 1868**

***Scolytus mali* Bechstein, 1805**

***Xyleborus sayi* Hopkins, 1915**

Family Scraptiidae

***Anaspis rufa* Say, 1826**

Notes: [BOLD:AAH0469](#)

***Canifa pallipes* Melsheimer, 1846**

Family Silphidae

***Necrophila americana* Linnaeus, 1758**

***Nicrophorus orbicollis* Say, 1825**

Notes: [BOLD:AAE1939](#)

***Oiceoptoma inaequale* Fabricius, 1781**

Family Silvanidae

***Ahasverus advena* Waltl, 1834**

Notes: [BOLD:AAJ2005](#)

***Silvanus bidentatus* Fabricius, 1792**

Notes: [BOLD:AAO0157](#)

***Telephanus velox* Haldeman, 1846**

Notes: [BOLD:AAW6380](#)

Family Staphylinidae

***Amischa analis* Gravenhorst, 1802**

Notes: [BOLD:ABA5313](#)

***Anotylus insecatus* Gravenhorst, 1806**

Notes: [BOLD:AAR3352](#)

***Anotylus tetracarınatus* Block, 1799**

***Atheta brunneipennis* Thomson, 1852**

Notes: [BOLD:ABA9094](#)

***Bisnius blandus* Gravenhorst, 1806**

***Carpelimus fuliginosus* Gravenhorst, 1802**

Notes: [BOLD:AAO0558](#)

***Coproporus ventriculus* Say, 1834**

Notes: [BOLD:ACV1788](#)

Lordithon appalachianus* Campbell, 1982**Notes: [BOLD:ABA6331](#)Lordithon cinctus* Gravenhorst, 1802**Notes: [BOLD:ABA6370](#)***Meronera venustula* Erichson, 1839**Notes: [BOLD:ABW2870](#)***Myllaena arcana* Casey, 1911**Notes: [BOLD:ACJ6804](#)***Philonthus caeruleipennis* Mannerheim, 1830*****Philonthus flavibasis* Casey, 1915**Notes: [BOLD:AAH0113](#)***Platydracus cinnamopterus* Gravenhorst, 1802**Notes: [BOLD:ACJ0017](#)***Scaphidium quadriguttatum* Melsheimer**Notes: [BOLD:ACP0011](#)***Sepedophilus cinctulus* Erichson, 1839**Notes: [BOLD:ACC1294](#)***Sepedophilus testaceus* Fabricius, 1793**Notes: [BOLD:AAH0108](#)***Stenichnus scutellaris* Muller & Kunze, 1822**Notes: [BOLD:AAN9916](#)***Tachinus corticinus* Gravenhorst, 1802**Notes: [BOLD:AAH0107](#)***Tachyporus atriceps* Stephens, 1832**Notes: [BOLD:ABX2484](#)***Tachyporus chrysomelinus* Linnaeus, 1758**Notes: [BOLD:AAN9511](#)***Tachyporus elegans* Horn, 1877**Notes: [BOLD:AAU6934](#)***Tachyporus nitidulus* Fabricius, 1781**Notes: [BOLD:ABA9096](#)***Trichophya pilicornis* Gyllenhal, 1810**Notes: [BOLD:ABW9580](#)

***Xantholinus linearis* Olivier, 1795**

Notes: [BOLD:AAG4333](#)

Family Stenotrachelidae

***Cephaloon lepturoides* Newman, 1838**

Family Synchronidae

***Mallodrya subaenea* Horn, 1888**

Notes: [BOLD:AAK7440](#)

***Synchroa punctata* Newman, 1838**

Family Tetratomidae

***Eustrophus tomentosus* Say, 1827**

Notes: [BOLD:ACI7017](#)

Family Throscidae

***Aulonthroscus constrictor* Say, 1839**

Notes: [BOLD:AAU7339](#)

***Aulonthroscus distans* Blanchard, 1917**

Notes: [BOLD:ABA9083](#)

***Aulonthroscus* sp.**

***Trixagus carinicollis* Schaeffer, 1916**

Notes: [BOLD:AAN6148](#)

***Trixagus chevrolati* Bonvouloir, 1859**

Family Trogossitidae

***Tenebroides corticalis* Melsheimer, 1844**

Order Dermaptera

Family Forficulidae

***Forficula auricularia* Linnaeus, 1758**

***Forficula auricularia*-A Linnaeus, 1758**

Notes: [BOLD:AAG9897](#)

Checklist of species observed or collected at the *rare* Charitable Research Reserve in Cambridge, Ontario, Canada. The second of five checklists for Kingdom Animalia, this checklist contains members of Phylum Arthropoda, Class Insecta (Orders Diptera, Ephemeroptera, and Hemiptera).

Phylum Arthropoda

Kingdom Animalia

Class Insecta

Order Diptera

Family Agromyzidae

Agromyza frontella Rondani, 1874

Notes: [BOLD:AAJ7105](#)

Aulagromyza luteoscutellata de Meijere, 1924

Notes: [BOLD:AAJ9681](#)

Calycomyza majuscula Frick, 1956

Notes: [BOLD:AAV4861](#)

Cerodontha biseta Hendel, 1920

Cerodontha dorsalis Loew, 1863

Cerodontha fasciata Strobl, 1880

Cerodontha muscina Meigen, 1830

Notes: [BOLD:AAF1051](#)

Chromatomyia lactuca Frost, 1924

Japanagromyza viridula Coquillett, 1902

Notes: [BOLD:AAI7960](#)

Liriomyza brassicae Riley, 1885

Notes: [BOLD:AAF6806](#)

Liriomyza fricki Spencer, 1965

Notes: [BOLD:ACE7414](#)

Nemorimyza posticata Meigen, 1830

Notes: [BOLD:AAG9234](#)|[BOLD:ACJ0616](#)

***Ophiomyia labiatarum* Hering, 1937**

***Ophiomyia nasuta* Melander, 1913**

Notes: [BOLD:AAK5607](#)

***Ophiomyia quinta* Spencer, 1969**

Notes: [BOLD:AAI3360](#)|[BOLD:ABZ1036](#)

***Ophiomyia similata* Malloch, 1918**

Notes: [BOLD:AAP8823](#)|[BOLD:ACV3095](#)|[BOLD:ACV5944](#)

***Phytoliriomyza dorsata* Siebke, 1864**

Notes: [BOLD:AAG4751](#)

***Phytoliriomyza robiniae* Valley, 1982**

Notes: [BOLD:AAI1337](#)

***Phytomyza flavicornis* Fallen, 1823**

Notes: [BOLD:AAH9376](#)

***Phytomyza solidaginophaga* Sehgal, 1971**

Notes: [BOLD:AAL4176](#)

***Pseudonapomyza europaea* Spencer, 1973**

Family Anisopodidae

***Sylvicola alternatus* Say, 1823**

Notes: [BOLD:AAG2000](#)

***Sylvicola fuscatus* Fabricius, 1775**

Notes: [BOLD:AAG1998](#)

Family Anthomyiidae

***Anthomyia pluvialis* Linnaeus, 1758**

Notes: [BOLD:AAP2970](#)

***Delia antiqua* Meigen, 1826**

***Delia platura* Meigen, 1826**

Notes: [BOLD:AAA3453](#)

***Eustalomyia festiva* Zetterstedt, 1845**

Notes: [BOLD:AAP8833](#)

***Eutrichota pilimana* Ringdahl, 1918**

Notes: [BOLD:AAP2968](#)

***Hylemyza partita* Meigen, 1826**

Notes: [BOLD:AAG2463](#)

***Pegomya flavifrons* Walker, 1849**

Notes: [BOLD:AAG2479](#)

Family Anthomyzidae

***Mumetopia occipitalis* Melander, 1913**

Notes: [BOLD:AAG4827](#)

***Stiphrosoma balteatum* Rohacek & Barber, 2005**

Family Asilidae

***Dioctria baumhaueri* Meigen, 1820**

***Efferia aestuans* Linnaeus, 1763**

***Efferia albibarbis* Macquart, 1838**

***Laphria canis* Williston, 1883**

***Laphria canis complex* Williston, 1883**

***Laphria cinerea* Back, 1904**

***Laphria flavicollis* Say, 1824**

***Laphria janus* McAtee, 1919**

***Laphria sicala* McAtee, 1919**

***Laphria thoracica* Fabricius, 1805**

***Machimus sadyates* Walker, 1849**

Family Aulacigastridae

***Aulacigaster neoleucopeza* Mathis & Freidberg, 1994**

Notes: [BOLD:AAV0437](#)|[BOLD:ABV3853](#)

Family Bombyliidae

***Anthrax irroratus* Say, 1823**

***Bombylius major* Linnaeus, 1758**

Notes: [BOLD:ABV0388](#)

***Hemipenthes morio* Linnaeus, 1758**

***Hemipenthes sinuosa* Wiedemann, 1821**

***Hemipenthes webberi* Johnson, 1919**

***Xenox tigrinus* De Geer, 1776**

Family Calliphoridae

***Calliphora livida* Hall, 1948**

Notes: [BOLD:ABY7153](#)

***Cynomya cadaverina* Robineau-Desvoidy, 1830**

Notes: [BOLD:AAB0868](#)

Phormia regina* Meigen, 1826**Notes: [BOLD:AAB9140](#)Pollenia angustigena* Wainwright, 1940**Notes: [BOLD:AAP2825](#)***Pollenia griseotomentosa* Jacentkovsky, 1944**Notes: [BOLD:AAI2766](#)***Pollenia labialis* Robineau-Desvoidy, 1863**Notes: [BOLD:AAI2765](#)***Pollenia pediculata* Macquart, 1834**Notes: [BOLD:AAG6745](#)***Pollenia rudis* Fabricius, 1794**Notes: [BOLD:AAH3035](#)**Family Cecidomyiidae*****Asteromyia carbonifera* Osten Sacken, 1862**Notes: [BOLD:AAA2254](#)[BOLD:ABX5689](#)***Asteromyia laeviana* Felt, 1907**Notes: [BOLD:ABV1420](#)***Asteromyia modesta* Felt, 1907**Notes: [BOLD:AAM1947](#)[BOLD:AAM1948](#)[BOLD:AAM1954](#)[BOLD:ACG8775](#)[BOLD:ACN2213](#)***Asteromyia tumifica* Beutenmuller, 1907**Notes: [BOLD:ACL0470](#)***Janetiella glechomae* Tavares, 1930**Notes: [BOLD:AAQ0642](#)***Mayetiola destructor* Say, 1817**Notes: [BOLD:ABV9277](#)**Family Ceratopogonidae*****Stilobezzia antennalis* Coquillett, 1901****Family Chironomidae*****Bryophaenocladus ictericus* Meigen, 1830**Notes: [BOLD:AAM6273](#)***Bryophaenocladus* sp. 8ES**Notes: [BOLD:AAG1021](#)

Camptocladius stercorarius* De Geer, 1776**Notes: [BOLD:AAN5341](#)Chironomus acidophilus* Keyl, 1960**Notes: [BOLD:AAJ4295](#)***Chironomus dilutus* Kiknadze & Butler, 1999**Notes: [BOLD:AAB4658](#)***Chironomus maturus* Johannsen, 1908**Notes: [BOLD:AAB4657](#)***Chironomus melanescens* Keyl, 1961**Notes: [BOLD:AAI4303](#)***Chironomus ochreatus* Townes, 1945**Notes: [BOLD:ACV5571](#)***Cladotanytarsus atridorsum* Kieffer, 1924**Notes: [BOLD:AAJ3263](#)***Conchapelopia telema* Roback, 1971**Notes: [BOLD:AAC4802](#)[BOLD:AAN5351](#)***Corynoneura scutellata* Winnertz, 1846**Notes: [BOLD:AAN5330](#)***Cricotopus annulator cmlpx* Goetghebuer, 1927*****Cricotopus bicinctus* Meigen, 1818**Notes: [BOLD:ACC7282](#)***Cricotopus* sp. 18ES*****Cricotopus* sp. 19ES**Notes: [BOLD:AAP5141](#)***Cricotopus tremulus* Linnaeus, 1758**Notes: [BOLD:AAE4298](#)***Cricotopus triannulatus* Macquart, 1826**Notes: [BOLD:AAP5920](#)***Cricotopus trifascia* Edwards, 1929**Notes: [BOLD:ACS9429](#)[BOLD:ACT0257](#)***Cricotopus vierriensis* Goetghebuer, 1935**Notes: [BOLD:AAG1005](#)[BOLD:ACV5403](#)[BOLD:ACV5404](#)

Dicrotendipes modestus* Say, 1823**Notes: [BOLD:AAL7329](#)Dicrotendipes tritonus* Kieffer, 1916**Notes: [BOLD:AAC0706](#)***Gymnometriocnemus brumalis* Edwards, 1929**Notes: [BOLD:AAP6873](#)***Lauterborniella agrayloides* Kieffer, 1911**Notes: [BOLD:AAN5343](#)***Limnophyes natalensis* Kieffer, 1914**Notes: [BOLD:AAB7361](#)***Limnophyes* sp. 14ES**Notes: [BOLD:ABU5525](#)***Metriocnemus* sp. 4ES**Notes: [BOLD:ABX5809](#)***Micropsectra nigripila* Johannsen, 1905*****Micropsectra subletteorum* Anderson, Stur & Ekrem, 2013**Notes: [BOLD:AAF7088](#)***Microtendipes pedellus* De Geer, 1776**Notes: [BOLD:AAE0707](#)***Monopelopia tenuicalcar* Kieffer, 1918**Notes: [BOLD:AAM6277](#)***Nanocladius anderseni* Saether, 1977**Notes: [BOLD:AAC3041](#)***Nilotanypus fimbriatus* Walker, 1828**Notes: [BOLD:AAE5762](#)***Orthocladius carlatus* Roback, 1957**Notes: [BOLD:AAG1000](#)***Orthocladius doreus* Roback, 1957**Notes: [BOLD:AAB2641](#)|[BOLD:AAB2645](#)|[BOLD:ACV3368](#)***Orthocladius oliveri* Sponis, 1977**Notes: [BOLD:AAB7872](#)***Orthocladius rivulorum* Kieffer, 1909**Notes: [BOLD:AAB3988](#)

Pagastia orthogonia* Oliver, 1959**Notes: [BOLD:AAI2601](#)Paraphaenocladus impensus* Walker, 1856**Notes: [BOLD:AAC4197](#)***Paratanytarsus dissimilis* Johannsen, 1905**Notes: [BOLD:AAE3698](#)***Paratanytarsus grimmii* Schneider, 1885**Notes: [BOLD:AAD1485](#)***Paratanytarsus laccophilus* Edwards, 1929**Notes: [BOLD:AAC8842](#)[BOLD:ACF2457](#)***Paratanytarsus* sp. 7TE**Notes: [BOLD:AAP2907](#)***Paratanytarsus* sp. TE03**Notes: [BOLD:AAE3675](#)***Polypedilum convictum* Walker, 1856**Notes: [BOLD:AAD1397](#)***Psectrocladius obvius* Walker, 1856**Notes: [BOLD:AAF6432](#)***Rheocricotopus robacki* Beck and Beck, 1964**Notes: [BOLD:AAM6249](#)***Rheotanytarsus pellucidus* Walker, 1848**Notes: [BOLD:AAI0332](#)***Smittia edwardsi* Goetghebuer, 1932**Notes: [BOLD:AAF4817](#)***Smittia* sp. 14ES**Notes: [BOLD:AAM7064](#)***Smittia* sp. 22ES**Notes: [BOLD:AAN5358](#)***Smittia* sp. 23ES**Notes: [BOLD:AAH9641](#)***Smittia* sp. 8ES**Notes: [BOLD:ACP4736](#)

Stempellinella fimbriata* Ekrem, 2007**Notes: [BOLD:AAD0300](#)Tanytarsus glabrescens* Edwards, 1929**Notes: [BOLD:ACV5604](#)[BOLD:ACV5898](#)***Tanytarsus guerlus* Roback, 1957**Notes: [BOLD:AAC4523](#)[BOLD:AAC4525](#)***Tanytarsus mendax* Kieffer, 1925**Notes: [BOLD:ACJ3722](#)[BOLD:ACV3832](#)***Tanytarsus recurvatus* Brundin, 1947**Notes: [BOLD:AAC3354](#)***Tanytarsus wirthi* Ekrem, Sublette & Sublette, 2003**Notes: [BOLD:AAD2144](#)***Thienemanniella xena* Roback, 1957**Notes: [BOLD:AAD5253](#)[BOLD:AAD5254](#)**Family Chloropidae*****Chaetochlorops inquilinus* Coquillett, 1898*****Elachiptera costata* Loew, 1863*****Elachiptera nigriceps* Loew, 1863**Notes: [BOLD:AAP5169](#)***Elachiptera sibirica* Loew, 1858**Notes: [BOLD:AAH4208](#)***Eribolus longulus* Loew, 1863*****Gaurax dubius* Macquart, 1835**Notes: [BOLD:ACC7744](#)***Gaurax pallidipes* Malloch, 1915**Notes: [BOLD:AAH4210](#)***Gaurax varihalteratus* Malloch, 1913**Notes: [BOLD:ACM2340](#)***Hapleginella conicola* Greene, 1918*****Malloewia abdominalis* Becker, 1912**Notes: [BOLD:ABW1379](#)***Malloewia nigripalpis* Malloch, 1913**Notes: [BOLD:ABZ4644](#)

***Olcella provocans* Becker, 1912**

***Oscinella frit* Linnaeus, 1758**

***Oscinisoma alienum* Becker, 1912**

Notes: [BOLD:ACE3223](#)

***Psilacrum arpidia* Malloch, 1916**

Notes: [BOLD:ACE0829](#)

***Rhopalopterum carbonarium* Loew, 1869**

***Thaumatomyia glabra* Meigen, 1830**

Notes: [BOLD:AAH4135](#)

Family Chyromyidae

***Gymnochiromyia concolor* Malloch, 1914**

Notes: [BOLD:ACV5890](#)

Family Clusiidae

***Clusia czernyi* Johnson, 1913**

Notes: [BOLD:AAF4394](#)

***Clusia lateralis* Walker, 1849**

***Clusiodes johnsoni* Malloch, 1922**

Notes: [BOLD:AAJ4032](#)

***Clusiodes melanostomus* Loew, 1864**

Notes: [BOLD:AAJ4031](#)

***Sobarocephala flaviseta* Johnson, 1913**

Notes: [BOLD:AAN5648](#)

***Sobarocephala setipes* Melander and Argo, 1924**

Family Conopidae

***Physocephala marginata* Say, 1823**

Family Culicidae

***Aedes canadensis* Theobald**

***Aedes cinereus* Meigen, 1818**

Notes: [BOLD:AAC1222](#)

***Aedes* sp.**

***Aedes stimulans* (Walker, 1848)**

***Aedes vexans* Meigen, 1830**

Notes: [BOLD:AAA7067](#)

Anopheles quadrimaculatus Say, 1824

Coquillettidia perturbans Walker, 1856

Notes: [BOLD:AAB2539](#)

Culex restuans Theobald, 1901

Notes: [BOLD:AAA7661](#)

Culex territans Walker, 1856

Notes: [BOLD:AAB6943](#)[BOLD:ABY7666](#)

Mansonia perturbans Walker

Family Dolichopodidae

Dolichopus orichalceus Gosseries, 1989

Dolichopus terminalis Loew, 1866

Gymnopternus celer Meigen, 1824

Medetera signaticornis Loew, 1857

Notes: [BOLD:AAZ3931](#)

Neurigona disjuncta Van Duzee, 1913

Notes: [BOLD:ABW1193](#)

Xanthochlorus helvinus Loew, 1861

Family Drosophilidae

Chymomyza amoena Loew, 1862

Notes: [BOLD:AAE2703](#)

Drosophila affinis Sturtevant, 1916

Notes: [BOLD:AAB8851](#)

Drosophila falleni Wheeler, 1960

Notes: [BOLD:AAB7507](#)

Leucophenga varia Walker, 1849

Notes: [BOLD:AAG8500](#)

Scaptomyza adusta Loew, 1862

Notes: [BOLD:AAG8491](#)

Family Empididae

Rhamphomyia versicolor Chillcott, 1959

Notes: [BOLD:AAM7337](#)

Family Ephydridae

Athyroglossa dinorata Mathis & Zatwarnicki, 1990

Athyroglossa granulosa Cresson, 1922

Notes: [BOLD:ABY0801](#)

Axysta extera Cresson, 1942

Coenia curvicauda Meigen, 1830

Discocerina obscurella Fallen, 1813

Discomyza incurva Fallen 1823

Notes: [BOLD:ABA8754](#)

Hyadina albovenosa Coquillett, 1900

Hydrellia albilabris Meigen, 1830

Hydrellia griseola Fallen, 1813

Hydrellia ischiaca Loew, 1862

Hydrellia notata Deonier, 1971

Nostima scutellaris Cresson, 1933

Ochthera anatolikos Clausen, 1977

Parydra aquila Fallen, 1813

Philygria debilis Loew, 1861

Philygria obtecta Becker, 1896

Notes: [BOLD:AAG2740](#)

Pseudohyadina longicornis Sturtevant and Wheeler, 1954

Scatella favillacea Loew, 1862

Scatella stagnalis Fallen, 1813

Scatella tenuicosta Collin, 1930

Scatophila despecta Haliday, 1839

Scatophila virildella Sturtevant & Wheeler, 1954

Family Fanniidae

Fannia armata Meigen, 1826

Notes: [BOLD:AAU6630](#)

Family Heleomyzidae

Suillia quinquepunctata Say, 1823

Notes: [BOLD:AAC8595](#)

Family Hybotidae

Leptozepe flavipes Meigen, 1820

Notes: [BOLD:ACE5974](#)

Platypalpus annulatus Fallen, 1815

Platypalpus holosericus Melander, 1924

Notes: [BOLD:AAP6357](#)

Platypalpus melleus Melander, 1927

Notes: [BOLD:AAV3697](#)

Platypalpus niger Meigen, 1804

Platypalpus pulicarius Meigen, 1830

Notes: [BOLD:AAQ0265](#)

Platypalpus stabilis Collin, 1961

Platypalpus unguiculatus Zetterstedt, 1838

Notes: [BOLD:ABA0579](#)

Tachydromia aemula Loew, 1864

Notes: [BOLD:AAN5500](#)

Family Keroplatidae

Orfelia nemoralis Meigen, 1818

Notes: [BOLD:AAP2528](#)

Family Lauxaniidae

Lauxania shewelli Perusse & Wheeler 2000

Poecilominettia puncticeps Coquillett, 1902

Notes: [BOLD:AAN8633](#)

Family Limoniidae

Epiphragma fasciapenne Say, 1823

Notes: [BOLD:ACL8650](#)

Erioptera caliptera Say, 1823

Notes: [BOLD:AAN5882](#)

Erioptera ebenina Alexander, 1926

Notes: [BOLD:ACB0353](#)

Helius flavipes Macq.

Notes: [BOLD:AAF9008](#)

Ilisia venusta Osten Sacken, 1860

Ormosia affinis Lundbeck, 1898

Notes: [BOLD:AAU6544](#)

Ormosia meigenii Osten Sacken, 1859

Notes: [BOLD:ACA9818](#)

Pseudolimnophila inornata* Osten Sacken, 1869**Notes: [BOLD:AAI1351](#)**Family Lonchopteridae**Lonchoptera bifurcata* Fallen, 1810****Family Micropezidae*****Compsobata univitta* Walker, 1849**Notes: [BOLD:AAP8989](#)***Rainieria antennaepe*s Say, 1823****Family Milichiidae*****Leptometopa latipes* Meigen, 1830**Notes: [BOLD:AAP8985](#)***Paramyia nitens* Loew, 1869**Notes: [BOLD:AAG0166](#)[BOLD:AAG0169](#)***Phleomyia indecora* Loew, 1869****Family Muscidae*****Coenosia tigrina* Fabricius, 1775*****Helina depuncta* Fallen, 1825*****Helina evecta* Harris, 1780**Notes: [BOLD:AAC2498](#)***Helina rufitibia* Stein, 1898**Notes: [BOLD:AAG1742](#)***Lispe albitarsis* Stein, 1898**Notes: [BOLD:AAP1125](#)***Lispocephala erythrocer*a (Robineau-Desvoidy, 1830)*****Macrorchis ausoba* Walker, 1849*****Muscina levida* Harris, 1788**Notes: [BOLD:AAB8817](#)***Myospila meditabunda* Fabricius, 1781**Notes: [BOLD:AAD7145](#)**Family Mycetophilidae*****Aglaomyia gatineau* Vockeroth, 1980**Notes: [BOLD:ABV3010](#)***Exechia attrita* Johannsen, 1912**Notes: [BOLD:ACM3454](#)

***Mycetophila caudata* Staeger, 1840**

Notes: [BOLD:AAI3260](#)

***Mycetophila fungorum* De Geer, 1776**

Notes: [BOLD:ACF2821](#)

***Mycetophila ocellus* Walker, 1848**

Notes: [BOLD:AAP4734](#)

***Paratinia recurva* Johannsen, 1910**

***Symmerus lautus* Loew, 1869**

***Trichonta submaculata* (Staeger, 1840)**

Notes: [BOLD:AAU4912](#)

***Zygomyia zaitzevi* Chandler, 1991**

Family Odiniidae

***Odinia betulae* Sabrosky, 1959**

Notes: [BOLD:AAP8071](#)

***Odinia mejjerei* Collin, 1952**

Notes: [BOLD:ACV3828](#)

Family Opomyzidae

***Geomyza apicalis* (Meigen, 1830)**

Notes: [BOLD:ACM2703](#)

***Geomyza tripunctata* Fallen, 1823**

Family Pediciidae

***Pedicia inconstans* Osten Sacken, 1859**

Family Phoridae

***Conicera dauci* Meigen, 1830**

Notes: [BOLD:AAN8685](#)

***Megaselia arcticae* Disney, 2004**

Notes: [BOLD:AAG3248](#)

***Megaselia citrinella* Buck & Disney, 2001**

***Megaselia fungivora* Wood, 1909**

***Megaselia lucifrons* (Schmitz, 1918)**

Notes: [BOLD:AAL9075](#)

***Megaselia nigriceps* Loew, 1866**

Notes: [BOLD:AAV6384](#)

Megaselia rufipes* Meigen, 1804**Notes: [BOLD:AAG3274](#)Megaselia variana* Schmitz, 1926**Notes: [BOLD:AAZ6701](#)**Family Pipunculidae*****Pipunculus hertzogi* Rapp, 1943****Family Psilidae*****Loxocera cylindrica* Say, 1823*****Psila lateralis* Loew, 1860**Notes: [BOLD:AAF9707](#)***Psila persimilis* Wakerly, 1959*****Psila rosae* Fabricius, 1794**Notes: [BOLD:AAP6388](#)**Family Psychodidae*****Psychoda trinodulosa* Tonnoir, 1922**Notes: [BOLD:AAN8770](#)**Family Rhagionidae*****Bolbomyia nana* Loew, 1862**Notes: [BOLD:ACV5660](#)***Chrysopilus thoracicus* Fabricius, 1805*****Rhagio tringarius* Linnaeus, 1758****Family Sarcophagidae*****Boettcheria bisetosa* Parker, 1914**Notes: [BOLD:AAH7139](#)***Boettcheria cimbicis* Townsend, 1892*****Sarcophaga subvicina* Baranov, 1937**Notes: [BOLD:AAG6743](#)***Senotainia trilineata* Wulp, 1890**Notes: [BOLD:AAG6744](#)**Family Scathophagidae*****Americina adusta* Loew, 1863**Notes: [BOLD:AAH4235](#)***Megaphthalma pallida* Fallen, 1819**Notes: [BOLD:AAH4234](#)

***Parallelomma vittatum* Meigen, 1826**

***Scathophaga furcata* Say, 1823**

Notes: [BOLD:AAH0022](#)

Family Sciaridae

***Bradysia difformis* Frey, 1948**

Notes: [BOLD:AAV1295](#)

***Bradysia fenestralis* Zetterstedt, 1838**

Notes: [BOLD:AAV1366](#)

***Bradysia nitidicollis* Meigen, 1818**

***Bradysia pallipes* Fabricius, 1787**

Notes: [BOLD:AAM9254](#)

***Bradysia scabricornis* Tuomikoski, 1960**

Notes: [BOLD:ABA0929](#)

***Bradysia vagans* Winnertz, 1868**

Notes: [BOLD:AAM9252](#)

***Camptochaeta uniformis* Mohrig & Menzel, 1990**

Notes: [BOLD:ACA4924](#)

***Corynoptera bicuspidata* Lengersdorf, 1926**

Notes: [BOLD:AAU6513](#)

***Corynoptera cuniculata* Lengersdorf, 1942**

Notes: [BOLD:AAU6537](#)

***Corynoptera melanochaeta* Mohrig & Menzel, 1992**

Notes: [BOLD:AAM9242](#)

***Corynoptera saccata* Tuomikoski, 1960**

Notes: [BOLD:AAN6437](#)

***Corynoptera subcavipes* Menzel & Smith, 2007**

Notes: [BOLD:AAU6542](#)

***Cratyna ambigua* Lengersdorf, 1934**

Notes: [BOLD:AAH3968](#)[BOLD:AAN6439](#)

***Ctenosciara hyalipennis* Meigen, 1804**

Notes: [BOLD:AAH3983](#)

***Leptosciarella scutellata* Staeger, 1840**

Notes: [BOLD:ACD1218](#)

Lycoriella castanescens* Lengersdorf, 1940**Notes: [BOLD:ABA1215](#)Lycoriella perochoeta* Mohrig & Menzel, 1990**Notes: [BOLD:ACC1855](#)***Lycoriella stylata* Mohrig & Mamaev, 1985**Notes: [BOLD:AAN6430](#)***Scatopsciara atomaria* Zetterstedt, 1851**Notes: [BOLD:AAN6431](#)***Sciara humeralis* Zetterstedt, 1851****Family Sciomyzidae*****Poecilographa decorum* Loew, 1864*****Pteromicra similis* Steyskal, 1954**Notes: [BOLD:AAG6869](#)***Tetanocera plumosa* Loew, 1847*****Trypetoptera canadensis* Macquart, 1843****Family Sepsidae*****Nemopoda nitidula* Fallen, 1820**Notes: [BOLD:AAG5640](#)***Saltella sphondylii* Schrank, 1803*****Sepsis punctum* Fabricius, 1794**Notes: [BOLD:AAG5639](#)**Family Simuliidae*****Prosimulium arvum* Adler and Kim, 1985**Notes: [BOLD:AAD4764](#)***Prosimulium mixtum* Syme and Davies, 1958*****Simulium vittatum* Zetterstedt, 1838**Notes: [BOLD:AAA4121](#)**Family Sphaeroceridae*****Apteromyia claviventris* Strobl, 1909**Notes: [BOLD:AAG7283](#)***Coproica acutangula* Zetterstedt, 1847*****Coproica ferruginata* Stenhammar, 1854**Notes: [BOLD:AAN6407](#)

***Coproica hirtula* Rondani, 1880**

Notes: [BOLD:ACF7714](#)

***Copromyza equina* Fallen, 1820**

Notes: [BOLD:AAJ7412](#)

***Gonioneura spinipennis* Haliday, 1836**

***Ischiolepta pusilla* Fallen, 1820**

***Leptocera caenosa* Rondani, 1880**

***Leptocera erythrocer* Becker, 1919**

Notes: [BOLD:AAG7276](#)

***Lotophila atra* Meigen, 1830**

***Minilimosina fungicola* Spuler, 1925**

***Minilimosina intercepta* Marshall, 1985**

Notes: [BOLD:AAG7309](#)

***Opalimosina mirabilis* Collin, 1902**

***Pullimosina heteroneura* Haliday, 1836**

***Pullimosina longicosta* Spuler, 1925**

***Pullimosina pullula* Zetterstedt, 1847**

***Rachispoda fumipennis-group* Spuler 1924**

***Rachispoda limosa* Fallén, 1820**

***Rachispoda lutosa-group* Stenhammar, 1855**

***Sclerocoelus sordipes* Adams 1904**

***Spelobia bifrons* Stenhammar, 1854**

***Spelobia clunipes* Meigen, 1830**

***Spelobia luteilabris* Rondani, 1880**

***Spelobia ochripes* Meigen, 1830**

Notes: [BOLD:AAG7279](#)

***Spelobia semioculata* Richards, 1965**

***Sphaerocera curvipes* Latreille, 1805**

***Telomerina flavipes* Meigen, 1830**

Notes: [BOLD:ACJ1971](#)

***Trachypopella nuda* Rohacek and Marshall, 1985**

Family Stratiomyidae

***Actina viridis* Say, 1824**

Notes: [BOLD:AAP7640](#)

Allognosta fuscitarsis Say, 1823
Allognosta obscuriventris Loew, 1863
Caloparyphus tetraspilus Loew, 1866
Euparyphus stigmatalis Loew, 1866
Microchrysa polita Linnaeus, 1758
Nemotelus bruesii Melander, 1903
Nemotelus centralis Hanson, 1958
Psellidotus meganticus Curran, 1925
Ptecticus gigliotosi McFadden, 1971
Sargus decorus Say, 1824
Stratiomys norma Wiedemann, 1830
Stratiomys obesa Loew, 1866

Family Syrphidae

Allograpta micrura Osten Sacken, 1877
Allograpta obliqua Say, 1823
Notes: [BOLD:AAD8276](#)

Brachyopa sedmani
Brachypalpus oarus Walker, 1849
Notes: [BOLD:AAP8757](#)

Chalcosyrphus libo Walker, 1849
Notes: [BOLD:AAG4679](#)

Chalcosyrphus nemorum Fabricius, 1805
Notes: [BOLD:AAG6762](#)

Chrysotoxum pubescens Loew, 1864
Dasysyrphus venustus Meigen
Notes: [BOLD:ACV5348](#)

Epistrophe nitidicollis Meigen, 1822
Eristalis arbustorum Linnaeus, 1758
Eristalis dimidiata Wiedemann, 1830
Eristalis flavipes Walker, 1849
Eristalis stipator Osten Sacken, 1877

Eristalis tenax Linnaeus, 1758

Eristalis transversa Wiedemann, 1830

Eumerus sp.

Eupeodes americanus Wiedemann, 1830

Eupeodes volucris Osten Sacken, 1877

Ferdinandea buccata Loew, 1863

Notes: [BOLD:AAE0948](#)

Helophilus fasciatus Walker, 1849

Heringia salax Loew, 1866

Lejota aerea Loew, 1872

Notes: [BOLD:AA9807](#)

Mallota posticata Fabricius, 1805

Melanotstoma mellinum Linnaeus 1758

Merodon equestris Fabricius, 1794

Microdon tristis Loew, 1864

Myolepta nigra Loew, 1972

Notes: [BOLD:AAV0836](#)

Neoascia distincta Williston, 1887

Notes: [BOLD:AAG6766](#)

Ocyptamus fuscipennis Macquart, 1834

Orthonevra nitida Wiedemann, 1830

Paragus haemorrhous Meigen, 1822

Notes: [BOLD:AAC2439](#)

Parhelophilus laetus Loew, 1963

Platycheirus hyperboreus Staeger, 1845

Notes: [BOLD:ACF4734](#)

Platycheirus obscurus Say, 1824

Notes: [BOLD:AAF1237](#)

Platycheirus quadratus Say, 1823

Platycheirus scambus Staeger, 1843

Sericomyia chrysotoxoides Macquart, 1842

Notes: [BOLD:ABX5395](#)

Sphaerophoria asymmetrica Knutson, 1973

Sphaerophoria bifurcata Knutson, 1973

Sphaerophoria brevopilosa Knutson, 1973

Sphaerophoria contigua Macquart, 1847

Sphaerophoria philanthus Meigen

Sphegina keeniana Williston, 1887

Notes: [BOLD:ACR0385](#)

Sphegina petiolata Coquillett, 1910

Spilomyia longicornis Loew, 1872

Syritta pipiens Linnaeus, 1758

Syrphus rectus Osten Sacken, 1875

Syrphus ribesii Linnaeus

Notes: [BOLD:AAA4570](#)

Syrphus torvus Osten Sacken, 1875

Notes: [BOLD:AAC6088](#)

Toxomerus geminatus Say, 1923

Notes: [BOLD:AAC1312](#)

Toxomerus marginatus Say, 1823

Notes: [BOLD:AAA4277](#)

Xanthogramma flavipes Loew, 1863

Notes: [BOLD:AAK0114](#)

Xylota quadrimaculata Loew, 1866

Family Tabanidae

Chrysops aestuans Wulp, 1867

Chrysops ater Macquart, 1850

Notes: [BOLD:ACE5640](#)

Chrysops calvus Pechuman and Teskey, 1967

Chrysops lateralis Wiedemann, 1828

Chrysops striatus Osten Sacken, 1875

Chrysops vittatus Wiedemann, 1821

Hybomitra epistates Osten Sacken, 1878

Hybomitra lasiophthalma Macquart, 1838

Notes: [BOLD:AAF0889](#)

Tabanus lineola Fabricius

Family Tachinidae

Actia interrupta Curran, 1933

Blepharomyia pagana Meigen, 1824

Notes: [BOLD:AAV0903](#)

Campylocheta teliosis Reinhard, 1952

Ceracia dentata Coquillett, 1895

Notes: [BOLD:ABX6290](#)

Homalactia harringtoni Coquillett, 1902

Notes: [BOLD:AAP2717](#)

Leschenaultia exul Townsend, 1892

Notes: [BOLD:ACE2864](#)

Lydina americana Townsend, 1892

Notes: [BOLD:AAG2432](#)

Oswaldia minor Curran, 1925

Notes: [BOLD:ACF1129](#)

Phorocera obscura Fallen, 1810

Notes: [BOLD:ABY8575](#)

Siphona hokkaidensis Mesnil, 1957

Notes: [BOLD:AAG2172](#)

Siphona intrudens Curran, 1932

Notes: [BOLD:AAP2721](#)

Siphona pisinnia O'Hara, 1983

Notes: [BOLD:AAZ4865](#)

Family Tephritidae

Euaresta bella Loew, 1862

Eurosta solidaginis Fitch, 1855

Eutreta novaeboracensis Fitch, 1855

Rhagoletis suavis Loew, 1862

Urophora cardui Linnaeus, 1758

Xanthomyia platyptera Loew, 1873

Family Tipulidae

Nephrotoma cornicina Linnaeus, 1758

Tipula (Beringotipula) coloradensis Doane, 1911

Tipula dorsimacula Walker, 1848

Notes: [BOLD:AAF8990](#)

Tipula mallochi Alexander

Family Xylomyidae

Macroceromys terminalis Vasey 1977

Solva pallipes Loew, 1863

Xylomyia americana Weid

Xylomyia simillima Steyskal 1947

Xylomyia tenthredinoides Van der Wulp 1867

Family Xylophagidae

Xylophagus lugens Loew, 1863

Notes: [BOLD:AAJ9649](#)

Xylophagus reflectens Walker, 1848

Notes: [BOLD:AAM7333](#)[BOLD:AAP7637](#)

Order Ephemeroptera**Family Baetidae**

Baetis intercalaris McDunnough, 1921

Callibaetis ferrugineus Walsh, 1862

Cloeon dipterum Linnaeus, 1761

Iswaeon anoka Daggy, 1945

Family Caenidae

Caenis latipennis Banks, 1907

Family Ephemeridae

Hexagenia limbata Serville, 1829

Family Heptageniidae

Stenacron interpunctatum Say, 1839

Order Hemiptera**Family Anthocoridae**

Cardiastethus borealis Kelton, 1977

Orius insidiosus Say, 1832

Orius tristicolor White, 1879

Family Aphididae

Acyrtosiphon malvae Mosley, 1841

Notes: [BOLD:AAF3206](#)

Acyrtosiphon pisum Harris, 1776

Aphis glycines Matsumura, 1917

Notes: [BOLD:AAB7938](#)

Aphis middletonii Thomas, 1879

Notes: [BOLD:AAB6817](#)

Aphis rubicola Oestlund, 1887

Notes: [BOLD:AAF7621](#)

Eriosoma americanum Riley, C.V., 1879

Notes: [BOLD:AAD7955](#)

Eucallipterus tiliae Linnaeus, 1758

Notes: [BOLD:AAD0131](#)

Lipaphis pseudobrassicae Davis, 1914

Notes: [BOLD:AAD9153](#)

Melaphis rhois Fitch, 1866

Notes: [BOLD:AAA2079](#)

Rhopalosiphum nymphaeae Linnaeus, 1761

Schizaphis scirpicola Hille Ris Lambers, 1960

Notes: [BOLD:AAD1238](#)

Family Belostomatidae

Belostoma flumineum Say, 1832

Family Berytidae

Neoneides muticus Say, 1832

Family Cercopidae

Aphrophora alni Fallén, 1805

Aphrophora cribrata Walker, 1851

Clastoptera obtusa Say, 1825

Lepyronia quadrangularis Say, 1825

Neophilaenus lineatus Linnaeus, 1758

Philaenus spumarius subsp. *quadrimaculatus* Schrank, 1776

Philaenus spumarius Linnaeus, 1758

Family Cicadellidae

***Agallia quadripunctata* Oman 1933**

Notes: [BOLD:AAG2899](#)

***Agallia* sp.**

***Agalliopsis ancistra* Oman 1970**

***Agalliopsis* sp.**

***Anoscopus flavostriatus* Donovan, 1799**

***Anoscopus flavostrigata* Donovan, 1799**

***Aphrodes* sp.**

***Arboridia* sp.**

***Athysansus argentarius* Metcalf, 1955**

***Balclutha* sp.**

***Ceratagallia* sp.**

***Chlorotettix unicolor* Fitch 1851**

***Cicadula melanogaster* Provancher 1872**

***Colladonus clitellarius* Say, 1830**

Notes: [BOLD:ACV9851](#)

Cosmotettix cf. bilineatus

***Cuerna striata* Walker, 1851**

***Deltocephalus pulicaris* Fallén 1806**

Notes: [BOLD:AAV8918](#)

***Dicraneura* sp.**

***Dikraneura mali* Provancher, 1890**

Notes: [BOLD:ABA5842](#)

***Dikrella cruentata* Gillette, 1898**

Notes: [BOLD:AAV0158](#)

***Diplocolenus abdominalis* Fabricius 1803**

Notes: [BOLD:AAG2897](#)

***Doratura stylata* Boheman, 1847**

Notes: [BOLD:AAG8821](#)

***Draeculacephala constricta* Davidson et DeLong, 1943**

***Draeculacephala* sp.**

***Elymana caduca* DeLong 1936**

***Empoasca coccinea* Fitch, 1851**

Notes: [BOLD:ABA5764](#)

***Empoasca decipiens* Zachvatkin, 1935**

Notes: [BOLD:AAV6741](#)

***Empoasca fabae* Cardoso, 1974**

Notes: [BOLD:AAG2868](#)|[BOLD:AAG2873](#)

***Empoasca* sp.**

***Erasmoneura nigra* Gillette, 1898**

***Eratoneura certa* Beamer, 1932**

Notes: [BOLD:ABA5787](#)

***Eratoneura flexibilis* Knull, 1949**

Notes: [BOLD:AAZ8495](#)|[BOLD:AAZ8496](#)

***Errastunus ocellaris* Fallén, 1806**

Notes: [BOLD:AAG8839](#)

***Erythridula dunni* Hepner, 1976**

Notes: [BOLD:ABA5786](#)

***Erythridula scythia* Auten & Johnson, 1936**

Notes: [BOLD:AAN8412](#)

***Erythridula tenuispica* Beamer, 1930**

Notes: [BOLD:ABA5830](#)

***Erythridula wysongi* Ross & DeLong, 1953**

Notes: [BOLD:AAN8287](#)|[BOLD:ABZ1306](#)

***Erythroneura aza* Robinson, 1924**

Notes: [BOLD:AAV6747](#)

***Erythroneura bakeri* Dmitriev & Dietrich, 2007**

Notes: [BOLD:AAV0161](#)

***Erythroneura elegans* McAtee, 1920**

Notes: [BOLD:ABA5798](#)

***Erythroneura ontari* Robinson, 1924**

Notes: [BOLD:ABA5810](#)

***Erythroneura ontari* Robinson, 1924**

Notes: [BOLD:ABA5810](#)

Checklist of species observed or collected at the *rare* Charitable Research Reserve in Cambridge, Ontario, Canada. The third of five checklists for Kingdom Animalia, this checklist contains members of Phylum Arthropoda, Class Insecta (Orders Hemiptera, Hymenoptera and Lepidoptera).

Class Insecta

Order Hemiptera

Family Cicadellidae

Erythroneura rubrella McAtee, 1920

Notes: [BOLD:AAV0164](#)[BOLD:ACC8414](#)

Erythroneura sp.

Erythroneura tricineta Fitch, 1851

Notes: [BOLD:AAV6738](#)[BOLD:AAV6751](#)

Erythroneura vitifex Fitch, 1856

Notes: [BOLD:AAV6742](#)[BOLD:ACQ8506](#)

Erythroneura vitis Harris, 1831

Erythroneura vulnerata Fitch, 1851

Notes: [BOLD:AAO8361](#)[BOLD:AAV6752](#)[BOLD:ABA5772](#)[BOLD:ABY9043](#)[BOLD:ABY9046](#)[BOLD:ACQ3943](#)[BOLD:ACV2800](#)[BOLD:ACV2885](#)[BOLD:ACV2886](#)

Eupteryx atropunctata Goeze, 1778

Notes: [BOLD:AAG2869](#)

Eupteryx flavoscuta Gillette, 1898

Notes: [BOLD:ABA5805](#)

Fieberiella florii Stål, 1864

Forcipata acclina DeLong & Caldwell, 1936

Forcipata loca DeLong & Caldwell, 1936

Notes: [BOLD:ACC8165](#)

Graphocephala coccinea Forster, 1771

Graphocephala sp.

Gyponana sp.

Hymetta balteata McAtee, 1919

Notes: [BOLD:AAV0157](#)

Jikradia olitoria Say, 1830

Latalus ocellaris De Long & Sleesman, 1929

Macropsis basalis Van Duzee, 1889

Notes: [BOLD:ACC9200](#)

Macrosteles quadrilineatus Forbes, 1885

Notes: [BOLD:AAA9422](#)

Macrosteles sp.

Macrosteles variatus Fallén, 1806

Notes: [BOLD:AAV0236](#)

Neokolla hieroglyphica Say, 1830

Notes: [BOLD:AAN8418](#)

Oncopsis sobria Walker, 1851

Notes: [BOLD:ACI7197](#)

Osbornellus limosus DeLong, 1941

Penthimia americana Fitch, 1851

Scaphoideus major Osborn, 1900

Notes: [BOLD:AAV6734](#)

Scaphoideus sp.

Scaphytopius sp.

Sorhoanus pascuellus Fallén, 1826

Typhlocyba arsinoe McAtee, 1926

Typhlocyba niobe McAtee, 1926

Notes: [BOLD:ABA5877](#)

Typhlocyba pomaria McAtee, 1926

Notes: [BOLD:AAF5980](#)

Zonocyba hockingensis Knull, 1945

Notes: [BOLD:ACV8488](#)

Family Cicadidae

Tibicen canicularis Harris, 1841

Family Clastopteridae

Clastoptera proteus Fitch, 1851

Family Corixidae

Palmacorixa buenoi Abbott, 1913

Sehirus cinctus Palisot, 1811

Trichocorixa borealis Sailer, 1948

Trichocorixa sexcincta Champion, 1901

Family Cydnidae

Sehirus cinctus cinctus Palisot, 1811

Family Cymidae

Cymus angustatus Stål, 1874

Family Delphacidae

Delphacodes sp.

Javaella pellucida Fabricius, 1794

Kosswigianella lutulenta Van Duzee, 1894

Liburniella ornata Stål, 1862

Megamelus lunatus Beamer, 1955

Pissonotus basalis Van Duzee, 1897

Family Derbidae

Cedusa incisa Metcalf, 1923

Family Dictyopharidae

Scolops sulcipes Say, 1825

Family Flatidae

Metcalfa pruinosa Say, 1830

Family Gelastocoridae

Gelastocoris oculatus Fabricius, 1798

Family Gerridae

Aquarius remigis Say, 1832

Family Issidae

Acanalonia bivittata Say, 1825

Family Lygaeidae

Kleidocerys resedae subsp. *geminatus* Say, 1832

Lygaeus kalmii Stål, 1874

Nysius sp.

Family Membracidae

Atymna helena Woodruff, 1915

Notes: [BOLD:AA9905](#)

Campylenchia latipes Say, 1824

Ceresa sp.

Cyrtolobus sp.

Enchenopa binotata Say, 1824

Entylia carinata Forster, 1771

Micrutalis calva Say, 1831

Publilia concava Say, 1824

Telamona decorata Ball, 1903

Family Miridae

Adelphocoris lineolatus Goeze, 1778

Amblytylus nasutus Kirschbaum, 1856

Capsus ater Linnaeus, 1758

Ceratocapsus sp.

Chlamydatus associatus Uhler, 1872

Notes: [BOLD:AAF3365](#)

Chlamydatus sp.

Collaria meillearii Provancher, 1872

Criocoris saliens Reuter, 1876

Deraeocoris sp.

Fulvius slateri Wheeler, 1977

Halticus sp.

Heterocordylus malinus Slingerland, 1909

Leptopterna dolabrata Linnaeus, 1758

Litomiris sp.

Lopidea sp.

Lygidea sp.

***Lygocoris pabulinus* Linnaeus, 1761**

Notes: [BOLD:AAB2218](#)

***Lygus* sp.**

***Nabacula subcoleoptrata* Kirby, 1837**

***Nabis roseipennis* Reuter, 1872**

***Neolygus* sp.**

***Orthocephalus* sp.**

***Orthops scutellatus* Uhler, 1877**

***Pagasa fusca* Stein, 1857**

***Paraproba capitata* Van Duzee, 1912**

***Phoenicocoris strobicola* Knight, 1923**

Notes: [BOLD:AAH8507](#)

***Phytocoris* sp.**

***Pithanus maerkelii* Herrich-Schaeffer, 1838**

***Plagiognathus* sp.**

***Poecilocapsus lineatus* Fabricius, 1798**

***Prepops* sp.**

***Slaterocoris* sp.**

***Stenodema trispinosa* Reuter, 1904**

***Stenodema vicinum* Provancher, 1872**

***Stenotus binotatus* Fabricius, 1794**

***Taedia* sp.**

Family Nabidae

***Hoplistoscelis sordidus* Reuter, 1872**

***Nabis rufusculus* Reuter, 1872**

Family Notonectidae

***Notonecta undulata* Say, 1832**

Family Oxycarenidae

***Crophius disconotus* Say, 1832**

Family Pachygronthidae

***Phlegyas abbreviatus* Uhler, 1876**

Family Pentatomidae

***Acrosternum hilare* Say, 1832**

Banasa calva Say, 1832

Banasa dimidiata Say, 1832

Brochymena quadripustulata Fabricius, 1775

Cosmopepla lintneriana Kirkaldy, 1909

Euschistus tristigmus subsp. *luridus* Dallas, 1851

Neottiglossa undata Say, 1832

Parabrochymena arborea Say, 1825

Picromerus bidens Linnaeus, 1758

Podisus maculiventris Say, 1832

Family Phymatidae

Phymata americana Melin, 1930

Piesma cinerum Say, 1832

Family Psyllidae

Pachypsylla celtidismamma Fletcher, 1882

Psyllopsis fraxinicola Foerster, 1848

Family Reduviidae

Empicornis errabundus Say, 1832

Sinea diadema Fabricius, 1776

Zelus luridus Stål, 1862

Zelus tetracanthus Stål, 1862

Family Rhopalidae

Arhyssus sp.

Harmostes reflexulus Say, 1832

Stictopleurus punctiventris Dallas, 1852

Family Rhyparochromidae

Ligyrocoris diffusus Uhler, 1871

Megalonotus sabulicola Thomson, 1870

Sphragisticus nebulosus Fallén, 1807

Family Saldidae

Saldula confluenta Say, 1832

Saldula pallipes Fabricius, 1794

Saldula saltatoria Linnaeus, 1758

Family Thyreocoridae

Corimelaena pulicaria Germar, 1839

Galgupha atra Amyot and Serville, 1843

Family Tingidae

Corythucha marmorata Uhler, 1878

Corythucha sp.

Dictyla echii Schrank, 1782

Order Hymenoptera**Family Andrenidae**

Andrena andrenoides Cresson, 1878

Andrena barbilabris Kirby, 1802

Notes: [BOLD:AAB4998](#)

Andrena canadensis Dalla Torre, 1896

Andrena carlini Cockerell, 1901

Andrena erythrogaster Ashmead, 1890

Andrena hirticincta Provancher, 1888

Andrena nasonii Robertson, 1895

Andrena obscuripennis Smith, 1853

Andrena rudbeckiae Robertson, 1891

Andrena solidaginis Robertson, 1893

Andrena sp.

Andrena thaspiae Graenicher, 1903

Andrena wilkella Kirby, 1802

Perdita octomaculata Say, 1824

Pseudopanurgus nebrascensis Crawford, 1903

Family Anthophoridae

Anthophora furcata Panzer, 1798

Ceratina calcarata Robertson, 1900

Ceratina dupla Say, 1837

Ceratina sp.

Melissodes desponsa Smith, 1854

Family Apidae

Apis mellifera Linnaeus, 1758

Bombus bimaculatus Cresson, 1863

Bombus borealis Kirby, 1837

***Bombus griseocollis* DeGeer, 1773**

***Bombus impatiens* Cresson, 1863**

Notes: [BOLD:ABZ2516](#)

***Bombus perplexus* Cresson, 1863**

***Bombus rufocinctus* Cresson, 1863**

***Bombus vagans* Smith, 1854**

***Ceratina mikmaqi* Rehan and Sheffield, 2011**

Notes: [BOLD:AAA2368](#)

***Melissodes boltoniae* Robertson, 1905**

***Melissodes communis* Cresson, 1878**

***Melissodes druriella* Kirby, 1802**

***Melissodes illata* Lovell & Cockerell, 1906**

***Melissodes subillata* LaBerge, 1961**

***Melissodes trinodis* Robertson, 1901**

***Melissodes wheeleri* Cockerell, 1906**

***Nomada articulata* Smith, 1854**

***Nomada bella* Cresson, 1863**

Notes: [BOLD:ABZ2527](#)

***Nomada bethunei* Cockerell, 1903**

***Nomada cressonii* Robertson, 1893**

***Nomada luteoloides* Robertson, 1895**

***Nomada pygmaea* Cresson, 1863**

Notes: [BOLD:ABZ6834](#)

***Nomada subrutula* Lovell & Cockerell, 1905**

Notes: [BOLD:AAC5044](#)

***Triepeolus helianthi* Robertson, 1897**

***Triepeolus nigrihirtus* Mitchell, 1962**

***Triepeolus obliterated* Graenicher, 1911**

***Triepeolus simplex* Robertson, 1903**

***Xylocopa virginiana* Linnaeus, 1771**

Family Bethyridae

***Parasierola* sp.**

Family Braconidae

***Aphidius ervi* Haliday, 1834**

Notes: [BOLD:AAA4188](#)

***Ascogaster quadridentata* Wesmael, 1835**

***Asobara rufescens* Foerster, 1862**

Notes: [BOLD:AAU8583](#)

***Asobara* sp.**

***Cotesia xylina* Say, 1836**

Notes: [BOLD:AAA9386](#)

***Diaeretiella rapae* McIntosh, 1855**

Notes: [BOLD:AAG1421](#)

***Diolcogaster facetosa* Weed, 1888**

Notes: [BOLD:ABA5941](#)

***Ephedrus lacertosus* Haliday, 1833**

Notes: [BOLD:ACW2698](#)

***Peristenus* sp.**

***Pholetesor ornigis* Weed, 1887**

Notes: [BOLD:AAB0520](#)

***Pygostolus falcatus* Nees, 1834**

***Spathius elegans* Matthews, 1970**

Family Chalcididae

***Conura albifrons* Walsh, 1861**

Notes: [BOLD:AAG8371](#)

Family Chrysididae

***Cleptes semiauratus* Linnaeus, 1761**

Family Colletidae

***Colletes eulophi* Robertson, 1891**

***Colletes hyalinus* Provancher, 1888**

***Colletes mandibularis* Smith, 1853**

***Colletes nudus* Robertson, 1898**

***Colletes simulans* Cresson, 1868**

***Hylaeus affinis* Smith, 1853**

Hylaeus* cf. *affinis

***Hylaeus ellipticus* Kirby, 1827**

***Hylaeus mesillae* subsp. *cressoni* Cockerell, 1907**

***Hylaeus modestus* Say, 1837**

***Hylaeus* sp.**

Family Crabronidae

Astata unicolor Say, 1824

Cerceris arelate Banks, 1912

Cerceris atramontensis Banks, 1913

Cerceris clypeata Dahlbom, 1844

Crossocerus annulipes Lepeletier et Brullé, 1834

Crossocerus barbipes Dahlbom, 1845

Notes: [BOLD:AAG3190](#)

Crossocerus elongatulus van der Linden, 1829

Crossocerus tarsatus subsp. *planipes* Fox, 1895

Diodontus minutus Fabricius, 1793

Ectemnius cephalotes Olivier, 1792

Ectemnius continuus Fabricius, 1804

Ectemnius lapidarius Panzer, 1804

Ectemnius maculosus Gmelin, 1781

Ectemnius stirpicola Packard, 1866

Gorytes atricornis Packard, 1867

Gorytes simillimus Smith, 1856

Hoplisoides nebulosus Packard, 1867

Lestica confluenta Say, 1837

Lestica producticollis Packard, 1866

Lyroda subita Say, 1837

Mimesa pauper Packard, 1867

Oxybelus uniglumis Linnaeus, 1758

Passaloecus cuspidatus Smith, 1856

Notes: [BOLD:AAG7762](#)

Passaloecus singularis Dahlbom, 1844

Pemphredon inornata Say, 1824

Pemphredon lethifer Shuckard, 1837

Philanthus bilunatus Cresson, 1865

Pison koreense Radoszkowski, 1887

Psen monticola Packard, 1867

Rhopalum coarctatum Scopoli, 1763

Saygorytes phaleratus Say, 1837

Solierella peckhami Ashmead, 1897

Stigmaeus americanus Packard, 1867

Notes: or fraternus

Stigmaeus fraternus Say, 1824

Tachysphex antennatus Fox, 1894["", 1893"]

Tachysphex pompiliformis Panzer, 1803

Trypoxylon attenuatum Smith, 1851

Trypoxylon carinatum Say, 1837

Trypoxylon clavicerum Lepeletier & Serville, 1828

Trypoxylon frigidum Smith, 1856

Notes: [BOLD:AAG3193](#)

Trypoxylon johnsoni Fox, 1891

Trypoxylon lactitarse Saussure, 1867

Trypoxylon politum Drury, 1773

Family Diapriidae

Belyta validicornis Thomson, 1858

Notes: [BOLD:AAU8736](#)

Family Encyrtidae

Copidosoma floridanum Ashmead, 1900

Notes: [BOLD:AAA7203](#)

Family Eupelmidae

Eupelmus vesicularis Retzius, 1783

Family Formicidae

Camponotus herculeanus Linnaeus, 1758

Notes: [BOLD:AAA2372](#)

Camponotus nearcticus Emery, 1893

Notes: [BOLD:AAD4432](#)

Camponotus pennsylvanicus De Geer, 1773

Notes: [BOLD:AAA9461](#)

Camponotus sp.

Crematogaster cerasi Fitch, 1855

Crematogaster sp.

Formica lasioides Emery, 1893

Notes: [BOLD:AAE0406](#)

Formica sp.

Lasius alienus Foerster, 1850

Notes: [BOLD:AAA9049](#)

Lasius claviger Roger, 1862

Lasius nearcticus Wheeler, 1906

Notes: [BOLD:AAD1528](#)

Lasius neoniger Emery, 1893

Notes: [BOLD:AAB9126](#)

Lasius sp.

Leptothorax ambiguus Emery, 1895

Myrmica sp.

Ponera pennsylvanica Buckley, 1866

Notes: [BOLD:AAF0443](#)

Prenolepis imparis Say, 1836

Notes: [BOLD:AAC1302](#)

Stenamma brevicorne Mayr, 1886

Notes: [BOLD:AAH7068](#)

Stigmatomma pallipes Haldeman, 1844

Tapinoma sessile Say, 1836

Notes: [BOLD:AAA3893](#)[BOLD:AAA3900](#)

Temnothorax ambiguus Emery, 1895

Notes: [BOLD:AAG0685](#)

Family Halictidae

Agapostemon radiatus Forster, 1771

Agapostemon sericeus Förster, 1771

Agapostemon virescens Fabricius, 1775

Augochlora aurata Smith, 1853

Augochlora pura Say, 1837

Augochlorella aurata Smith, 1853

Notes: [BOLD:AAD6445](#)

Dialictus sp.

Halictus confusus Smith, 1853

Halictus ligatus Say, 1837

Halictus rubicundus Christ, 1791

Lasioglossum anomalum Robertson, 1892

Lasioglossum atwoodi Gibbs, 2010

Lasioglossum birkmanni Crawford, 1906

Lasioglossum bruneri Crawford, 1902

Lasioglossum comagenense (Knerer & Atwood, 1964)

Lasioglossum coriaceum Smith, 1853

Notes: [BOLD:AAB7007](#)

Lasioglossum cressonii Robertson, 1890

Lasioglossum dreisbachi Mitchell, 1960

Lasioglossum ephialtum Gibbs, 2010

Lasioglossum fattigi Mitchell, 1960

Lasioglossum foxii Robertson, 1895

Lasioglossum heterognathum Mitchell, 1960

Lasioglossum hitchensi Gibbs, 2012

Lasioglossum imitatum Smith, 1853

Lasioglossum leucozonium Schrank, 1781

Lasioglossum lineatulum Crawford, 1906

Lasioglossum macoupinense Robertson, 1895

Lasioglossum michiganense Mitchell, 1960

Lasioglossum nigroviride Graenicher, 1911

Lasioglossum paradmirandum Knerer & Atwood, 1966

Lasioglossum pectinatum Robertson, 1890

Lasioglossum pectorale Smith, 1853

Lasioglossum perpunctatum Ellis, 1913

Lasioglossum pilosum Smith, 1853

Lasioglossum platyparium Robertson, 1895

Lasioglossum pruinosum Robertson, 1892

Lasioglossum sp. 1

Lasioglossum sp. 2

Lasioglossum subversans Mitchell, 1960

Lasioglossum tegulare Robertson, 1890

Lasioglossum tenax Sandhouse, 1924

Lasioglossum timothyi Gibbs, 2010

Lasioglossum versans Lovell, 1905

Notes: [BOLD:ABZ6180](#)

Lasioglossum versatum Robertson, 1902

Lasioglossum vierecki Crawford, 1904

Lasioglossum weemsi Mitchell, 1960

Lasioglossum zonulum Smith, 1848

Lasioglossum zophops Ellis, 1914

Sphecodes atlantis Mitchell, 1956

Sphecodes clematidis Robertson, 1897

Sphecodes confertus Say, 1837

Sphecodes cressonii Robertson, 1903

Sphecodes davisii Robertson, 1897

Sphecodes dichrous Smith, 1853

Sphecodes heraclei Robertson, 1897

Sphecodes levis Lovell & Cockerell, 1907

Sphecodes minor Robertson, 1898

Sphecodes persimilis Lovell & Cockerell, 1907

Sphecodes pycnanthemii Robertson, 1897

Sphecodes ranunculi Robertson, 1897

Notes: [BOLD:AAG7655](#)

Sphecodes sp.

Sphecodes stygius Robertson, 1893

Sphecodes wheeleri Mitchell, 1956

Family Ichneumonidae

Agrothereutes abbreviatus Fabricius, 1794

Notes: [BOLD:AAG7687](#)

Agrypon flexorium Thunberg, 1822

Notes: [BOLD:AAH7052](#)

Aritranis director Thunberg, 1822

Notes: [BOLD:AAG7768](#)

Bathyplectes anurus* Thomson, 1887**Notes: [BOLD:ABA6269](#)Bathythrix decipiens* Gravenhorst, 1829**Notes: [BOLD:AAU8495](#)***Campoletis flavicincta* Ashmead, 1890**Notes: [BOLD:AAZ8146](#)***Cryptus albitarsis* Cresson, 1864**Notes: [BOLD:AAH1693](#)***Cylloceria melancholica* Gravenhorst, 1820*****Cymodusa distincta* Cresson, 1864**Notes: [BOLD:ABZ4364](#)***Diadegma pendulum* Walley, 1967**Notes: [BOLD:AAZ9563](#)***Dialipsis dissimilis* Dasch, 1992**Notes: [BOLD:ABA6048](#)***Diplazon laetatorius* Fabricius, 1781**Notes: [BOLD:AAD4214](#)***Dolichomitus irritator* Fabricius, 1775**Notes: [BOLD:AAU8680](#)***Dusona minor* Provancher, 1879**Notes: [BOLD:AAH1652](#)***Enytus apostata* Gravenhorst, 1829**Notes: [BOLD:AAG5797](#)***Exochus nigripalpis* Thomson, 1887**Notes: [BOLD:AAG7713](#)***Hyposoter inquinatus* Holmgren, 1860**Notes: [BOLD:AAU8361](#)***Ichneumon discoensis* Fox, 1892**Notes: [BOLD:ACE9045](#)***Ischnus inquisitorius* Muller, 1776**Notes: [BOLD:AAG7737](#)***Iseropus stercorator* Fabricius, 1793**Notes: [BOLD:AAQ2094](#)

***Lissonota coracina* Gmelin, 1790**

***Megacara hortulana* Gravenhorst, 1829**

Notes: [BOLD:AAU8687](#)

***Mesochorus suomiensis* Schwenke, 1999**

Notes: [BOLD:AAZ1979](#)

***Ophion bilineatus* Say, 1829**

Notes: [BOLD:AAG8323](#)

***Ophion clave* Viereck, 1905**

Notes: [BOLD:AAG7774](#)

***Ophion idoneus* Viereck, 1905**

Notes: [BOLD:AAN8172](#)

***Ophion* sp. 5 MDS2014**

Notes: [BOLD:AAI3361](#)

***Oresbius taeniatus* Townes, 1962**

***Orthocentrus fulvipes* Gravenhorst, 1829**

Notes: [BOLD:AAM9125](#)

***Phobocampe bicingulata* Gravenhorst, 1829**

Notes: [BOLD:AAM7401](#)

***Pimpla aequalis* Provancher, 1880**

Notes: [BOLD:AAG7634](#)

***Pleolophus basizonus* Gravenhorst**

***Podoschistus vittifrons* Cresson, 1868**

Notes: [BOLD:AAL0380](#)

***Stenomacrus nemoralis* Holmgren, 1858**

Notes: [BOLD:AAM7494](#)

***Tranosema rostrale* Brischke, 1880**

Notes: [BOLD:AAD1926](#)

***Zaglyptus varipes* Gravenhorst, 1829**

Family Leucospidae

***Leucospis affinis* Say, 1824**

Family Megachilidae

***Anthidiellum notatum* Latreille, 1809**

Anthidium manicatum Linnaeus, 1758
Coelioxys rufitarsus Smith, 1854
Heriades variolosa subsp. *variolosa* Cresson, 1872
Hoplitis pilosifrons Cresson, 1864
Hoplitis producta Cresson, 1864
Hoplitis truncata Cresson, 1878
Megachile brevis Say, 1837
Megachile campanulae Robertson, 1903
Megachile frigide Smith, 1853
Megachile gemula Cresson, 1878
Megachile inermis Provancher, 1888
Megachile latimanus Say, 1823
Megachile lippiae Cockerell, 1900
Megachile mendica Cresson, 1878
Megachile montivaga Cresson, 1878
Megachile perihirta Cockerell, 1898
Megachile pugnata Say, 1837
Megachile relativa Cresson, 1878
Megachile rotundata Fabricius, 1793
Megachile texana Cresson, 1878
Osmia coerulescens Mitchell, T.B. 1962
Osmia conjuncta Cresson, 1864
Osmia lignaria Say, 1837

Notes: [BOLD:AAE5495](#)

Osmia proxima Cresson, 1864
Osmia pumila Cresson, 1864
Stelis lateralis Cresson, 1864

Family Mutillidae

Myrmosa unicolor Say, 1824
Pseudomethoca frigida Smith 1855

Family Mymaridae

Anaphes listronoti Huber, 1997
Gonatocerus morrilli Howard, 1908
Ooetonus silvensis Girault, 1916

Notes: [BOLD:AAN7553](#)

Family Platygasteridae

Platygaster variabilis Fouts, 1924

Notes: [BOLD:ABW3242](#)

Synopeas pennsylvanicum Fouts, 1924

Notes: [BOLD:ABA6127](#)

Telenomus podisi Ashmead, 1893

Notes: [BOLD:AAG7891](#)|[BOLD:AAY9192](#)|[BOLD:ACU5364](#)

Family Pompilidae

Agenioideus cinctellus Spinola, 1808

Agenioideus humilis Cresson, 1867

Anoplius imbellis Banks, 1944

Anoplius nigerrimus van der Vecht, 1973

Anoplius virginienensis Cresson

Aporinellus wheeleri Baquaert, 1919

Arachnospila michiganensis subsp. *michiganensis* (Dreisbach)

Auplopus carbonarius Scopoli, 1763

Auplopus mellipes subsp. *variitarsatus* Dalla Torre, 1897

Auplopus nigrellus Banks, 1912

Caliadurgus fasciatellus subsp. *alienatus* Smith, 1855

Dipogon sayi subsp. *sayi* Banks, 1941

Episyron biguttatus subsp. *biguttatus* Fabricius, 1798

Priocnemis cornica Say, 1836

Priocnemis germana Cresson, 1867

Priocnemis minorata Banks, 1912

Priocnemis notha subsp. *notha* Cresson, 1867

Priocnemis scitula subsp. *relicta* Banks, 1912

Family Pteromalidae

Mesopolobus bruchophagi Gahan, 1917

Notes: [BOLD:ACL4975](#)

Family Sapygidae

Sapyga centrata Say, 1836

Notes: [BOLD:ACL7820](#)

Family Sierolomorphidae

Sierolomorpha canadensis Provancher, 1888

Family Siricidae

Tremex columba Linnaeus

Family Sphecidae

Chalybion californicum de Saussure, 1867

Isodontia auripes Fernald, 1906

Isodontia mexicana de Saussure, 1867

Sceliphron caementarium Drury, 1773

Sphex ichneumoneus Linnaeus, 1758

Family Tenthredinidae

Ametastegia aperta Norton, 1861

Notes: [BOLD:AAI4543](#)

Ametastegia pallipes Spinola

Notes: [BOLD:AAE5602](#)

Caulocampus acericaulis MacGillivray, 1906

Notes: [BOLD:ACJ9109](#)

Dolerus asper Zaddach, 1859

Notes: [BOLD:AAG7773](#)

Dolerus nitens Zaddach 1859

Notes: [BOLD:ACV5952](#)

Empria maculata Norton, 1861

Notes: [BOLD:ACC8799](#)

Empria nordica Ross 1936

Notes: [BOLD:ACI4328](#)

Fenusa ulmi Sundevall

Notes: [BOLD:AAN7643](#)

Halidamia affinis Fallén 1807

Notes: [BOLD:AAN7641](#)

Macrophya flavolineata Norton 1860

Notes: [BOLD:ABU8852](#)

Metallus lanceolatus Thomson, 1870

Notes: [BOLD:AAP1085](#)

Monophadnus pallescens* Gmelin 1790**Notes: [BOLD:ACK2140](#)Pachynematus extensicornis* Norton**Notes: [BOLD:AAN8130](#)***Periclista* sp. tM8**Notes: [BOLD:AAG3550](#)***Priophorus compressicornis* Fabricius, 1804**Notes: [BOLD:ACI7354](#)***Pristiphora chlorea* Norton 1867**Notes: [BOLD:ACG2990](#)[BOLD:ACM9731](#)***Taxonus epicera* Say 1836**Notes: [BOLD:ACC7921](#)***Taxonus pallicoxus* Provancher 1885**Notes: [BOLD:AAG7788](#)***Taxonus terminalis* Say 1824**Notes: [BOLD:AAU8702](#)***Tomostethus multicinctus* Rohwer**Notes: [BOLD:ACV5036](#)**Family Trichogrammatidae*****Trichogramma platneri* Nagarkatti, 1975**Notes: [BOLD:AAE0242](#)**Family Vespidae*****Ancistrocerus adiabatus* subsp. *adiabatus* Saussure, 1852*****Ancistrocerus albophaleratus* de Saussure, 1855*****Ancistrocerus antilope* subsp. *antilope* Panzer, 1798*****Ancistrocerus campestris* Saussure, 1852*****Ancistrocerus catskill* Saussure, 1853*****Ancistrocerus unifasciatus* subsp. *unifasciatus* Saussure, 1852*****Dolichovespula arenaria* Fabricius**Notes: [BOLD:ACE9710](#)

***Eumenes crucifer* Provancher, 1888**

***Eumenes fraternus* Say**

***Euodynerus foraminatus* subsp. *foraminatus* de Saussure, 1853**

***Euodynerus leucomelas* subsp. *leucomelas* de Saussure, 1856**

***Monobia quadridens* Linnaeus, 1763**

***Parancistrocerus leionotus* Viereck, 1906**

***Parancistrocerus pedestris* de Saussure, 1855**

Notes: subsp pedestris? No authorship found

***Parancistrocerus pensylvanicus* de Saussure, 1856**

***Parancistrocerus pensylvanicus* subsp. *pensylvanicus* de Saussure, 1856**

***Polistes dominula* Christ, 1791**

Notes: [BOLD:AAB7105](#)

***Polistes fuscatus* Fabricius, 1793**

***Symmorphus canadensis* Saussure, 1855**

***Symmorphus cristatus* Saussure, 1856**

***Vespula flavopilosa* Jakobson, 1978**

***Vespula germanica* Fabricius, 1793**

Notes: [BOLD:AAG9055](#)

***Vespula maculifrons* Buysson**

Notes: [BOLD:AAD5593](#)

***Vespula vidua* de Saussure, 1854**

Notes: [BOLD:AAN8137](#)

***Vespula vulgaris* Linnaeus, 1758**

Order Lepidoptera

Family Blastobasidae

***Asaphocrita busckiella* Dietz, 1910**

Notes: [BOLD:AAA8938](#)

***Blastobasis glandulella* Riley, 1871**

Notes: [BOLD:AAB1096](#)

Family Bucculatricidae

***Bucculatrix ainsliella* Murtfeldt 1905**

Notes: [BOLD:AAB4931](#)

***Bucculatrix pomifoliella* Clemens, 1860**

Notes: [BOLD:AAD2085](#)

Family Cosmopterigidae

Cosmopterix montisella Chambers, 1875

Notes: [BOLD:AAH4285](#)

Teladoma helianthi Busck, 1932

Notes: [BOLD:AAE1519](#)

Family Crambidae

Acentria ephemerella Denis & Schiffermüller, 1775

Agriphila vulgivagella Clemens, 1860

Anania funebris Ström, 1768

Notes: [BOLD:AAB4181](#)

Desmia maculalis Westwood, 1832

Notes: [BOLD:ACE8375](#)

Elophila gyralis Hulst, 1886

Elophila icciusalis Walker, 1859

Elophila tinealis Munroe, 1972

Checklist of species observed or collected at the *rare* Charitable Research Reserve in Cambridge, Ontario, Canada. The fourth of five checklists for Kingdom Animalia, this checklist contains members of Phylum Arthropoda, Class Insecta (Orders Lepidoptera to Trichoptera), and Class Malacostraca. From Phylum Chordata, it contains Classes Actinopterygii, Amphibia, and Aves (Orders Anseriformes to Passeriformes).

Kingdom Animalia

Phylum Arthropoda

Class Insecta

Order Lepidoptera

Family Crambidae

Loxostege sticticalis Linnaeus, 1761

Microcrambus elegans Clemens, 1860

Nomophila nearctica Munroe, 1973

Perispasta caeculalis Zell., 1875

Petrophila bifascialis Robinson, 1869

Sitochroa palealis Denis & Schiffermüller, 1775

Udea rubigalis Guenée, 1854

Urola nivalis Drury, 1773

Family Depressariidae

Agonopterix arenella Denis & Schiffermüller, 1775

Notes: [BOLD:AAC6982](#)

Agonopterix pulvipennella Clemens, 1864

Notes: [BOLD:AAA7550](#)

Depressaria depressana Fabricius, 1775

Machimia tentoriferella Clemens, 1860

Family Drepanidae

Drepana arcuata Walker

Family Elachistidae

Perittia herrichiella Herrich-Schaffer, 1855

Family Epermeniidae

Epermenia alba punctella Busck, 1908

Notes: [BOLD:AAF0142](#)

Family Erebiidae

Apantesis phalerata Harris, 1841

Cisseps fulvicollis Hübner, 1818

Ctenucha virginica Esper, 1794

Hypena madefactalis Guenée, 1854

Hypena scabra Fabricius, 1798

Hyphantria cunea Drury, 1773

Lymantria dispar subsp. *dispar* Linnaeus, 1758

Rivula propinqualis Guenée, 1854

Notes: [BOLD:AAA4282](#)

Family Gelechiidae

Bryotropha hodgei Rutten & Karsholt, 2004

Notes: [BOLD:AAH4276](#)

Chionodes fondella Busck, 1906

Notes: [BOLD:ABA4737](#)

***Chrysoesthia sexguttella* Thunberg, 1794**

Notes: [BOLD:AAD8505](#)

***Dichomeris furia* Hodges, 1986**

Notes: [BOLD:AAI9560](#)

***Dichomeris inserrata* Walsingham, 1882**

Notes: [BOLD:AAH4488](#)

***Dichomeris leuconotella* Busck, 1904**

***Dichomeris ligulella* Hübner, 1818**

Notes: [BOLD:AAA8109](#)

***Dichomeris mercatrix* Hodges, 1986**

***Helcystogramma hystricella* Braun, 1921**

Notes: [BOLD:AAE7016](#)

***Metzneria lappella* Linnaeus, 1758**

***Monochroa fragariae* Busck, 1919**

***Scrobipalpa acuminatella* Sircom, 1850**

Notes: [BOLD:AAC1644](#)

***Scrobipalpula physaliella* Chambers, 1872**

Notes: [BOLD:ACB8750](#)

***Scrobipalpula sacculicola* Braun, 1925**

Notes: [BOLD:ABY8834](#)

***Sinoe chambersi* Lee, 2012**

Notes: [BOLD:ACF2217](#)

***Xenolechia ontariensis* Keifer, 1933**

Notes: [BOLD:AAC6357](#)

Family Geometridae

***Alsophila pometaria* Harris, 1841**

Notes: [BOLD:AAB0196](#)

***Besma quercivoraria* Guenée in Boisduval and Guenée, 1858**

***Biston betularia* Linnaeus, 1758**

***Campaea perlata* Guenée in Boisduval and Guenée, 1858**

***Coryphista meadii* Packard, 1874**

***Costaconvexa centrostrigaria* Wollaston, 1858**

***Ecliptopera silaceata* [Denis and Schiffermüller], 1775**

***Ennomos magnaria* Guenée in Boisduval and Guenée, 1858**

***Epirrhoe alternata* Müller, 1764**

***Euchlaena serrata* Drury, 1773**

***Idaea dimidiata* Hufnagel, 1767**

***Operophtera bruceata* Hulst, 1886**

Notes: [BOLD:AAA2999](#)

***Orthonama obstipata* Fabricius, 1794**

***Phigalia titea* Cramer, 1780**

Notes: [BOLD:AAA5234](#)

***Plagodis phlogosaria* Guenée in Boisduval and Guenée, 1858**

Notes: [BOLD:AAA3984](#)

***Pleuroprucha insulsaria* Guenée in Boisduval and Guenée, 1858**

***Scopula inductata* Guenée in Boisduval and Guenée, 1858**

***Speranza pustularia* Guenée in Boisduval and Guenée, 1858**

Notes: [BOLD:AAA4456](#)

***Synchlora frondaria* Guenée in Boisduval and Guenée, 1858**

***Trichodezia albovittata* Guenée in Boisduval and Guenée, 1858**

Notes: [BOLD:AAA6926](#)

***Xanthorhoe ferrugata* Clerck, 1759**

Notes: [BOLD:AAA3817](#)

***Xanthorhoe lacustrata* Guenée in Boisduval and Guenée, 1858**

Notes: [BOLD:AAA8660](#)

Family Gracillariidae

***Acrocercops astericola* Frey & Boll, 1873**

Notes: [BOLD:AAD3996](#)

***Caloptilia packardella* Chambers, 1872**

Notes: [BOLD:AAD2590](#)

***Cameraria saccharella* Braun, 1908**

Notes: [BOLD:AAH4493](#)

***Cremastobombycia solidaginis* Frey & Boll, 1876**

***Parornix betulae* Stainton, 1854**

Notes: [BOLD:AAE3418](#)

***Parornix crataegifoliella* Clemens, 1860**

Notes: [BOLD:AAF8198](#)

***Phyllocnistis ampelopsiella* Chambers, 1871**

Notes: [BOLD:AAI3015](#)

***Phyllocnistis vitegenella* Clemens, 1859**

Notes: [BOLD:AAI3014](#)

***Phyllonorycter clemensella* Chambers, 1871**

Notes: [BOLD:AAN8981](#)

***Phyllonorycter maestingella* Müller, 1764**

Notes: [BOLD:AAL6962](#)

***Phyllonorycter ostryaefoliella* Clemens, 1859**

Notes: [BOLD:AAD7999](#)

***Phyllonorycter propinquinella* Braun, 1908**

Notes: [BOLD:AAH4497](#)

***Phyllonorycter salicifoliella* Chambers, 1871**

Notes: [BOLD:AAD4915](#)

***Phyllonorycter trinotella* Braun, 1908**

Notes: [BOLD:AAG1128](#)

***Phyllonorycter tritaenianella* Chambers, 1871**

Notes: [BOLD:AAF6577](#)

Family HesperIIDae

***Anatrytone logan* W. H. Edwards, 1863**

***Ancyloxypha numitor* Fabricius, 1793**

***Atalopedes campestris* Boisduval, 1852**

***Carterocephalus palaemon* Pallas, 1771**

***Epargyreus clarus* Cramer, 1775**

***Erynnis baptisiae* W. Forbes, 1936**

***Erynnis juvenalis* Fabricius, 1793**

Notes: [BOLD:AAC6872](#)

***Erynnis lucilius* Scudder and Burgess, 1870**

***Euphyes conspicua* W. H. Edwards, 1863**

***Euphyes dion* W. H. Edwards, 1879**

***Euphyes vestris* Boisduval, 1852**

***Pholisora catullus* Fabricius, 1793**

***Poanes hobomok* T. Harris, 1862**

Poanes massasoit Scudder, 1863
Poanes viator W. H. Edwards, 1865
Polites mystic W. H. Edwards, 1863
Polites origenes Fabricius, 1793
Polites peckius W. Kirby, 1837
Polites themistocles Latreille, 1824
Pompeius verna W. H. Edwards, 1862
Thymelicus lineola Ochsenheimer, 1808
Wallengrenia egeremet Scudder, 1863

Family Lasiocampidae

Malacosoma disstria Hubner

Notes: [BOLD:AAA4130](#)

Tolyte velleda Stoll, 1791

Family Lycaenidae

Celastrina ladon Cramer, 1780
Celastrina neglecta W. H. Edwards, 1862
Cupido comyntas Godart, 1824
Feniseca tarquinius Fabricius, 1793
Lycaena hyllus Cramer, 1775
Satyrium titus Fabricius, 1793
Satyrium acadicum W. H. Edwards, 1862
Satyrium calanus Hübner, 1809
Satyrium caryaevorus McDunnough, 1942
Satyrium liparops LeConte, 1833

Family Lymantriidae

Dasychira basiflava Packard, 1864
Orgyia definita Packard, 1864
Orgyia leucostigma J. E. Smith, 1797

Family Momphidae

Mompha terminella Humphreys & Westwood, 1845
Notes: [BOLD:AAX4784](#)

Family Neptculidae

Ectoedemia argyropeza Zeller, 1839
Notes: [BOLD:AAC1036](#)

***Stigmella microtheriella* Stainton, 1854**

Notes: [BOLD:AAI0007](#)

***Stigmella rhamnicola* Braun, 1916**

Notes: [BOLD:AAU7678](#)

Family Noctuidae

***Achatia distincta* Hübner, 1813**

Notes: [BOLD:AAB7392](#)

***Agrotis ipsilon* Hufnagel, 1766**

***Agrotis venerabilis* Walker, 1857**

***Allagrapha aerea* Hübner, 1803**

***Amphipoea americana* Speyer, 1875**

***Amphipoea interoceanica* Smith, 1899**

***Amphipyra pyramidoides* Guenée, 1852**

Notes: [BOLD:AAA8525](#)

***Anathix ralla* Grote and Robinson, 1868**

Notes: [BOLD:AAC9569](#)

***Apamea devastator* Brace, 1819**

***Autographa precatationis* Guenée, 1852**

***Caenurgina crassiuscula* Haworth, 1809**

***Catocala cerogama* Guenée, 1852**

Notes: [BOLD:AAB3383](#)

***Catocala grynea* Cramer, 1779**

***Cerastis tenebrifera* Walker, 1865**

Notes: [BOLD:AAC1487](#)

***Chrysodeixis includens* Walker, 1858**

***Crocigrapha normani* Grote, 1874**

Notes: [BOLD:AAA6924](#)

***Cucullia asteroides* Guenée, 1852**

***Cucullia convexipennis* Grote and Robinson, 1868**

***Euplexia benesimilis* McDunnough, 1922**

Notes: [BOLD:AAA4097](#)

***Eupsilia devia* Grote, 1875**

Notes: [BOLD:AAD9847](#)

***Feltia jaculifera* Guenée, 1852**

***Hyppa xylinoides* Guenée, 1852**

Notes: [BOLD:ABY9574](#)

***Idia aemula* Hübner, 1814**

***Lacinipolia meditata* Grote, 1873**

***Lacinipolia renigera* Stephens, 1829**

***Leucania commoides* Guenée, 1852**

***Leucania multilinea* Walker, 1856**

***Leucania phragmitidicola* Guenée, 1852**

***Leucania pseudargyria* Guenée, 1852**

***Loscopia velata* Walker, 1865**

***Macrochilo absorptalis* Walker, 1859**

***Melanchra adjuncta* Guenée, 1852**

Notes: [BOLD:ACF4823](#)

***Meropleon diversicolor* Morrison, 1874**

***Morrisonia confusa* Hübner, 1831**

Notes: [BOLD:AAA6652](#)

***Mythimna unipuncta* Haworth, 1809**

***Noctua pronuba* Linnaeus, 1758**

***Ochropleura implecta* Lafontaine, 1998**

***Oligia modica* Guenée, 1852**

***Orthosia hibisci* Guenée, 1852**

Notes: [BOLD:AAA4128](#)

***Orthosia rubescens* Walker, 1865**

Notes: [BOLD:AAC0946](#)

***Palthis angulalis* Hübner, 1796**

Notes: [BOLD:AAA3933](#)

***Peridroma saucia* Hübner, 1808**

***Phalaenostola metonalis* Walker, 1859**

***Protodeltote albidula* Guenée, 1852**

***Pseudohermonassa bicarnea* Guenée, 1852**

***Renia adspergillus* Bosc, 1800**

***Striacosta albicosta* Smith, 1888**

***Sunira bicolorago* Guenée, 1852**

Notes: [BOLD:AAA4426](#)

Xestia smithii* Snellen, 1896**Notes: [BOLD:AAA2590](#)**Family Nolidae**Nola ovilla* Grote, 1875**Notes: [BOLD:AAD1810](#)**Family Notodontidae*****Schizura unicornis* J. E. Smith, 1797*****Symmerista leucitys* Franclemont, 1946****Family Nymphalidae*****Aglais milberti* Godart, 1819*****Asterocampa clyton* Boisduval and Le Conte, 1835*****Boloria Bellona* Fabricius, 1775*****Boloria selene* [Schiffermüller], 1775*****Cercyonis pegala* Fabricius, 1775*****Chlosyne nycteis* E. Doubleday, 1847*****Coenonympha tullia* Müller, 1764*****Danaus plexippus* Linnaeus, 1758*****Euphydryas phaeton* Drury, 1773*****Euptoieta claudia* Cramer, 1775*****Junonia coenia* Hübner, 1822*****Lethe anthedon* A. Clark, 1936*****Lethe appalachia* R. Chermock, 1947*****Lethe eurydice* Linnaeus, 1763*****Libytheana carinenta* Cramer, 1777*****Limenitis archippus* Cramer, 1775*****Limenitis arthemis* Drury, 1773*****Megisto cymela* Cramer, 1777*****Nymphalis antiopa* Linnaeus, 1758*****Nymphalis l-album* [Schiffermüller], 1775*****Phyciodes cocyta* Cramer, 1777*****Phyciodes tharos* Drury, 1773*****Polygonia comma* T. Harris, 1842*****Polygonia interrogationis* Fabricius, 1798**

Polygonia progne Cramer, 1775

Speyeria Cybele Fabricius, 1775

Vanessa atalanta Linnaeus, 1758

Vanessa cardui Linnaeus, 1758

Vanessa virginiensis Drury, 1773

Family Papilionidae

Papilio canadensis Rothschild and Jordan, 1906

Papilio cressphontes Cramer, 1777

Papilio glaucus Linnaeus, 1758

Papilio polyxenes Fabricius, 1775

Family Pieridae

Colias eurytheme Boisduval, 1852

Colias philodice Godart, 1819

Pieris oleracea T. Harris, 1829

Pieris rapae Linnaeus, 1758

Pyrisitia lisa Boisduval and Le Conte, 1830

Family Plutellidae

Plutella porrectella Linnaeus, 1758

Notes: [BOLD:ACG9804](#)

Plutella xylostella Linnaeus, 1758

Notes: [BOLD:AAA1513](#)

Family Psychidae

Psyche casta Pallas, 1767

Notes: [BOLD:ACL8669](#)

Family Pterophoridae

Gillmeria pallidactyla Haworth, 1811

Hellinsia homodactylus Walker, 1864

Hellinsia pectodactylus Staudinger, 1859

Family Sphingidae

Deidamia inscriptum Harris, 1839

Notes: [BOLD:AAB0001](#)

Family Tischeriidae

Coptotriche badiiella Chambers, 1875

Notes: [BOLD:ACU4456](#)

Family Tortricidae

***Acleris chalybeana* Fernald, 1882**

Notes: [BOLD:AAA7667](#)

***Acleris cornana* McDunnough, 1933**

***Ancylis muricana* Walsingham, 1879**

Notes: [BOLD:AAU7760](#)

***Argyrotaenia mariana* Fernald, 1882**

Notes: [BOLD:AAA4119](#)

***Choristoneura rosaceana* Harris, 1841**

Notes: [BOLD:AAA1517](#)

***Cochylis hoffmanana* Kearfott, 1907**

Notes: [BOLD:AAB3571](#)

***Cochylis temerana* Busck, 1907**

Notes: [BOLD:AAB7534](#)

***Endothenia hebesana* Walker, 1863**

***Epinotia medioviridana* Kearfott, 1908**

***Eucosma similana* Clemens, 1860**

***Grapholita prunivora* Walsh, 1868**

Notes: [BOLD:AAG0330](#)

***Olethreutes atrodentana* Fernald, 1882**

***Olethreutes fasciatana* Clemens, 1860**

***Olethreutes permundana* Clemens, 1860**

***Pandemis lamprosana* Robinson, 1869**

***Phaneta ochrocephala* Walsingham, 1895**

***Phaneta parmatana* Clemens, 1860**

***Phaneta tomonana* Kearfott, 1907**

***Platynota idaeusalis* Walker, 1859**

Notes: [BOLD:ABY7901](#)

***Pristerognatha fuligana* Denis & Schiffermüller, 1775**

Notes: [BOLD:AAC7661](#)

***Proteoteras aesculana* Riley, 1881**

Notes: [BOLD:AAA6740](#)

Order Mantodea**Family Mantidae**

Mantis religiosa subsp. *religiosa* Linnaeus, 1758

Order Mecoptera**Family Bittacidae**

Bittacus strigosus Hagen, 1861

Family Panorpidae

Panorpa galerita Byers, 1962

Panorpa latipennis Hine, 1901

Panorpa subfurcata Westwood, 1846

Order Neuroptera**Family Chrysopidae**

Chrysopa oculata Say, 1839

Family Hemerobiidae

Hemerobius humulinus Linnaeus, 1758

Notes: [BOLD:AAG0892](#)|[BOLD:AAN7492](#)

Hemerobius stigma Stephens, 1836

Notes: [BOLD:AAG0891](#)

Micromus posticus Walker, 1853

Notes: [BOLD:AAG0906](#)

Order Odonata**Family Aeshnidae**

Aeshna umbrosa Walker, 1908

Anax junius Drury, 1773

Family Calopterygidae

Hetaerina americana Fabricius, 1798

Family Coenagrionidae

Argia moesta Hagen, 1861

Enallagma antennatum Say, 1839

Enallagma civile Hagen, 1861

Enallagma ebrium Hagen, 1861

Enallagma exsulans Hagen, 1861

Enallagma geminatum Kellicott, 1895

Enallagma signatum Hagen, 1861

Ischnura kellicotti Williamson, 1898

Ischnura posita Hagen, 1861

Ishnura verticalis Say, 1839

Nehalennia irene Hagen, 1861

Family Lestidae

Lestes disjunctus Selys, 1862

Lestes rectangularis Say, 1839

Family Libellulidae

Erythemis simplicicollis Say, 1839

Libellula luctuosa Burmeister, 1839

Libellula pulchella Drury, 1773

Libellula quadrimaculata Linnaeus, 1758

Pachydiplax longipennis Burmeister, 1839

Plathemis lydia Drury, 1773

Sympetrum internum Montgomery, 1943

Sympetrum obtrusum Hagen, 1867

Sympetrum semicinctum Say, 1839

Tramea lacerat Hagen, 1861

Order Orthoptera

Family Acrididae

Cholealtis conspera Harris, 1841

Chorthippus curtipennis Harris, 1835

Chortophaga viridifasciata De Geer, 1773

Dissosteira carolina Linnaeus, 1758

Dissosteria carolina Linnaeus, 1758

Melanoplus bivatattus Say, 1825

Melanoplus sanguinipes subsp. *sanguinipes* Fabricius, 1798

Melanoplus sp.

Family Gryllidae

Allonemobius fasciatus De Geer, 1773

Gryllus veletis Alexander and Bigelow, 1960

Oecanthus nigricornis F. Walker, 1869

Oecanthus quadripunctatus Beutenmuller, 1894

Family Tetrigidae

Tetrix arenosum subsp. *angusta* Hancock, 1896

Tetrix subulata Linnaeus, 1761

Family Tetrioniidae

Conocephalus brevipennis Scudder, 1863

Scudderia sp.

Order Phasmatodea**Family Heteronemiidae**

Diapheromera femorata Say, 1824

Order Plecoptera**Family Chloroperlidae**

Sweltsa onkos Ricker, 1935

Order Psocoptera**Family Amphipsocidae**

Polypsocus corruptus Hagen, 1861

Family Caeciliidae

Caecilius sp.

Family Caeciliusidae

Valenzuela flavidus Stephens, 1836

Notes: [BOLD:AAH3228](#)|[BOLD:AAN8447](#)

Family Ectopsocidae

Ectopsocus meridionalis Ribaga, 1904

Family Mesopsocidae

Mesopsocus unipunctatus Müller, 1764

Family Peripsocidae

Peripsocus subfasciatus Rambur, 1842

Family Psocidae

Blaste opposita Banks, 1907

Metylophorus novaescotiae Walker, 1853

Family Stenopsocidae

Graphopsocus cruciatus Linnaeus, 1768

Notes: [BOLD:ACA2933](#)|[BOLD:ACB0984](#)

Order Thysanoptera**Family Aeolothripidae**

Aeolothrips ericae Bagnall, 1920

Notes: [BOLD:ABA2981](#)

Family Phlaeothripidae

Haplothrips verbasci Osborn, 1897

Notes: [BOLD:AAI6861](#)

Family Thripidae

Chirothrips manicatus Haliday, 1836

Odontothrips biuncus John, 1921

Taeniothrips inconsequens Uzel, 1895

Notes: [BOLD:ACC0651](#)

Order Trichoptera**Family Helicopsychidae**

Helicopsyche borealis Hagen, 1861

Family Hydropsychidae

Ceratopsyche morosa Hagen, 1861

Notes: [BOLD:AAA3679](#)

Cheumatopsyche campyla Ross, 1938

Notes: [BOLD:AAA3892](#)[BOLD:ACE5263](#)

Hydropsyche phalerata Hagen, 1861

Notes: [BOLD:AAC3243](#)

Family Hydroptilidae

Agraylea multipunctata Curtis, 1834

Hydroptila armata Ross, 1938

Hydroptila perdita Morton, 1905

Notes: [BOLD:AAE5187](#)

Hydroptila spatulata Morton, 1905

Notes: [BOLD:AAD0137](#)

Orthotrichia cristata Morton, 1905

Family Leptoceridae

Oecetis avara Banks, 1895

Oecetis cinerascens Hagen, 1861

Oecetis inconspicua Walker, 1852

Notes: [BOLD:AAA1532](#)

Oecetis nocturna Ross, 1966

Family Limnephilidae

Ironoquia punctatissima Walker, 1852

Pycnopsyche antica Walker, 1852

Family Phryganeidae

Banksiola crotchi Banks, 1944

Family Polycentropodidae

Plectrocnemia cinerea Hagen, 1861

Notes: [BOLD:AAA3441](#)|[BOLD:ACL7631](#)

Class Malacostraca**Order Amphipoda****Family Hyalellidae**

Hyalella azteca Saussure, 1858

Order Decapoda**Family Cambaridae**

Orconectes propinquus Girard, 1852

Order Isopoda**Family Trachelipodidae**

Trachelipus rathkii Brandt, 1833

Notes: [BOLD:AAH4102](#)

Family Trichoniscidae

Hyloniscus riparius Koch, 1838

Notes: [BOLD:AAV6495](#)

Trichoniscus pusillus Brandt, 1833

Notes: [BOLD:AAN7523](#)

Phylum Chordata**Class Actinopterygii****Order Cypriniformes****Family Catostomidae**

Catostomus catostomus Forster, 1773

Catostomus commersonii Lacepède, 1803

Hypentelium nigricans Lesueur, 1817

Moxostoma erythrurum Rafinesque, 1818

Moxostoma valenciennesi Jordan, 1885

Family Cyprinidae

Cyprinella spiloptera Cope, 1867

Cyprinus Carpio Linnaeus, 1758

Luxilus chrysocephalus Rafinesque, 1820

Luxilus cornutus Mitchill, 1817

Nocomis biguttatus Kirtland, 1840

Nocomis micropogon Cope, 1865

Notropis heterodon Cope, 1865

Notropis photogenis Cope, 1865

Pimephales notatus Rafinesque, 1820

Rhinichthys atratulus Hermann, 1804

Semotilus atromaculatus Mitchill, 1818

Order Esociformes**Family Esocidae**

Esox lucius Linnaeus, 1758

Order Gasterosteiformes**Family Gasterosteidae**

Culaea inconstans Kirtland, 1840

Order Perciformes**Family Centrarchidae**

Ambloplites rupestris Rafinesque, 1817

Lepomis gibbosus Linnaeus, 1758

Micropterus dolomieu Lacepède, 1802

Micropterus salmoides Lacepède, 1802

Pomoxis nigromaculatus Lesueur in Cuvier and Valenciennes, 1829

Family Percidae

Etheostoma blennioides Rafinesque, 1819

Etheostoma exile Girard, 1859

Etheostoma nigrum Rafinesque, 1820

Perca flavescens Mitchill, 1814

Percina maculata Girard, 1859

Order Salmoniformes**Family Salmonidae**

Salvelinus fontinalis Mitchill, 1814

Order Siluriformes

Family Ictaluridae

Ameiurus nebulosus Lesueur, 1819

Noturus flavus Rafinesque, 1818

Class Amphibia**Order Anura****Family Bufonidae**

Anaxyrus americanus Holbrook, 1836

Family Hylidae

Hyla versicolor LeConte, 1825

Pseudacris crucifer Wied-Neuwied, 1838

Pseudacris triseriata Wied-Neuwied, 1838

Family Ranidae

Lithobates catesbeiana Shaw, 1802

Lithobates clamitans Latreille in Sonnini de Manoncourt and Latreille, 1801

Lithobates pipiens Schreber, 1782

Lithobates sylvatica LeConte, 1825

Order Caudata**Family Ambystomidae**

Ambystoma jeffersonianum x *laterale* var. *hybrid species: jefferson and blue-spotted* Green, 1827 and Hallowell, 1856

Ambystoma laterale Hallowell, 1856

Ambystoma maculatum Shaw, 1802

Family Plethodontidae

Hemidactylium scutatum Temminck and Schlegel, 1838

Plethodon cinereus Green, 1818

Class Aves**Order Anseriformes****Family Anatidae**

Aix sponsa Linnaeus, 1758

Anas acuta Linnaeus, 1758

Anas americana Gmelin, 1789

Anas clypeata Linnaeus, 1758

Anas crecca Linnaeus, 1758

Anas discors Linnaeus, 1766

Anas platyrhynchos Linnaeus, 1758

Anas rubripes Brewster, 1902
Anas strepera Linnaeus, 1758
Aythya affinis Eyton, 1838
Aythya americana Eyton, 1838
Aythya collaris Donovan, 1809
Aythya marila Linnaeus, 1761
Aythya valisineria A. Wilson, 1814
Branta bernicla Linnaeus, 1758
Branta canadensis Linnaeus, 1758
Branta hutchinsii Richardson, 1832
Bucephala albeola Linnaeus, 1758
Bucephala clangula Linnaeus, 1758
Chen caerulescens Linnaeus, 1758
Clangula hyemalis Linnaeus, 1758
Cygnus buccinator Richardson, 1831
Cygnus columbianus Ord, 1815
Cygnus olor Gmelin, 1789
Lophodytes cucullatus Linnaeus, 1758
Melanerpes erythrocephalus Linnaeus, 1758
Mergus merganser Linnaeus, 1758
Mergus serrator Linnaeus, 1758
Oxyura jamaicensis Gmelin, 1789

Order Apodiformes

Family Apodidae

Chaetura pelagica Linnaeus, 1758

Family Trochilidae

Archilochus colubris Linnaeus, 1758

Order Caprimulgiformes

Family Caprimulgidae

Caprimulgus vociferus A. Wilson, 1812

Chordeiles minor J. R. Forster, 1771

Order Charadriiformes

Family Charadriidae

Charadrius semipalmatus Bonaparte, 1825

Charadrius vociferus Linnaeus, 1758

Family Laridae

Chroicocephalus philadelphia Ord, 1815

Larus delawarensis Ord, 1815

Larus fuscus Linnaeus, 1758

Larus glaucoides B. Meyer, 1822

Larus hyperboreus Gunnerus, 1767

Larus marinus Linnaeus, 1758

Larus smithsonianus Coues, 1862

Larus thayeri W. S. Brooks, 1915

Mniotilta varia Linnaeus, 1766

Sterna hirundo Linnaeus, 1758

Family Scolopacidae

Actitis macularius Linnaeus, 1766

Arenaria interpres Linnaeus, 1758

Bartramia longicauda Bechstein, 1812

Calidris alpina Linnaeus, 1758

Calidris bairdii Coues, 1861

Calidris melanotos Vieillot, 1819

Calidris minutilla Vieillot, 1819

Calidris pusilla Linnaeus, 1766

Gallinago delicata Ord, 1825

Scolopax minor Gmelin, 1789

Tringa flavipes Gmelin, 1789

Tringa melanoleuca Gmelin, 1789

Tringa solitaria A. Wilson, 1813

Family Sternidae

Hydroprogne caspia Pallas, 1770

Order Ciconiiformes**Family Ardeidae**

Ardea alba Linnaeus, 1758

Ardea herodias Linnaeus, 1758

Botaurus lentiginosus Rackett, 1813

Butorides virescens Linnaeus, 1758

Chlidonias niger Linnaeus, 1758

Egretta caerulea Linnaeus, 1758

Order Columbiformes**Family Columbidae**

Columba livia Gmelin, 1789

Zenaida macroura (Linnaeus, 1758)

Order Coraciiformes**Family Alcedinidae**

Megaceryle alcyon Linnaeus, 1758

Order Cuculiformes**Family Cuculidae**

Coccyzus americanus Linnaeus, 1758

Coccyzus erythrophthalmus A. Wilson, 1811

Order Falconiformes**Family Accipitridae**

Accipiter cooperii Bonaparte, 1828

Accipiter gentilis Linnaeus, 1758

Accipiter striatus Vieillot, 1808

Agelaius phoeniceus Linnaeus, 1766

Aquila chrysaetos Linnaeus, 1758

Buteo jamaicensis Gmelin, 1788

Buteo lagopus Pontoppidan, 1763

Buteo lineatus Gmelin, 1788

Buteo platypterus Vieillot, 1823

Circus cyaneus Linnaeus, 1766

Haliaeetus leucocephalus Linnaeus, 1766

Family Cathartidae

Cathartes aura Linnaeus, 1758

Family Falconidae

Falco columbarius Linnaeus, 1758

Falco peregrinus Tunstall, 1771

Falco sparverius Linnaeus, 1758

Family Pandionidae

Pandion haliaetus Linnaeus, 1758

Order Galliformes**Family Odontophoridae**

Colinus virginianus Linnaeus, 1758

Family Phasianidae

Bonasa umbellus Linnaeus, 1766

Meleagris gallopavo Linnaeus, 1758

Phasianus colchicus Linnaeus, 1758

Order Gaviiformes**Family Gaviidae**

Gavia immer Brunnich, 1764

Order Gruiformes**Family Gruidae**

Grus canadensis Linnaeus, 1758

Family Rallidae

Fulica americana Gmelin, 1789

Porzana carolina Linnaeus, 1758

Rallus limicola Vieillot, 1819

Order Passeriformes**Family Alaudidae**

Eremophila alpestris (Linnaeus, 1758)

Family Bombycillidae

Bombycilla cedrorum Vieillot, 1808

Family Calcaridae

Calcarius lapponicus Linnaeus, 1758

Family Cardinalidae

Cardinalis cardinalis Linnaeus, 1758

Passerina cyanea Linnaeus, 1766

Pheucticus ludovicianus Linnaeus, 1766

Plectrophenax nivalis Linnaeus, 1758

Family Certhiidae

Certhia americana Bonaparte, 1838

Family Corvidae

Corvus brachyrhynchos C. L. Brehm, 1822

Corvus corax Linnaeus, 1758

Cyanocitta cristata Linnaeus, 1758

Family Emberizidae

Ammodramus leconteii Audubon, 1844

Ammodramus nelsoni Allen, 1875

Ammodramus savannarum Gmelin, 1789
Junco hyemalis Linnaeus, 1758
Melospiza georgiana Latham, 1790
Melospiza lincolni Audubon, 1834
Melospiza melodia A. Wilson, 1810
Passerculus sandwichensis Gmelin, 1789
Passerella iliaca Merrem, 1786
Pipilo erythrophthalmus Linnaeus, 1758
Pipilo maculatus Swainson, 1827
Pooecetes gramineus Gmelin, 1789
Spizella arborea A. Wilson, 1810
Spizella pallida Swainson, 1832
Spizella passerina Bechstein, 1798
Spizella pusilla A. Wilson, 1810
Zonotrichia albicollis Gmelin, 1789
Zonotrichia leucophrys J. R. Forster, 1772

Family Fringillidae

Carduelis flammea Linnaeus, 1758
Carduelis pinus A. Wilson, 1810
Carduelis tristis Linnaeus, 1758
Carpodacus mexicanus Statius Muller, 1776
Carpodacus purpureus Gmelin, 1789
Coccothraustes vespertinus W. Cooper, 1825
Loxia curvirostra Linnaeus, 1758

Checklist of species observed or collected at the *rare* Charitable Research Reserve in Cambridge, Ontario, Canada. The fifth of five checklists for Kingdom Animalia, this checklist contains records from Phylum Chordata, Class Aves (Orders Passeriformes to Strigiformes), Class Mammalia, and Class Reptilia, as well as Phylum Gastropoda.

Phylum Chordata

Class Aves

Order Passeriformes

Family Fringillidae

Loxia leucoptera Gmelin 1789

Family Hirundinidae

Hirundo rustica Linnaeus, 1758

Petrochelidon pyrrhonota (Vieillot, 1817)

Riparia riparia Linnaeus, 1758

Stelgidopteryx serripennis Audubon, 1838

Tachycineta bicolor Vieillot, 1808

Family Icteridae

Dolichonyx oryzivorus Linnaeus, 1758

Euphagus carolinus Statius Muller, 1776

Euphagus cyanocephalus Wagler, 1829

Icterus galbula Linnaeus, 1758

Icterus spurius Linnaeus, 1766

Molothrus ater Boddaert, 1783

Quiscalus quiscula Linnaeus, 1758

Sturnella magna Linnaeus, 1758

Xanthocephalus xanthocephalus Bonaparte, 1826

Family Laniidae

Lanius excubitor Linnaeus, 1758

Family Mimidae

Dumetella carolinensis Linnaeus, 1766

Mimus polyglottos Linnaeus, 1758

Toxostoma rufum Linnaeus, 1758

Family Motacillidae

Anthus rubescens Tunstall, 1771

Family Paridae

Poecile atricapillus Linnaeus, 1766

Family Parulidae

Cardellina canadensis Linnaeus, 1766

Cardellina pusilla A. Wilson, 1811

Geothlypis philadelphia A. Wilson, 1810

Geothlypis trichas Linnaeus, 1766

Leiothlypis celata Say, 1822

Leiothlypis peregrina A. Wilson, 1811

Leiothlypis ruficapilla A. Wilson, 1811

Oporornis agilis A. Wilson, 1812

Setophaga americana Linnaeus, 1758

Setophaga caerulescens J. F. Gmelin, 1789

Setophaga castanea A. Wilson, 1810

Setophaga citrina Boddaert, 1783

Setophaga coronata Linnaeus, 1766

Setophaga discolor Vieillot, 1809

Setophaga fusca Statius Müller, 1776

Setophaga magnolia A. Wilson, 1811

Setophaga palmarum J. F. Gmelin, 1789

Setophaga pensylvanica Linnaeus, 1766

Setophaga petechia Linnaeus, 1766

Setophaga pinus Linnaeus, 1766

Setophaga ruticilla Linnaeus, 1758

Setophaga striata J. R. Forster, 1772

Setophaga tigrina J. F. Gmelin, 1789

Setophaga virens J. F. Gmelin, 1789

Vermivora chrysoptera Linnaeus, 1766

Vermivora cyanoptera Olson & Reveal, 2009

Family Passeridae

Passer domesticus Linnaeus, 1758

Family Peucedramidae

Nycticorax nycticorax Linnaeus, 1758

Parkesia noveboracensis J. F. Gmelin, 1789

Picoides arcticus Swainson, 1832

Seiurus aurocapilla Linnaeus, 1766

Family Regulidae

Regulus calendula (Linnaeus, 1766)

Regulus satrapa Lichtenstein 1823

Family Sittidae

Sitta canadensis Linnaeus, 1766

Sitta carolinensis Latham, 1790

Family Sturnidae

Sturnus vulgaris Linnaeus, 1758

Family Sylviidae

Polioptila caerulea Linnaeus, 1766

Family Thraupidae

Piranga olivacea Gmelin, 1789

Family Troglodytidae

Cistothorus palustris A. Wilson, 1810

Thryothorus ludovicianus (Latham, 1790)

Troglodytes aedon Vieillot, 1809

Troglodytes hiemalis Vieillot, 1819

Family Turdidae

Catharus fuscescens (Stephens, 1817)

Catharus guttatus Pallas, 1811

Catharus minimus Lafresnaye, 1848

Catharus ustulatus Nuttall, 1840

Hylocichla mustelina Gmelin, 1789

Sialia sialis Linnaeus, 1758

Turdus migratorius Linnaeus, 1766

Family Tyrannidae

Contopus cooperi Nuttall, 1831

Contopus virens Linnaeus, 1766

Empidonax alnorum Brewster, 1895

Empidonax flaviventris W. M. Baird & S. F. Baird, 1843

Empidonax minimus W. M. Baird & S. F. Baird, 1843

Empidonax traillii Audubon, 1828

Myiarchus crinitus Linnaeus, 1758

Sayornis phoebe Latham, 1790

Tyrannus tyrannus Linnaeus, 1758

Family Vireonidae

Vireo flavifrons Vieillot, 1808

Vireo gilvus Vieillot, 1808

Vireo griseus Boddaert, 1783

Vireo olivaceus Linnaeus, 1766

Vireo philadelphicus Cassin, 1851

Vireo solitarius A. Wilson, 1810

Order Pelecaniformes

Family Phalacrocoracidae

Phalacrocorax auritus Lesson, 1831

Order Piciformes

Family Picidae

Colaptes auratus Linnaeus, 1758

Dryocopus pileatus Linnaeus, 1758

Melanerpes carolinus Linnaeus, 1758

Picoides pubescens Linnaeus, 1766

Picoides villosus Linnaeus, 1766

Sphyrapicus varius Linnaeus, 1766

Order Podicipediformes

Family Podicipedidae

Podiceps auritus Linnaeus, 1758

Podiceps grisegena Boddaert, 1783

Podilymbus podiceps Linnaeus, 1758

Order Strigiformes

Family Strigidae

Aegolius acadicus Gmelin, 1788

Asio flammeus Pontoppidan, 1763

Bubo virginianus Gmelin, 1788

Megascops asio Linnaeus, 1758

Strix varia Barton, 1799

Class Mammalia

Order Artiodactyla

Family Cervidae

Odocoileus virginianus Zimmermann, 1780

Order Carnivora

Family Canidae

Canis latrans Say, 1823

Vulpes vulpes Linnaeus, 1758

Family Felidae

Lynx rufus Schreber, 1777

Family Mephitidae

Mephitis mephitis Schreber, 1776

Family Mustelidae

Lontra canadensis Schreber, 1777

Mustela erminea Linnaeus, 1758

Neovison vison Schreber, 1777

Family Procyonidae

Procyon lotor Linnaeus, 1758

Order Chiroptera

Family Vespertilionidae

Eptesicus fuscus Palisot de Beauvois, 1796

Lasionycteris noctivagans LeConte, 1831

Lasiurus borealis Müller, 1776

Lasiurus cinereus Palisot de Beauvois, 1796

Myotis lucifugus LeConte, 1831

Myotis septentrionalis Trouessart, 1897

Order Didelphimorphia

Family Didelphidae

Didelphis virginiana Kerr, 1792

Order Lagomorpha

Family Leporidae

Lepus americanus Erxleben, 1777

Lepus europaeus Pallas, 1778

Sylvilagus floridanus J. A. Allen, 1890

Order Rodentia

Family Castoridae

Castor canadensis Kuhl, 1820

Family Cricetidae

Microtus pennsylvanicus Ord, 1815

Myodes gapperi Vigors, 1830

Ondatra zibethicus Linnaeus, 1766

Peromyscus leucopus Rafinesque, 1818

Peromyscus maniculatus Wagner, 1845

Family Dipodidae

Zapus hudsonius Zimmermann, 1780

Family Erethizontidae

Erethizon dorsatus Linnaeus, 1758

Family Muridae

Mus musculus Linnaeus, 1758

Rattus norvegicus Berkenhout, 1769

Family Sciuridae

Glaucomys sabrinus Shaw, 1801

Marmota monax Linnaeus, 1758

Sciurus carolinensis Gmelin, 1788

Tamias striatus Linnaeus, 1758

Tamiasciurus hudsonicus Erxleben, 1777

Order Soricomorpha

Family Soricidae

Blarina brevicauda Say, 1823

Sorex cinereus Kerr, 1792

Sorex fumeus G. M. Miller, 1895

Family Talpidae

Condylura cristata Linnaeus, 1758

Class Reptilia

Order Squamata

Family Colubridae

Lampropeltis triangulum subsp. *triangulum* (Lacépède, 1789)

Nerodia sipedon Linnaeus, 1758

Opheodrys vernalis Harlan, 1827

Regina septemvittata Say, 1825

Storeria dekayi Holbrook, 1839

Storeria occipitomaculata Storer, 1839

Thamnophis sauritus Linnaeus, 1766

Thamnophis sirtalis subsp. *sirtalis* (Linnaeus, 1758)

Order Testudines

Family Chelydridae

Chelydra serpentina Linnaeus, 1758

Family Emydidae

Chrysemys picta Schneider, 1783

Phylum Mollusca

Class Gastropoda

Family Discidae

Anguispira alternata Say, 1816

Family Pristilomatidae

Hawaiiia minuscula A. Binney, 1841

Family Succineidae

Novisuccinea ovalis Say, 1817

Family Vertiginidae

Vertigo bollesiana E. S. Morse, 1865

Order Basommatophora

Family Planorbidae

Gyraulus circumstriatus Tryon, 1866

Order Hygrophila

Family Physidae

Physa gyrina Say, 1821

Order Pulmonata

Family Zonitidae

Paravitrea multidentata A. Binney, 1840

Order Stylommatophora

Family Agriolimacidae

Deroceras reticulatum Muller, 1774

Family Arionidae

Arion fuscus (O. F. Müller, 1774)

Arion subfuscus Draparnaud, 1805

Family Gastrodontidae

Oxychilus allarius (J. S. Miller, 1822)

Zonitoides arboreus Say, 1816

Notes: [BOLD:AAN3419](#)

Family Helicidae

Cepaea nemoralis Linnaeus, 1758

Cochlicopa lubrica (Muller, 1774)

Family Helicodiscidae

Helicodiscus parallelus Say, 1817

Family Hygromiidae

Trochulus hispidus (Linnaeus, 1758)

Notes: [BOLD:ACI9420](#)

Family Succineidae

Succinea putris Linnaeus, 1758

Family Vitrinidae

Vitrina angelicae Beck, 1837

Checklist of species observed or collected at the *rare* Charitable Research Reserve in Cambridge, Ontario, Canada. This checklist contains members of Kingdom Amoebozoa, Phylum Mycetozoa.

Class Myxogastria

Order Liceales

Family Tubiferaceae

Lycogala epidendrum Linnaeus, 1829

Notes: / flavofuscum

Order Liceida

Family Reticulariaceae

Tubifera ferruginosa (Batsch) J.F. Gmel.

Order Stemonitida**Family Stemonitidae**

Stemonitis axifera Bull, 1791

Checklist of species observed or collected at the *rare* Charitable Research Reserve in Cambridge, Ontario, Canada. This checklist contains records from Kingdom Fungi, including Phyla Ascomycota, Basidiomycota, and Zygomycota.

Phylum Ascomycota

Dictyocatenulata alba Finley & E. F. Morris 1967

Phylum Ascomycota**Class Arthoniomycetes****Order Arthoniales****Family Arthoniaceae**

Arthonia caesia Koerber, 1861

Arthonia caudata Willey, 1892

Arthonia radiata Vetensk-Akad, 1808

Class Dothideomycetes**Order Pleosporales****Family Venturiaceae**

Apiosporina morbosa Arx, 1954

Order Polyporales**Family Fomitopsidaceae**

Ischnoderma resinosum Schrader, 1794

Piptoporus betulinus Bulliard, 1780

Postia caesia Schrad, 1881

Notes: (*Oligoporus caesius*)

Postia fragilis Jülich, 1982

Family Ganodermataceae

Ganoderma applanatum Persoon, 1799

Ganoderma lucidum Curtis 1791

Notes: or *Ganoderma tsugae*

Family Meripilaceae

Gloeoporus dichrous Fries, 1815

Grifola frondosa Dickson, 1785

Family Meruliaceae

Bjerkandera adusta Willdenow, 1787

Climacodon septentrionale Fries, 1821

Phlebia radiata Fries, 1821

Porothelium fimbriatum Persoon, 1818

Family Phanerochaetaceae

Steccherinum ochraceum Persoon, 1792

Family Polyporaceae

Cerrena unicolor Bulliard, 1785

Favolus alveolaris De Candolle 1815

Laetiporus sulphureus Bulliard, 1780

Lenzites betulina Linnaeus, 1753

Polyporus badius Persoon, 1801

Polyporus brumalis Persoon, 1794

Trametes elegans Sprengel, 1820

Trichaptum abietinum Dickson, 1972

Notes: (?)

Tyromyces chioneus Fries, 1815

Notes: (Tyromyces albellus, Polyporus albellus)

Family Steccherinaceae

Irpex lacteus Fries, 1818

Class Eurotiomycetes**Order Mycocaliciales****Family Mycocaliciaceae**

Mycocalicium subtile Persoon, 1925

Phaeocalicium curtisii Tuckerman, 1975

Order Verrucariales**Family Verrucariaceae**

Verrucaria calkinsiana Servit, 1950

Class Lecanoromycetes**Order Baeomycetales****Family Trapeliaceae**

Trapelia involuta (Taylor) Hertel

Trapelia placodioides Coppins & P. James

Order Candelariales**Family Candelariaceae**

Candelaria concolor (Dicks.) Stein

Candelariella aurella (Hoffm.) Zahlbr.

Candelariella efflorescens R.C. Harris & W.R. Buck

Order Lecanorales**Family Acarosporaceae**

Acarospora glaucocarpa (Ach.) Körb.

Family Cladoniaceae

Cladonia ochrochlora Flörke

Family Lecanoraceae

Lecanora allophana (Ach.) Nyl. 1872

Notes: f. *sorediata*

Lecanora allophana f. *sorediata*

Lecanora pulicaris (Pers.) Ach.

Lecanora sambuci (Pers.) Nyl.

Lecanora symmicta (Ach.) Ach.

Lecanora thysanophora R. C. Harris

Lecidella carpathica Körb.

Family Parmeliaceae

Flavoparmelia caperata (Linnaeus) Hale (1986)

Flavopunctelia flaventior (Stirt.) Hale

Melanelixia subaurifera (Nyl.) O. Blanco et al.

Parmelia squarrosa Hale

Parmelia sulcata Taylor

Punctelia rudecta (Ach.) Krog

Punctelia subrudecta (Nyl.) Krog

Xanthoparmelia cumberlandia (Gyeln.) Hale, 1974

Family Peltigeraceae

Peltigera evansiana Gyelnik

Peltigera rufescens (Weiss) Humb.

Family Porpidiaceae

Bilimbia sabuletorum (Schreb.) Arnold

Family Psoraceae

Protoblastenia rupestris (Scop.) J. Steiner

Psora decipiens (Hedwig) Hoffm.

Family Ramalinaceae

Bacidia schweinitzii (Fr. ex E. Michener) A. Schneider

Lecania croatica (Zahlbr.) Kotlov

Lecania naegelii (Hepp) Diederich & v. d. Boom

Family Stereocaulaceae

Lepraria incana (Linnaeus) Ach.

Lepraria lobificans Nyl.

Order Lecanoromycetes**Family Thelenellaceae**

Julella fallaciosa (Arnold) R. C. Harris

Order Ostropales**Family Coenogoniaceae**

Coenogonium pineti (Ach.) Lücking & Lumbsch, 2004

Family Graphidaceae

Graphis scripta (Linnaeus) Ach. (1809)

Family Phlyctidaceae

Phlyctis spp.

Family Stictidaceae

Conotrema urceolatum (Ach.) Gilenstam 2005

Order Teloschistales**Family Physciaceae**

Buellia punctata (Hoffm.) A. Massal.

Buellia stillingiana J. Steiner 1919

Hyperphyscia adglutinata (Flörke) H. Mayrhofer & Poelt

Phaeophyscia adiastrata (Essl.) Essl. 1978

Phaeophyscia orbicularis (Neck.) Moberg

Phaeophyscia pusilloides (Zahlbr.) Essl. 1978

Phaeophyscia rubropulchra (Degel.) Moberg 1978

Physcia adscendens (Th. Fr.) H. Olivier

Physcia aipolia (Ehrh. ex Humb.) Fűrnr.

Physcia millegrana Degel.

Physcia stellaris (Linnaeus) Nyl.

Physciella chloantha (Ach.) Essl.

Physconia detersa (Nyl.) Poelt

Family Teloschistaceae

Caloplaca flavovirescens (Wulfen) Søchting, Frödén & Arup

Caloplaca pyracea (Ach.) Zwackh

Xanthomendoza fallax (Hepp ex Arn.) Soechting, KSnrefelt & S. Kondratyuk

Xanthomendoza ulophyllodes (RSsSnen) Soechting, KSnrefelt & S. Kondratyuk

Xanthoria parietina (Linnaeus) Th. Fr.

Class Leotiomycetes

Order Helotiales

Family Bulgariaceae

Bulgaria inquinans (Pers.) Fr. (1822)

Family Helotiaceae

Ascocoryne cylichnium (Tul.) Korf 1971

Bisporella citrina (Batsch) Korf & S.E.Carp. (1974)

Chlorociboria aeruginascens (Nyl.) Kanouse 1947

Family Hemiphacidiaceae

Chlorenchelia versiformis (Pers.) J.R.Dixon (1975)

Class Pezizomycetes

Order Pezizales

Family Pezizaceae

Peziza repanda Pers. (1808)

Family Pyronemataceae

Aleuria aurantia (Pers.) Fuckel, 1870

Jafnea semitosta (Berk. & M.A. Curtis) Korf

Scutellinia scutellata (Linnaeus) Lambotte 1887

Scutellinia setosa Nees) Kuntze (1891)

Notes: /erinaceous

Tarzetta cupularis (Linnaeus) Svrček (1981)

Class Sordariomycetes

Order Hypocreales

Family Bionectriaceae

Ovicuculispora parmeliae (Berk. & Curt.) Etayo

Family Hypocreaceae

Hypomyces lactifluorum (Schwein.) Tul. & C. Tul. 1860

Order Xylariales

Family Xylariaceae

Daldinia concentrica (Bolton) Ces. & De Not. 1863

Hypoxylon fragiforme (Pers.) J. Kickx f. 1835

Ustulina deusta (Hoffm.) P.M.D. Martin, (1970)

Notes: (?)

Xylaria longipes Nitschke 1867

Xylaria polymorpha (Pers.) Grev. 1824

Phylum Basidiomycota

Class Agaricomycetes

Order Agaricales

Family Agaricaceae

Agaricus arvensis Schaeff. 1774

Agaricus placomyces Peck 1878

Calvatia gigantea (Batsch) Lloyd 1904

Coprinus comatus (O.F. Müll.) Pers. 1797

Lepiota clypeolaria (Bull.) P. Kumm. 1871

Lepiota cristata Barla

Leucoagaricus naucinus Wasser, 1977

Notes: (*Lepiota naucina*)

Lycoperdon perlatum Persoon, 1796

Notes: (*Lycoperdon gemmatum*)

Parasola plicatilis (Curtis) Redhead, Vilgalys & Hopple 2001

Family Amanitaceae

Amanita bisporigera G.F.Atk., 1906

Family Bolbitiaceae

Conocybe rugosa (Peck) Watling, 1981

Panaeolus foenisecii R.Maire, 1933

Notes: (*Panaeolina foenisecii*)

Family Cortinariaceae

Gymnopilus spectabilis (Fr.) A. H. Smith

Notes: (*Gymnopilus junonius*)

Phaeomarasmius proximans Singer, 1989

Family Entolomataceae

Clitopilus prunulus P. Kumm., 1871

Clitopilus scyphoides Singer, 1946

Entoloma abortivum Donk, 1949

Entoloma spp.

Entoloma strictus Hesler (1967)

Notes: (*Nolanea strictia*)

Leptonia incana Gillet, ?

Notes: Or euchlora

Family Hygrophoraceae

Arrhenia epichysium (Pers.) Redhead, Lutzoni, Moncalvo & Vilgalys 2002

Hygrocybe coccinea P. Kumm, 1871

Hygrocybe flavescens Singer, 1951

Hygrocybe miniata P. Kumm, 1871

Hygrocybe pratensis Murrill, 1914

Notes: (*Camarophyllus pratensis*)

Hygrocybe punicea P. Kumm, 1871

Hygrocybe virginea P.D. Orton & Watling, 1969

Hygrophorus eburneus Fries, 1838

Family Hymenogastraceae

Galerina autumnalis (Peck) A.H. Sm. & Singer

Notes: (*Galerina marginata*)

Hebeloma crustuliniforme Bulliard, 1787

Family Inocybaceae

Crepidotus applanatus Persoon, 1796

Crepidotus mollis Staude, 1857

Inocybe rimosa Bulliard, 1789

Inocybe spp.

Crepidotus crocophyllus Berkeley, 1847

Family Lycoperdaceae

Lycoperdon pyriforme Schaeffer, 1774

Family Lyophyllaceae

Lyophyllum decastes Fries, 1818

Family Marasmiaceae

Baeospora myosura Fries, 1818

Clitocybula oculus Peck, 1878

Marasmius rotula Scopoli, 1772

Micromphale foetidum (Sowerby) Singer, 1949

Pleurocybella porrigens (Pers.) Singer, 1947

Notes: / *Phylotus porrigens*

Rhodocollybia butryacea (Bulliard, 1792) Lennox, 1979

Notes: (*Collybia butryacea*)

Gymnopus acervatus Fries, 1821

Notes: / *Connopus acervatus*

Xerula furfuracea (Peck, 1893) R. H. Petersen, 2010

Family Mycenaceae

Mycena galericulata (Scop.) Gray (1821)

Mycena haematopus (Pers.) P.Kummmer, 1871

Mycena inclinata (Fr.) Quél., 1872

Mycena leaiana (Berk.) Saccardo, 1891

Mycena olida Bresadola, 1887

Mycena osmundicola J. E. Lange, 1914

Mycena spp.

Panellus stipticus (Bull.) P.Karst. (1879)

Xeromphalina kauffmanii A. H. Smith, 1953

Family Physalacriaceae

Armillaria gallica Marxmüller & Romagnesi, 1987

Armillaria mellea complex (Vahl, 1790) Kummer, 1871

Armillaria ostoyae (Romagnesi, 1970) Herink, 1973

Flammulina velutipes (Curtis, 1782) Singer, 1951

Hymenopellis limonisporea R.H. Petersen, 2010

Xerula megalospora (Clements, 1896) R. H. Petersen, 2010

Family Pleurotaceae

Pleurotus ostreatus (Jacquin) Kummer, 1871

Family Pluteaceae

Pluteus atricapillus (Schaeffer) Kummer, 1871

Pluteus atromarginatus (Konrad, 1927) Kühner, 1935

Pluteus cervinus (Schaeffer, 1774) Kummer, 1871

Notes: (*Pluteus atricapillus*)

Pluteus hongoi Singer, 1989

Pluteus longistriatus Peck, 1885

Pluteus umbrosus (Pers.) P. Kummer, 1871

Notes: (*Pluteus granularis*)

Family Psathyrellaceae

Coprinellus micaceus (Bull.:Fr.) Vilgalys, Hopple & Jacq. Johnson

Coprinopsis atramentaria (Bull.) Redhead, Vilgalys & Moncalvo (2001)

Coprinus disseminatus (Pers.) J.E.Lange (1938)

Psathyrella candolleana (Fr.) Maire, 1937

Family Schizophyllaceae

Schizophyllum commune Fries, 1815

Family Strophariaceae

Agrocybe praecox (Pers.) Fayod

Gymnopilus penetrans (Fr.) Maire

Gymnopolis sapineus (Fr.) Maire

Hypholoma capnoides (Fr.) P. Kummer, 1871

Hypholoma fasciculare (Huds.:Fr.) P. Kummer

Hypholoma sublateritium (Fr.) Quélet

Pholiota aurivella (Batsch) P.Kumm. (1871)

Pholiota squarrosa (Batsch) Kummer, 1871

Pholiota squarrosoides (Peck, 1879) Saccardo, 1887

Family Tricholomataceae

Clitocybe ectypoides (Pk) Sacc.

Clitocybe gibba (Persoon, 1801) Harmaja, 2003

Collybia cookei (Bres.) J.D.Arnold (1935)

Hygrophorus langei (Kühner) A. Pearson, 1952

Notes: (?)

Hypsizygus tessulatus (Bull:Fr) Singer

Lepista irina (Fr.) H.E. Bigelow 1959

Lepista nuda (Bull.) Cooke 1871

Notes: (*Clitocybe nuda*)

Omphalina spp.

Phyllotopsis nidulans (Pers.) Singer 1936

Rhodotus palmatus (Bull.) Maire 1926

Tricholoma aurantium (Schaeff.) Ricken 1914

Tricholoma myomyces (Schaeff.) P. Kumm. 1871

Tricholoma terreum (P.Kumm., 1871)

Tricholoma virgatum (P.Kumm., 1871)

Xeromphalina caudicinalis (Kühner & Maire, 1934)

Panellus serotinus (Kühner, 1950)

Family Clavariaceae

Multiclavula mucida (R.H. Peterson, 1967)

Order Boletales

Family Boletaceae

Boletinellus merulioides (Schwein.) Murrill 1909

Leccinum scabrum Gray 1821

Family Sclerodermataceae

Scleroderma areolatum Ehrenberg, 1818

Scleroderma citrinum Persoon, 1801

Scleroderma michiganense (Guzmán) Guzmán 1970

Family Suillaceae

Suillus americanus (Peck) Snell (1959)

Suillus brevipes (Peck) Kuntze 1898

Suillus granulatus (Linnaeus) Roussel 1796

Suillus luteus (Linnaeus) Roussel 1796

Order Cantharellales**Family Cantharellaceae**

Craterellus fallax Smith 1968

Order Corticiales**Family Corticiaceae**

Phlebia tremellosa (Schrader) Nakasone & Burdsall, 1984

Order Geastrales**Family Geastraceae**

Geastrum fimbriatum Fries 1829

Geastrum quadrifidum Persoon, 1794

Order Gomphales**Family Gomphaceae**

Ramaria spp.

Ramaria stricta var. *concolor* (Persoon) Quélet 1888

Order Hymenochaetales**Family Hymenochaetaceae**

Phellinus igniarius (Linnaeus) Quélet 1886

Order Phallales**Family Phallaceae**

Phallus duplicatus Bosc (1811)

Phallus impudicus Linnaeus 1753

Phallus ravenelii Berkeley & M.A.Curtis (1873)

Order Polyporales**Family Meruliaceae**

Loweomyces fractipes (Berkeley & M.A. Curtis) Jülich 1982

Family Polyporaceae

Daedaleopsis confragosa (Bolton) J. Schröter 1888

Fomes fomentarius (Linnaeus) J. Kickx, 1867

Polyporus radicans Schweinitz, 1832.

Polyporus squamosus (Hudson) Fries 1821

Polyporus varius (Persoon) Fries 1821

Trametes gibbosa (Persoon) Fries 1836

Trametes pubescens (Schumacher) Pilát, 1939.

Trametes versicolor (Linnaeus) Lloyd 1921

Trichaptum bifforme (Fries) Ryvarden, 1972

Truncospora ohiensis (Berkeley) Pilát 1953

Order Russulales

Family Hericiaceae

Hericium americanum Ginns 1984

Hericium coralloides (Scopoli) Persoon, 1794

Hericium erinaceus (Bulliard) Persoon, 1797.

Family Russulaceae

Lactarius torminosus (Schaeffer) Gray 1821

Russula rosacea (Persoon) Gray 1821

Russula spp.

Family Stereaceae

Stereum ostrea (Blume & Nees) Fries, 1838.

Stereum rugosum Persoon 1794

Stereum striatum (Fries) Fries 1838

Family Auriscalpiaceae

Lentinellus ursinus (Fries) Kühner 1926

Order Thelephorales

Family Bankeraceae

Boletopsis subsquamosa (Linnaeus) Kotl. & Pouz.

Class Basidiomycetes

Order Cortinariales

Family Cortinariaceae

Inocybe geophylla var. *geophylla* (Persoon) Kummer, 1871

Class Dacrymycetes

Order Dacrymycetales

Family Dacrymycetaceae

Calocera cornea (Batsch) Fries, 1827.

Class Tremellomycetes

Order Tremellales

Family Exidiaceae

Exidia alba Lloyd) Burt 1921

Notes: / *Ductifera pululahuana*

Exidia glandulosa (Bulliard) Fries (1822)

Family Tremellaceae

Tremella foliacea Persoon (1800)

Tremella reticulata (Berkeley) Farl. (1908)

Class Ustilaginomycetes

Order Ustilaginales

Family Ustilaginaceae

Ustilago maydis (DC.) Corda

Phylum Zygomycota

Class Zygomycetes

Order Mortierellales

Family Mortierellaceae

Mortierella hyalina (Harz) W. Gams

Checklist of species observed or collected at the *rare* Charitable Research Reserve in Cambridge, Ontario, Canada. The first of two checklists for Kingdom Plantae, this checklist contains records from Phyla Bryophyta, Equisetophyta, Lycopodiophyta and Magnoliophyta (Class Liliopsida and Magnoliopsida).

Kingdom Plantae

Phylum Bryophyta

Class Bryopsida

Order Bryales

Family Bryaceae

Bryum caespiticium Hedw.

Bryum argenteum Hedw.

Family Mniaceae

Mnium marginatum (With.) Brid. ex P. Beauv.

Family Plagiomniaceae

Plagiomnium cuspidatum (Hedw.) T. Kop.

Order Dicranales**Family Dicranaceae**

Dicranum flagellare Hedw.

Dicranum montanum Hedw.

Family Ditrichaceae

Ceratodon purpureus (Hedw.) Brid.

Ditrichum spp.

Family Fissidentaceae

Fissidens adianthoides Hedw.

Fissidens taxifolius Hedw.

Fissidens spp.

Family Leucobryaceae

Leucobryum glaucum (Hedw.) Ångstr. in Fries

Order Encalyptales**Family Encalyptaceae**

Encalypta procera Bruch

Order Grimmiiales**Family Grimmiaceae**

Schistidium apocarpa (Hedw.) Bsg

Schistidium rivulare (Brid.) Podp.

Order Hedwigiales**Family Hedwigiaceae**

Hedwigia ciliata (Hedw.) P. Beauv.

Order Hypnales**Family Amblystegiaceae**

Amblystegium serpens (Hedw.) Schimp. in B.S.G.

Amblystegium varium (Hedw.) Lindb.

Campylium chrysophyllum (Brid.) J. Lange

Campylium hispidulum (Brid.) Mitt.

Campylium spp.

Hygroamblystegium fluviatile (Hedw.) Loeske

Hygroamblystegium tenax (Hedw.) Jenn.

Leptodictyum riparium (Hedw.) Warnst.

Drepanocladus aduncus (Hedw.) Warnst.

Family Anomodontaceae

Anomodon attenuatus (Hedw.) Hüb.

Anomodon rostratus (Hedw.) Schimp.

Family Brachytheciaceae

Brachythecium spp.

Cirriphyllum piliiferum (Hedw.) Grout

Eurhynchium hians (Hedw.) Sande Lac.

Eurhynchium pulchellum (Hedw.) Jenn.

Family Climaciaceae

Climacium americanum Brid.

Climacium dendroides (Hedw.) Web. & Mohr

Family Entodontaceae

Entodon seductrix (Hedw.) C. Müll.

Family Fontinalaceae

Fontinalis hypnoides Hartm.

Family Hylocomiaceae

Rhytidiadelphus triquetrus (Hedw.) Warnst.

Family Hypnaceae

Callicladium haldanianum (Grev.) Crum

Homomallium adnatum (Hedw.) Broth.

Hypnum curvifolium Hedw.

Hypnum imponens Hedw.

Hypnum lindbergii Mitt.

Hypnum spp.

Platydictya subtilis (Hedw.) Crum

Taxiphyllum deplanatum (Bruch & Schimp. ex Sull.) Fleisch.

Family Leskeaceae

Leskea polycarpa Hedw.

Leskeella nervosa (Brid.) Loeske

Family Plagiotheciaceae

Isopterygiopsis muelleriana (Schimp.) Iwats.

Family Thuidiaceae

Thuidium recognitum (Hedw.) Lindb.

Thuidium delicatulum (Hedw.) Schimp. in B.S.G.

Order Orthotrichales

Family Orthotrichaceae

Orthotrichum anomalum Hedw.

Order Pottiales

Family Pottiaceae

Barbula convoluta Hedw.

Desmatodon obtusifolius (Schwaegr.) Schimp.

Hymenostylium recurvirostre (Hedw.) Dix.

Tortella tortuosa (Hedw.) Limpr.

Barbula unguiculata Hedw.

Tortula ruralis (Hedw.) Gaertn. et al.

Weissia spp.

Order Splachnales

Family Meesiaceae

Leptobryum pyriforme (Hedw.) Wils.

Class Polytrichopsida

Order Polytrichales

Family Polytrichaceae

Atrichum angustatum (Brid.) Bruch & Schimp. in B.S.G.

Atrichum undulatum (Hedw.) P. Beauv.

Polytrichum spp.

Class Sphagnopsida

Order Sphagnales

Family Sphagnaceae

Sphagnum spp.

Class Tetraphidopsida

Order Tetraphidales

Family Tetraphidaceae

Tetraphis pellucida Hedw.

Phylum Equisetophyta

Class Equisetopsida

Order Equisetales

Family Equisetaceae

Equisetum arvense Linnaeus

Equisetum hyemale subsp. *affine* (Engelm.) Calder & Roy L. Taylor

Equisetum palustre Linnaeus

Equisetum pratense Ehrh.

Equisetum scirpoides Michx.

Equisetum sylvaticum Linnaeus

Equisetum variegatum subsp. *variegatum* Schleich. ex F. Weber & D. Mohr

Phylum Lycopodiophyta

Class Lycopodiopsida

Family Huperziaceae

Family Huperziaceae

Huperzia lucidula (Michx.) Trevis.

Order Lycopodiales

Family Lycopodiaceae

Lycopodiella inundata (Linnaeus) Holub

Lycopodium annotinum Linnaeus

Lycopodium obscurum Linnaeus

Lycopodium ssp.

Order Selaginellales

Order Selaginellales

Family Selaginellaceae

Selaginella eclipses W.R. Buck

Phylum Magnoliophyta

Class Liliopsida

Order Alismatales

Family Alismataceae

Sagittaria latifolia Willd.

Sagittaria rigida Pursh

Family Araceae

Arisaema triphyllum (Linnaeus) Schott

Symplocarpus foetidus (Linnaeus) Salisb. ex Nutt.

Family Butomaceae

Butomus umbellatus Linnaeus

Family Potamogetonaceae

Potamogeton crispus Linnaeus

Stuckenia pectinata (Linnaeus) Börner

Family Tofieldiaceae

Triantha glutinosa (Michx.) Baker

Order Arales**Family Araceae**

Calla palustris Linnaeus

Lemna minor Linnaeus

Wolffia borealis (Engelm. ex Hegelm.) Landolt

Wolffia columbiana H. Karst.

Order Asparagales**Family Amaryllidaceae**

Allium tricoccum Aiton

Family Asparagaceae

Asparagus officinalis Linnaeus

Convallaria majalis Linnaeus

Maianthemum canadense Desf.

Maianthemum racemosum subsp. *racemosum* (Linnaeus) Link

Maianthemum stellatum (Linnaeus) Link

Family Iridaceae

Iris pseudacorus Linnaeus

Family Orchidaceae

Cypripedium acaule Aiton

Cypripedium arietinum R. Br.

Cypripedium parviflorum var. *pubescens* (Willd.) O.W. Knight

Cypripedium reginae Walter

Order Cyperales**Family Cyperaceae**

Carex albursina E. Sheld.

Carex aquatilis Wahlenb.

Carex arctata Boott ex Hook.

Carex atherodes Spreng.

Carex backii Boott

Carex bebbii Olney ex Fernald

Carex blanda Dewey

Carex bromoides Schkuhr ex Willd.

Carex chordorrhiza Ehrh. ex L. f.

Carex comosa Boott
Carex crinita Lam.
Carex cristatella Britton
Carex deweyana Schwein.
Carex diandra Schrank
Carex disperma Dewey
Carex eburnea Boott
Carex foenea Willd.
Carex formosa Dewey
Carex glaucoidea Tuck. ex Olney
Carex gracillima Schwein.
Carex granularis Muhl. ex Willd.
Carex grisea Wahlenb.
Carex hirtifolia Mack.
Carex hitchcockiana Dewey
Carex hystericina Muhl. ex Willd.
Carex intumescens Rudge
Carex jamesii Schwein.
Carex lacustris Willd.
Carex laevivaginata (Kük.) Mack.
Carex lasiocarpa Ehrh.
Carex laxiculmis Schwein.
Carex laxiflora Lam.
Carex leptalea Wahlenb.
Carex livida (Wahlenb.) Willd.
Carex lupuliformis Sartwell ex Dewey
Carex lupulina Muhl. ex Willd.
Carex normalis Mack.
Carex peckii Howe
Carex pedunculata Muhl. ex Willd.
Carex pensylvanica Lam.
Carex plantaginea Lam.
Carex platyphylla J. Carey
Carex projecta Mack.
Carex pseudocyperus Linnaeus

Carex retrorsa Schwein.
Carex rosea Schkuhr ex Willd.
Carex scabrata Schwein.
Carex schweinitzii Dewey ex Schwein.
Carex scoparia Schkuhr ex Willd.
Carex sparganioides Muhl. ex Willd.
Carex spp.
Carex stipata Muhl. ex Willd.
Carex stricta Lam.
Carex tetanica Schkuhr
Carex tonsa var. *rugosperma* (Mack.) Crins
Carex trichocarpa Muhl. ex Willd.
Carex trisperma Dewey
Carex utriculata Boott
Carex vulpinoidea Michx.
Carex woodii Dewey
Cyperus bipartitus Torr.
Cyperus esculentus Linnaeus
Dulichium arundinaceum (Linnaeus) Britton
Eleocharis acicularis (Linnaeus) Roem. & Schult.
Eleocharis intermedia Schult.
Eriophorum virginicum Linnaeus
Eriophorum viridicarinatum (Engelm.) Fernald
Schoenoplectiella smithii var. *smithii* (A. Gray) Hayasaka
Schoenoplectus tabernaemontani (C.C. Gmel.) Palla
Scirpus atrovirens Willd.
Scirpus cyperinus (Linnaeus) Kunth

Order Juncales

Family Juncaceae

Juniperus virginiana Linnaeus
Luzula acuminata Raf.
Luzula multiflora subsp. *multiflora* (Ehrh.) Lej.

Order Liliales

Family Iridaceae

Iris spp.

Iris versicolor Linnaeus

Sisyrinchium angustifolium Mill.

Sisyrinchium montanum Greene

Sisyrinchium mucronatum Michx.

Family Liliaceae

Clintonia borealis (Aiton) Raf.

Erythronium albidum Nutt.

Erythronium americanum subsp. *americanum* Ker Gawl.

Hemerocallis fulva (Linnaeus) L.

Hemerocallis lilioasphodelus Linnaeus

Lilium canadense Linnaeus

Lilium michiganense Farw.

Lilium philadelphicum Linnaeus

Lilium superbum Linnaeus

Medeola virginiana Linnaeus

Polygonatum biflorum (Walter) Elliott

Polygonatum pubescens (Willd.) Pursh

Streptopus lanceolatus var. *lanceolatus* (Aiton) Reveal

Trillium erectum Linnaeus

Trillium grandiflorum (Michx.) Salisb.

Trillium spp.

Uvularia grandiflora Sm.

Family Melanthiaceae

Anticlea elegans var. *glaucus* (Nutt.) Zomlefer & Judd

Family Smilacaceae

Smilax herbacea Linnaeus

Smilax tamnoides Linnaeus

Order Najadales

Family Najadaceae

Najas flexilis (Willd.) Rostk. & W.L.E. Schmidt

Family Potamogetonaceae

Potamogeton amplifolius Tuck.

Potamogeton pusillus subsp. *pusillus* Linnaeus

Order Orchidales

Family Orchidaceae

Aplectrum hyemale (Muhl. ex Willd.) Torr.
Epipactis helleborine (Linnaeus) Crantz
Galearis spectabilis (Linnaeus) Raf.
Liparis loeselii (Linnaeus) Rich.
Platanthera dilatata (Pursh) Lindl. ex L.C. Beck
Platanthera hyperborea (Linnaeus) Lindl.
Platanthera nivea (Nutt.) Luer
Spiranthes lucida (H.H. Eaton) Ames

Order Poales

Family Juncaceae

Juncus acuminatus Michx.
Juncus articulatus Linnaeus
Juncus brachycarpus Engelm.
Juncus bufonius Linnaeus
Juncus dudleyi Wiegand
Juncus effusus Linnaeus
Juncus nodosus Linnaeus
Juncus tenuis Willd.

Family Poaceae

Agrostis capillaris Linnaeus
Agrostis gigantea Roth
Agrostis stolonifera Linnaeus
Alopecurus aequalis Sobol.
Andropogon gerardii Vitman
Avena fatua Linnaeus
Avena sativa Linnaeus
Brachyelytrum erectum (Schreb.) P. Beauv.
Briza maxima Linnaeus
Bromus ciliatus Linnaeus
Bromus latiglumis (Scribn. ex Shear) Hitchc.
Bromus pubescens Muhl. ex Willd.
Calamagrostis canadensis (Michx.) P. Beauv.
Cinna arundinacea Linnaeus
Dactylis glomerata Linnaeus
Danthonia spicata (Linnaeus) P. Beauv. ex Roem. & Schult.

Dichanthelium dichotomum var. *dichotomum* (Linnaeus) Gould
Dichanthelium latifolium (Linnaeus) Harvill
Dichanthelium linearifolium (Scribn.) Gould
Digitaria sanguinalis (Linnaeus) Scop.
Eleusine indica (Linnaeus) Gaertn.
Elymus canadensis Linnaeus
Elymus hystrix Linnaeus
Elymus lanceolatus subsp. *psammophilus* (J.M. Gillett & H. Senn) Á. Löve
Elymus repens (Linnaeus) Gould
Elymus riparius Wiegand
Elymus virginicus var. *virginicus* Linnaeus
Festuca rubra subsp. *rubra* Linnaeus
Glyceria borealis (Nash) Batch.
Glyceria canadensis (Michx.) Trin.
Glyceria maxima (Hartm.) Holmb.
Glyceria septentrionalis Hitchc.
Glyceria striata (Lam.) Hitchc.
Leersia oryzoides (Linnaeus) Sw.
Lolium perenne Linnaeus
Milium effusum Linnaeus
Muhlenbergia glomerata (Willd.) Trin.
Muhlenbergia mexicana var. *mexicana* (Linnaeus) Trin.
Muhlenbergia tenuiflora (Willd.) Britton, Sterns & Poggenb.
Oryzopsis asperifolia Michx.
Panicum capillare Linnaeus
Panicum virgatum Linnaeus
Patis racemosa (Smith) Romaschenko, P.M. Peterson & Soreng
Phalaris arundinacea Linnaeus
Poa compressa Linnaeus
Poa nemoralis Linnaeus
Poa pratensis subsp. *pratensis* Linnaeus
Poa ssp.
Schizachne purpurascens (Torr.) Swallen
Schizachyrium scoparium (Michx.) Nash

Setaria viridis (Linnaeus) P. Beauv.
Sorghastrum nutans (Linnaeus) Nash
Sporobolus vaginiflorus (Torr. ex A. Gray) Alph. Wood
Bromus inermis Leysser
Bromus kalmii A. Gray
Echinochloa crus-galli (Linnaeus) P. Beauv.
Phleum pratense Linnaeus
Phragmites australis (Cav.) Trin. ex Steud.
Setaria pumila (Poir.) Roem. & Schult.
Spartina pectinata Link

Family Typhaceae

Typha angustifolia Linnaeus
Typha latifolia Linnaeus

Order Typhales

Family Sparganiaceae

Sparganium americanum Nutt.
Sparganium eurycarpum Engelm.

Class Magnoliopsida

Order Apiales

Family Apiaceae

Aegopodium podagraria Linnaeus
Angelica atropurpurea Linnaeus
Cicuta bulbifera Linnaeus
Cicuta maculata Linnaeus
Conioselinum chinense (Linnaeus) Britton, Sterns & Poggenb.
Cryptotaenia canadensis (Linnaeus) DC.
Daucus carota Linnaeus
Erigenia bulbosa (Michx.) Nutt.
Heracleum mantegazzianum Sommier & Levier
Osmorhiza claytonii (Michx.) C.B. Clarke
Sanicula canadensis var. *grandis* Fernald
Sanicula marilandica Linnaeus
Sium suave Walter
Thaspium trifoliatum var. *aureum* (Linnaeus) Britton
Zizia aurea (Linnaeus) W.D.J. Koch

Family Araliaceae

Aralia elata (Miq.) Seem.

Aralia nudicaulis Linnaeus

Aralia racemosa subsp. *racemosa* Linnaeus

Hydrocotyle americana Linnaeus

Panax quinquefolius Linnaeus

Panax trifolius Linnaeus

Order Aristolochiales**Family Aristolochiaceae**

Asarum canadense Linnaeus

Order Asterales**Family Asteraceae**

Achillea millefolium Linnaeus

Ageratina altissima (Linnaeus) King & H. Rob.

Ambrosia artemisiifolia Linnaeus

Ambrosia trifida Linnaeus

Antennaria neglecta Greene

Arctium lappa Linnaeus

Arctium minus Bernh.

Artemisia campestris subsp. *caudata* (Michx.) H.M. Hall & Clem.

Artemisia vulgaris Linnaeus

Aster spp.

Bidens cernua Linnaeus

Bidens connata Muhl. ex Willd.

Bidens frondosa Linnaeus

Bidens spp.

Bidens vulgata Greene

Carduus nutans Linnaeus

Centaurea jacea Linnaeus

Centaurea stoebe subsp. *micranthos* (Gugler) Hayek

Cichorium intybus Linnaeus

Cirsium arvense (Linnaeus) Scop.

Cirsium discolor (Muhl. ex Willd.) Spreng.

Cirsium muticum Michx.

Cirsium oleraceum (Linnaeus) Scop.

Cirsium pumilum var. *hillei* (Canby) B. Boivin
Cirsium vulgare (Savi) Ten.
Echinacea purpurea (Linnaeus) Moench
Erechtites hieraciifolius (Linnaeus) Rafinesque ex de Candolle
Erigeron annuus (Linnaeus) Pers.
Erigeron canadensis Linnaeus
Erigeron philadelphicus var. *philadelphicus* Linnaeus
Erigeron pulchellus Michx.
Erigeron strigosus Muhl. ex Willd.
Eupatorium hyssopifolium Linnaeus
Eupatorium perfoliatum Linnaeus
Eurybia macrophylla (Linnaeus) Cass.
Euthamia graminifolia (Linnaeus) Nutt.
Eutrochium maculatum var. *maculatum* (Linnaeus) E.E. Lamont
Eutrochium purpureum var. *purpureum* (Linnaeus) E.E. Lamont
Helenium flexuosum Raf.
Helianthus annuus Linnaeus
Helianthus decapetalus Linnaeus
Helianthus giganteus Linnaeus
Helianthus tuberosus Linnaeus
Heliopsis helianthoides (Linnaeus) Sweet
Hieracium umbellatum Linnaeus
Hieracium vulgatum Fr.
Inula helenium Linnaeus
Lactuca canadensis Linnaeus
Lactuca serriola Linnaeus
Lapsana communis Linnaeus
Leucanthemum vulgare Lam.
Liatris cylindracea Michx.
Matricaria discoidea DC.
Nabalus albus (Linnaeus) Hooker
Nabalus altissimus (Linnaeus) Hooker
Onopordum acanthium Linnaeus
Packera aurea (Linnaeus) Á. Löve & D. Löve
Pilosella ×floribunda (Wimmer & Grabowski) Fries

Notes: X floribundum

Pilosella aurantiaca (Linnaeus) F.W. Schultz & Schultz Bipontinus
Pilosella caespitosa (Dumortier) P.D. Sell & C. West
Pilosella officinarum F.W. Schultz & Schultz Bipontinus
Pilosella piloselloides subsp. *piloselloides* (Villars) Soják
Pilosella piloselloides subsp. *praealta* (Gochnat) S. Bräutigam & Greuter
Prenanthes spp.
Ratibida pinnata (Vent.) Barnhart
Rudbeckia hirta Linnaeus
Rudbeckia laciniata Linnaeus
Solidago altissima var. *altissima* Linnaeus
Solidago caesia Linnaeus
Solidago canadensis Linnaeus
Solidago flexicaulis Linnaeus
Solidago gigantea Aiton
Solidago hispida Muhl. ex Willd.
Solidago juncea Aiton
Solidago nemoralis subsp. *nemoralis* Aiton
Solidago patula Muhl. ex Willd.
Solidago ptarmicoides (Torr. & A. Gray) B. Boivin
Solidago rigida Linnaeus
Solidago rugosa subsp. *rugosa* Mill.
Solidago spp.
Solidago ulmifolia Muhl. ex Willd.
Sonchus arvensis subsp. *arvensis* Linnaeus
Sonchus asper (Linnaeus) Hill
Sonchus oleraceus Linnaeus
Symphyotrichum cordifolium (Linnaeus) G.L. Nesom
Symphyotrichum ericoides var. *ericoides* (Linnaeus) G.L. Nesom
Symphyotrichum laeve (Linnaeus) Á. Löve & D. Löve
Symphyotrichum lanceolatum (Willd.) G.L. Nesom
Symphyotrichum lateriflorum var. *lateriflorum* (Linnaeus) Á. Löve & D. Löve
Symphyotrichum lateriflorum var. *hirsuticaule* (Lindl. ex DC.) G.L. Nesom
Symphyotrichum novae-angliae (Linnaeus) G.L. Nesom

Symphyotrichum novi-belgii (Linnaeus) G.L. Nesom

Symphyotrichum oolentangiense var. *oolentangiense* (Riddell) G.L. Nesom

Symphyotrichum oolentangiense (Riddell) G.L. Nesom

Symphyotrichum pilosum var. *pilosum* (Willd.) G.L. Nesom

Symphyotrichum puniceum (Linnaeus) Á. Löve & D. Löve

Symphyotrichum racemosum (Elliot) G.L. Nesom

Symphyotrichum spp.

Symphyotrichum urophyllum (Lindl.) G.L. Nesom

Tanacetum vulgare Linnaeus

Taraxacum officinale F.H. Wigg.

Tragopogon dubius Scop.

Tragopogon pratensis Linnaeus

Tussilago farfara Linnaeus

Xanthium strumarium Linnaeus

Family Campanulaceae

Lobelia siphilitica Linnaeus

Order Boraginales

Family Boraginaceae

Hackelia virginiana (Linnaeus) I.M. Johnst.

Myosotis scorpioides Linnaeus

Order Brassicales

Family Brassicaceae

Hesperis matronalis Linnaeus

Rorippa sylvestris (Linnaeus) Besser

Order Campanulales

Family Campanulaceae

Campanula rapunculoides Linnaeus

Campanula rotundifolia Linnaeus

Lobelia cardinalis Linnaeus

Lobelia inflata Linnaeus

Order Capparales

Family Brassicaceae

Alliaria petiolata (M. Bieb.) Cavara & Grande

Notes: or petiolata

Barbarea vulgaris W.T. Aiton
Berteroa incana (Linnaeus) DC.
Brassica juncea (Linnaeus) Czern.
Brassica rapa Linnaeus
Capsella bursa-pastoris (Linnaeus) Medik.
Cardamine bulbosa (Schreb. ex Muhl.) Britton, Sterns & Poggenb.
Cardamine concatenata (Michx.) Sw.
Cardamine diphylla (Michx.) Alph. Wood
Cardamine maxima (Nutt.) Alph. Wood
Cardamine pensylvanica Muhl. ex Willd.
Erysimum cheiranthoides Linnaeus
Nasturtium officinale W.T. Aiton
Rorippa palustris subsp. *palustris* Linnaeus
Sinapis alba Linnaeus
Sinapis arvensis Linnaeus
Sisymbrium altissimum Linnaeus
Thlaspi arvense Linnaeus
Turritis glabra Linnaeus

Order Caryophyllales

Family Amaranthaceae

Amaranthus albus Linnaeus
Amaranthus retroflexus Linnaeus
Amaranthus tuberculatus (Moq.) J.D. Sauer

Family Caryophyllaceae

Arenaria serpyllifolia Linnaeus
Cerastium arvense subsp. *arvense* Linnaeus
Cerastium fontanum subsp. *vulgare* (Hartm.) Greuter & Burdet
Dianthus armeria Linnaeus
Dianthus barbatus Linnaeus
Saponaria officinalis Linnaeus
Silene latifolia (Mill.) Britten & Rendle
Silene vulgaris (Moench) Garcke
Stellaria graminea Linnaeus

Family Chenopodiaceae

Chenopodium album Linnaeus

Family Phytolaccaceae

Phytolacca americana var. *americana* Linnaeus

Family Polygonaceae

Persicaria hydropiper (Linnaeus) Opiz

Persicaria pensylvanica (Linnaeus) M. Gómez

Rumex britannica Linnaeus

Rumex crispus Linnaeus

Rumex obtusifolius Linnaeus

Rumex verticillatus Linnaeus

Family Portulacaceae

Claytonia virginica Linnaeus

Order Celastrales**Family Aquifoliaceae**

Ilex verticillata (Linnaeus) A. Gray

Family Celastraceae

Celastrus scandens Linnaeus

Euonymus alatus (Thunb.) Siebold

Euonymus atropurpureus Jacq.

Euonymus obovatus Nutt.

Order Cornales**Family Cornaceae**

Cornus alternifolia L. f.

Cornus canadensis Linnaeus

Cornus obliqua Raf.

Cornus racemosa Lam.

Cornus rugosa Lam.

Cornus stolonifera Michx.

Order Cucurbitales**Family Cucurbitaceae**

Echinocystis lobata (Michx.) Torr. & A. Gray

Order Dipsacales**Family Adoxaceae**

Viburnum acerifolium Linnaeus

Viburnum lantana Linnaeus

Viburnum lentago Linnaeus

Viburnum opulus Linnaeus

Viburnum opulus var. *americanum* Aiton

Viburnum rafinesquianum Schult.

Family Caprifoliaceae

Caprifoliaceae spp.

Diervilla lonicera Mill.

Dipsacus sativus (Linnaeus) Honck.

Linnaea borealis subsp. *longiflora* (Torr.) Hultén

Lonicera canadensis Bartram & W. Bartram ex Marshall

Lonicera dioica Linnaeus

Lonicera morrowii A. Gray

Lonicera tatarica Linnaeus

Sambucus canadensis Linnaeus

Sambucus nigra Linnaeus

Sambucus racemosa subsp. *pubens* (Michx.) House

Symphoricarpos albus (Linnaeus) S.F. Blake

Symphoricarpos occidentalis Hook.

Triosteum aurantiacum E.P. Bicknell

Family Dipsacaceae

Dipsacus fullonum Linnaeus

Family Valerianaceae

Valeriana edulis subsp. *cilata* (Torrey & A. Gray) F.G. Meyer

Order Ericales

Family Balsaminaceae

Impatiens capensis Meerb.

Family Ericaceae

Epigaea repens Linnaeus

Gaultheria hispidula (Linnaeus) Muhl. ex Bigelow

Gaultheria procumbens Linnaeus

Vaccinium angustifolium Aiton

Vaccinium myrtilloides Michx.

Family Primulaceae

Lysimachia arvensis (Linnaeus) U. Manns & Anderberg

Family Pyrolaceae

Pyrola elliptica Nutt.

Pyrola spp.

Order Euphorbiales

Family Euphorbiaceae

Euphorbia cyparissias Linnaeus

Euphorbia esula Linnaeus

Checklist of species observed or collected at the *rare* Charitable Research Reserve in Cambridge, Ontario, Canada. The second of two checklists for Kingdom Plantae, this checklist contains records from Phyla Magnoliophyta (Class Magnoliopsida), Marchantiophyta, Pinophyta, and Pteridophyta.

Phylum Magnoliophyta

Kingdom Plantae

Class Magnoliopsida

Order Fabales

Family Fabaceae

Amorpha canescens Pursh

Amphicarpaea bracteata (Linnaeus) Fernald

Apios americana Medik.

Desmodium canadense (Linnaeus) DC.

Glycyrrhiza lepidota Pursh

Lespedeza capitata Michx.

Lotus corniculatus Linnaeus

Medicago lupulina Linnaeus

Medicago sativa subsp. *sativa* Linnaeus

Melilotus albus Medik.

Robinia pseudoacacia Linnaeus

Trifolium aureum Pollich

Trifolium campestre Schreb.

Trifolium hybridum Linnaeus

Trifolium pratense Linnaeus

Trifolium repens Linnaeus

Vicia americana Muhl. ex Willd.

Vicia cracca Linnaeus

Order Fagales

Family Betulaceae

Alnus glutinosa (Linnaeus) Gaertn.

Alnus incana subsp. *rugosa* (Du Roi) R.T. Clausen

Betula alleghaniensis Britton

Betula papyrifera Marshall

Betula pendula Roth

Betula populifolia Marshall

Betula pumila Linnaeus

Carpinus caroliniana subsp. *virginiana* (Marshall) Furlow

Corylus americana Walter

Corylus cornuta subsp. *cornuta* Marshall

Ostrya virginiana (Mill.) K. Koch

Family Fagaceae

Fagus grandifolia Ehrh.

Quercus alba Linnaeus

Quercus bicolor Willd.

Quercus ellipsoidalis E.J. Hill

Quercus macrocarpa Michx.

Quercus palustris Münchh.

Quercus rubra Linnaeus

Quercus velutina Lam.

Family Juglandaceae

Juglans nigra Linnaeus

Order Gentianales

Family Apocynaceae

Apocynum androsaemifolium Linnaeus

Apocynum cannabinum Linnaeus

Apocynum sp.

Notes: X floribundum

Vinca minor Linnaeus

Family Asclepiadaceae

Asclepias exaltata Linnaeus

Asclepias incarnata subsp. *incarnata* Linnaeus

Asclepias syriaca Linnaeus

Asclepias tuberosa Linnaeus

Family Gentianaceae

Gentiana andrewsii Griseb.

Gentiana rubricaulis Schwein.

Gentianella quinquefolia subsp. *quinquefolia* (Linnaeus) Small

Gentianopsis crinita (Froel.) Ma

Gentianopsis virgata subsp. *virgata* (Raf.) Holub

Notes: or *virgata*

Family Rubiaceae

Galium aparine Linnaeus

Galium asprellum Michx.

Order Geraniales

Family Balsaminaceae

Impatiens glandulifera Royle

Impatiens pallida Nutt.

Family Geraniaceae

Geranium maculatum Linnaeus

Geranium robertianum Linnaeus

Family Oxalidaceae

Oxalis corniculata Linnaeus

Oxalis montana Raf.

Oxalis stricta Linnaeus

Order Haloragales

Family Haloragaceae

Myriophyllum heterophyllum Michx.

Myriophyllum verticillatum Linnaeus

Order Hamamelidales

Family Platanaceae

Platanus occidentalis Linnaeus

Order Juglandales**Family Juglandaceae**

Carya cordiformis (Wangenh.) K. Koch

Carya glabra (Mill.) Sweet

Carya ovata var. *ovata* (Mill.) K. Koch

Juglans cinerea Linnaeus

Order Lamiales**Family Boraginaceae**

Anchusa arvensis (Linnaeus) M. Bieb.

Cynoglossum officinale Linnaeus

Echium vulgare Linnaeus

Lithospermum parviflorum Weakley, Witsell & D. Estes

Myosotis laxa Lehm.

Myosotis verna Nutt.

Symphytum officinale Linnaeus

Family Lamiaceae

Agastache nepetoides (Linnaeus) Kuntze

Ajuga reptans Linnaeus

Blephilia hirsuta (Pursh) Benth.

Clinopodium vulgare Linnaeus

Collinsonia canadensis Linnaeus

Galeopsis tetrahit Linnaeus

Glechoma hederacea Linnaeus

Lamium amplexicaule Linnaeus

Leonurus cardiaca Linnaeus

Lycopus americanus Muhl. ex W.P.C. Bartram

Lycopus asper Greene

Lycopus uniflorus Michx.

Melissa officinalis Linnaeus

Mentha arvensis auct. non L.

Mentha canadensis Linnaeus

Mentha sp.

Notes: X piperita

Mentha spicata Linnaeus
Monarda didyma Linnaeus
Monarda fistulosa Sims
Nepeta cataria Linnaeus
Physostegia virginiana subsp. *virginiana* (Linnaeus) Benth.
Prunella vulgaris subsp. *vulgaris* Linnaeus
Prunella vulgaris subsp. *lanceolata* (W.P.C. Barton) Piper & Beattie
Prunella vulgaris Linnaeus
Pycnanthemum virginianum (Linnaeus) Rob. & Fernald
Scutellaria galericulata Linnaeus
Scutellaria lateriflora Linnaeus
Stachys hispida Pursh
Stachys palustris Linnaeus
Teucrium canadense subsp. *canadense* Linnaeus

Family Oleaceae

Ligustrum vulgare Linnaeus
Syringa vulgaris Linnaeus

Family Plantaginaceae

Linaria vulgaris Mill.
Plantago lanceolata Linnaeus
Plantago major Linnaeus
Plantago rugelii Decne.
Veronica anagallis-aquatica Linnaeus

Family Scrophulariaceae

Verbascum phoeniceum Linnaeus
Verbascum thapsus Linnaeus
Veronica chamaedrys Linnaeus
Veronica officinalis Linnaeus
Veronica serpyllifolia Linnaeus

Family Verbenaceae

Verbena hastata Linnaeus
Verbena simplex Lehm.
Verbena stricta Vent.
Verbena urticifolia Linnaeus

Order Laurales**Family Lauraceae**

Lindera benzoin (Linnaeus) Blume

Order Linales**Family Linaceae**

Linum virginianum Linnaeus

Order Magnoliales**Family Annonaceae**

Asimina triloba (Linnaeus) Dunal

Order Malpighiales**Family Hypericaceae**

Hypericum ascyron Linnaeus

Hypericum mutilum subsp. *mutilum* Linnaeus

Hypericum perforatum Linnaeus

Hypericum punctatum Lam.

Family Salicaceae

Populus alba Linnaeus

Populus balsamifera Linnaeus

Populus deltoides W. Bartram ex Marshall

Populus grandidentata Michx.

Populus nigra Linnaeus

Populus tremuloides Michx.

Order Malvales**Family Malvaceae**

Abutilon theophrasti Medik.

Malva moschata Linnaeus

Family Tiliaceae

Tilia americana Linnaeus

Order Myrtales**Family Lythraceae**

Lythrum salicaria Linnaeus

Family Onagraceae

Chamerion angustifolium subsp. *angustifolium* (Linnaeus) Holub

Circaea alpina Linnaeus

Circaea canadensis subsp. *canadensis* (Linnaeus) Hill

Epilobium ciliatum subsp. *glandulosum* (Lehm.) Hoch & P.H. Raven

Epilobium coloratum Biehler

Epilobium hirsutum Linnaeus

Epilobium leptophyllum Raf.

Epilobium strictum Muhl.

Ludwigia polycarpa Short & Peter

Oenothera biennis Linnaeus

Oenothera serrulata Nuttall

Family Thymelaeaceae

Dirca palustris Linnaeus

Order Nymphaeales

Family Cabombaceae

Brasenia schreberi J.F. Gmel.

Order Papaverales

Family Papaveraceae

Chelidonium majus Linnaeus

Dicentra canadensis (Goldie) Walp.

Dicentra cucullaria (Linnaeus) Bernh.

Sanguinaria canadensis Linnaeus

Order Piperales

Family Saururaceae

Saururus cernuus Linnaeus

Order Plantaginales

Family Plantaginaceae

Callitriche palustris Linnaeus

Chelone glabra Linnaeus

Digitalis lanata Ehrh.

Digitalis lutea Linnaeus

Notes: or grandiflora

Digitalis purpurea Linnaeus

Order Polygalales

Family Polygalaceae

Polygala spp

Polygala verticillata var. *verticillata* Linnaeus

Polygaloides paucifolia (Willdenow) J.R. Abbott

Order Polygonales

Family Polygonaceae

Fallopia convolvulus (Linnaeus) Á. Löve

Fallopia scandens (Linnaeus) Holub

Persicaria hydropiperoides (Michx.) Small

Persicaria maculosa Gray

Persicaria punctata (Elliott) Small

Persicaria sagittata (Linnaeus) H. Gross

Polygonum aviculare Linnaeus

Order Primulales

Family Primulaceae

Lysimachia borealis (Rafinesque) U. Manns & Anderberg

Lysimachia ciliata Linnaeus

Lysimachia nummularia Linnaeus

Lysimachia thyrsiflora Linnaeus

Primula mistassinica Michx.

Order Ranunculales

Family Berberidaceae

Berberis canadensis Mill.

Berberis thunbergii DC.

Berberis vulgaris Linnaeus

Caulophyllum thalictroides (Linnaeus) Michx.

Podophyllum peltatum Linnaeus

Family Menispermaceae

Menispermum canadense Linnaeus

Family Ranunculaceae

Actaea pachypoda Elliott

Actaea rubra (Aiton) Willd.

Actaea spp.

Anemone acutiloba (DC.) G. Lawson

Anemone americana (DC.) H. Hara

Anemone canadensis Linnaeus

Anemone cylindrica A. Gray

Anemone quinquefolia Linnaeus
Anemone virginiana var. *virginiana* Linnaeus
Anemone virginiana var. *alba* (Oakes) Alph. Wood
Aquilegia canadensis Linnaeus
Caltha palustris Linnaeus
Clematis virginiana Linnaeus
Coptis trifolia (Linnaeus) Salisb.
Ranunculus abortivus Linnaeus
Ranunculus acris Linnaeus
Ranunculus hispidus var. *caricetorum* (Greene) T. Duncan
Ranunculus recurvatus var. *recurvatus* Poir.
Ranunculus repens Linnaeus
Ranunculus sceleratus var. *sceleratus* Linnaeus
Thalictrum dasycarpum Fisch. & Avé-Lall.
Thalictrum dioicum Linnaeus
Thalictrum pubescens Pursh
Thalictrum thalictroides (Linnaeus) Eames & B. Boivin

Order Rhamnales

Family Elaeagnaceae

Elaeagnus angustifolia Linnaeus
Elaeagnus umbellata Thunb.
Shepherdia canadensis (Linnaeus) Nutt.

Family Rhamnaceae

Frangula alnus Mill.
Rhamnus alnifolia L'Hér.

Order Rosales

Family Cannabaceae

Humulus lupulus Linnaeus

Family Crassulaceae

Sedum acre Linnaeus

Family Grossulariaceae

Ribes americanum Mill.
Ribes cynosbati Linnaeus
Ribes glandulosum Grauer
Ribes hirtellum Michx.

Ribes lacustre (Pers.) Poir.

Ribes oxycanthoides var. *oxycanthoides* Linnaeus

Ribes rubrum Linnaeus

Ribes ssp.

Ribes triste Pall.

Family Hydrangeaceae

Philadelphus coronarius Linnaeus

Family Rhamnaceae

Rhamnus cathartica Linnaeus

Family Rosaceae

Agrimonia gryposepala Wallr.

Amelanchier arborea (F. Michx.) Fernald

Amelanchier laevis Wiegand

Amelanchier spicata (Lam.) K. Koch

Aruncus dioicus (Walter) Fernald

Crataegus chrysocarpa Ashe

Crataegus crus-galli Linnaeus

Crataegus dissona Sarg.

Crataegus punctata Jacq.

Crataegus spp.

Dasiphora fruticosa auct. non (Linnaeus) Rydb.

Fragaria vesca Linnaeus

Fragaria virginiana Duchesne

Geum aleppicum Jacq.

Geum canadense Jacq.

Geum fragarioides (Michaux) Smedmark

Geum laciniatum Murray

Geum rivale Linnaeus

Geum urbanum Linnaeus

Malus coronaria (Linnaeus) Mill.

Malus pumila Mill.

Physocarpus opulifolius (Linnaeus) Maxim.

Potentilla anserina subsp. *anserina* Linnaeus

Potentilla argentea Linnaeus

Potentilla norvegica Linnaeus

Potentilla recta Linnaeus
Potentilla simplex Michx.
Prunus americana Marshall
Prunus avium (Linnaeus) L.
Prunus mahaleb Linnaeus
Prunus pensylvanica L. f.
Prunus serotina Ehrh.
Prunus virginiana subsp. *virginiana* Linnaeus
Pyrus communis Linnaeus
Rosa blanda Aiton
Rosa cinnamomea L. sensu 1759, non 1753
Rosa multiflora Thunb.
Rosa palustris Marshall
Rosa rugosa Thunb.
Rosa virginiana Mill.
Rubus allegheniensis Porter
Rubus canadensis Linnaeus
Rubus flagellaris Willd.
Rubus hispidus Linnaeus
Rubus idaeus Linnaeus
Rubus occidentalis Linnaeus
Rubus pubescens Raf.
Rubus repens (Linnaeus) Kuntze
Sorbus americana Marshall
Sorbus aucuparia Linnaeus
Spiraea alba Du Roi

Family Saxifragaceae

Micranthes virginiensis (Michx.) Small
Mitella diphylla Linnaeus
Mitella nuda Linnaeus
Parnassia glauca Raf.
Tiarella cordifolia Linnaeus

Order Rubiales

Family Rubiaceae

Galium circaezans Michx.

Galium mollugo Linnaeus
Galium palustre Linnaeus
Galium tinctorium Linnaeus
Galium trifidum subsp. *trifidum* Linnaeus
Galium triflorum Michx.
Mitchella repens Linnaeus

Order Salicales

Family Salicaceae

Salix ×fragilis Linnaeus
Salix alba Linnaeus
Salix amygdaloides Andersson
Salix bebbiana Sarg.
Salix candida Flügge ex Willd.
Salix cordata Muhl.
Salix discolor Muhl.
Salix eriocephala Michx.
Salix exigua Nutt.
Salix humilis var. *humilis* Marshall
Salix lucida Muhl.
Salix nigra Marshall
Salix pedicellaris Pursh
Salix petiolaris Sm.
Salix purpurea Linnaeus
Salix serissima (L.H. Bailey) Fernald
Salix viminalis Linnaeus

Order Sapindales

Family Aceraceae

Acer nigrum F. Michaux
Acer platanooides Linnaeus
Acer rubrum Linnaeus
Acer saccharinum Linnaeus
Acer saccharum Marshall
Acer spicatum Lam.

Family Anacardiaceae

Rhus aromatica Aiton

Rhus typhina Linnaeus

Toxicodendron radicans subsp. *negundo* (Greene) Gillis

Toxicodendron radicans var. *rydbergii* (Small ex Rydb.) Erskine

Toxicodendron vernix (Linnaeus) Kuntze

Family Rutaceae

Zanthoxylum americanum Mill.

Family Sapindaceae

Acer negundo Linnaeus

Aesculus hippocastanum Linnaeus

Family Staphyleaceae

Staphylea trifolia Linnaeus

Order Saxifragales

Family Haloragaceae

Myriophyllum sibiricum Kom.

Order Scrophulariales

Family Oleaceae

Fraxinus americana Linnaeus

Fraxinus nigra Marsh.

Fraxinus pennsylvanica Marshall

Family Orobanchaceae

Conopholis americana (Linnaeus) Wallr.

Epifagus virginiana (Linnaeus) W.P.C. Barton

Family Scrophulariaceae

Aureolaria flava (Linnaeus) Farw.

Aureolaria virginica (Linnaeus) Pennell

Pedicularis canadensis Linnaeus

Penstemon digitalis Nutt. ex Sims

Penstemon hirsutus (Linnaeus) Willd.

Scrophularia lanceolata Pursh

Scrophularia marilandica Linnaeus

Verbascum blattaria Linnaeus

Veronica americana Schwein. ex Benth.

Order Solanales

Family Convolvulaceae

Calystegia spithamea (Linnaeus) Pursh

Convolvulus arvensis Linnaeus

Cuscuta gronovii Willd. ex Schult.

Family Hydrophyllaceae

Hydrophyllum canadense Linnaeus

Hydrophyllum virginianum Linnaeus

Family Polemoniaceae

Phlox subulata subsp. *subulata* Linnaeus

Family Solanaceae

Physalis heterophylla Nees

Solanum dulcamara Linnaeus

Solanum lycopersicum Linnaeus

Order Urticales

Family Moraceae

Morus alba Linnaeus

Family Ulmaceae

Celtis occidentalis Linnaeus

Ulmus americana Linnaeus

Ulmus pumila Linnaeus

Ulmus rubra Muhl.

Ulmus thomasi Sarg.

Family Urticaceae

Boehmeria cylindrica (Linnaeus) Sw.

Laportea canadensis (Linnaeus) Wedd.

Pilea pumila (Linnaeus) A. Gray

Urtica dioica subsp. *gracilis* (Aiton) Selander

Urtica dioica subsp. *dioica* Linnaeus

Order Violales

Family Cucurbitaceae

Sicyos angulatus Linnaeus

Family Violaceae

Viola adunca var. *adunca* Sm.

Viola canadensis Linnaeus

Viola cucullata Aiton

Viola labradorica Schrank

Viola macloskeyi F.E. Lloyd

Viola nephrophylla Greene

Viola pubescens Aiton

Viola renifolia A. Gray

Viola rostrata Pursh

Viola sororia Willd.

Viola sororia var. *affinis* (Leconte) L.E. McKinney

Viola spp.

Order Vitales

Family Vitaceae

Parthenocissus quinquefolia (Linnaeus) Planch.

Vitis riparia Michx.

Order Lamiales

Family Phrymaceae

Phryma leptostachya Linnaeus

Order Saxifragales

Family Hamamelidaceae

Hamamelis virginiana Linnaeus

Phylum Marchantiophyta

Class Jungermanniopsida

Order Metzgeriales

Family Aneuraceae

Aneura pinguis (Linnaeus) Dumort.

Order Jungermanniales

Family Geocalycaceae

Lophocolea heterophylla (Schrader) Dum.

Family Porellaceae

Porella platyphylla (Linnaeus) Pfeiff.

Family Radulaceae

Radula complanata (Linnaeus) Dum.

Order Porellales

Family Frullaniaceae

Frullania eboracensis Gottsche

Class Marchantiopsida

Order Marchantiales

Family Aytoniaceae

Reboulia hemisphaerica (Linnaeus) Raddi

Family Conocephalaceae

Conocephalum conicum (Linnaeus) Lindb.

Family Marchantiaceae

Marchantia polymorpha Linnaeus

Phylum Pinophyta

Class Pinopsida

Order Cupressales

Family Cupressaceae

Juniperus communis Linnaeus

Juniperus communis var. *depressa* Pursh

Order Pinales

Family Cupressaceae

Thuja occidentalis Linnaeus

Family Pinaceae

Larix decidua Mill.

Larix laricina (Du Roi) K. Koch

Picea abies (Linnaeus) Karst.

Picea glauca (Moench) Voss

Picea pungens Engelm.

Pinus banksiana Lamb.

Pinus resinosa Aiton

Pinus strobus Linnaeus

Pinus sylvestris Linnaeus

Tsuga canadensis (Linnaeus) Carrière

Phylum Pteridophyta

Class Filicopsida

Order Ophioglossales

Family Ophioglossaceae

Botrypus virginianus (Linnaeus) Michaux

Order Polypodiales

Family Aspleniaceae

Asplenium platyneuron (Linnaeus) Britton, Sterns & Poggenb.

Asplenium trichomanes subsp. *trichomanes* Linnaeus

Asplenium viride Huds.

Family Dennstaedtiaceae

Pteridium aquilinum var. *latiusculum* (Desv.) Underw. ex A. Heller

Family Dryopteridaceae

Athyrium filix-femina var. *angustum* (Willd.) G. Lawson

Cystopteris bulbifera (Linnaeus) Bernh.

Cystopteris fragilis (Linnaeus) Bernh.

Notes: or tenuis

Deparia acrostichoides (Sw.) M. Kato

Dryopteris ×*triploidea* Wherry

Dryopteris carthusiana (Vill.) H.P. Fuchs

Notes: or spinulosa

Dryopteris clintoniana (D.C. Eaton) Dowell

Dryopteris cristata (Linnaeus) A. Gray

Dryopteris goldiana (Hook. ex Goldie) A. Gray

Dryopteris intermedia (Muhl. ex Willd.) A. Gray

Dryopteris marginalis (Linnaeus) A. Gray

Gymnocarpium dryopteris (Linnaeus) Newman

Matteuccia struthiopteris var. *pennsylvanica* (Willd.) C.V. Morton

Onoclea sensibilis Linnaeus

Polystichum acrostichoides (Michx.) Schott

Family Osmundaceae

Osmunda claytoniana Linnaeus

Osmunda regalis var. *spectabilis* (Willd.) A. Gray

Family Polypodiaceae

Polypodium virginianum Linnaeus

Notes: or vulgare

Family Pteridaceae

Adiantum pedatum Linnaeus

Pellaea glabella Mett. ex Kuhn

Family Thelypteridaceae

Thelypteris noveboracensis (Linnaeus) Nieuwl.

Thelypteris palustris var. *pubescens* (G. Lawson) Fernald

Class Polypodiopsida

Order Osmundales

Family Osmundaceae

Osmundastrum cinnamomea (Linnaeus) C. Presl

Analysis

The two surveying strategies – a four-month long terrestrial arthropod survey, followed by a concentrated bioblitz targeting a variety of taxa – resulted in 25,287 and 3,502 specimens barcoded, respectively, out of a total of 32,645 specimens collected. Observations of an additional 125 species and two higher taxa (for which no voucher specimen was kept) were recorded at the bioblitz (Suppl. material 7). Altogether the surveys covered 14 phyla, 29 classes, 117 orders, and 531 families of animals, plants, fungi and lichens. This comprised 3,986 BINs of animals, 1,193 of which are identified to species (Suppl. materials 4, 8, 9).

The most diverse groups were Ichneumonidae, Chironomidae, and Cecidomyiidae with 188, 365, and 584 BINs respectively. In terms of abundance, the three groups Sciaridae, Cecidomyiidae, and Chironomidae had the largest number of specimens with 1,528, 2,477, and 9,636 specimens. The most abundant BINs were [BOLD:ACC0651](#) (Thripidae: *Taeniothrips inconsequens*), [BOLD:AAD5253](#) (Chironomidae: *Thienemanniella xena*), and [BOLD:AAP5920](#) (Chironomidae: *Cricotopus triannulatus*) with 349, 636, and 1619 specimens collected. For these three BINs, and many similarly abundant BINs, the presence of closely allied and morphologically similar taxa makes oversampling of these exceptionally common species unavoidable.

Combining all existing data results in a final tally of 3,348 species (Table 1), 1,102 of them new records for the reserve (Suppl. material 10). An incidence-based rarefaction analysis (Fig. 2 Suppl. material 11) computed in EstimateS (Colwell and Elsensohn 2014) approximates that 6,744 BINs of invertebrate animals are present at the reserve, indicating that our inventory is at most 30% complete. 1,918 BINs were singletons (i.e. represented by one specimen); the high proportion of singletons (48%) is another indication that the species inventory is far from complete (Magurran 2004). For comparison, the Great Smoky Mountains National Park (North Carolina and Tennessee, United States) established an [AT BI effort](#) in 1998 and have tallied 18,545 of the estimated 100,000 species present in the park. In only a few months, our survey found 20% of the Great Smoky Mountains total from 17 years of effort. The Great Smoky Mountains National Park has recognized the contribution DNA barcoding can play in their ATBI effort and have included this method in their survey (e.g., Scholtens and Wagner 2007, Zhou et al. 2011).

Discussion

The present study has conducted an expansive biotic survey, released the data in several public biodiversity data repositories, and published the unique process and findings – all within a relatively modest timeframe. This model for rapid generation and dissemination of critical biodiversity data could be followed to conduct regional assessments of biodiversity status and change, and potentially aid in evaluating progress towards the Aichi Targets of the Strategic Plan for Biodiversity 2011–2020. To fully appreciate this approach, a closer look at four elements is presented: highlights of the biotic inventory, the multiple levels of acceleration, future improvements to the resource, and the utility of the resource going forward.

Table 1. Summary of species inventory for rare Charitable Research Reserve in Cambridge, Ontario, Canada, following the present study.					
Major Group	Common Name	No. on previous inventory	No. on 2015 surveys	New Species	New Total
Annelida	Earthworms	0	2	2	2
Arthropoda:Arachnida	Spiders and others	0	198	198	198
Arthropoda:Crustacea	Crustaceans	0	7	7	7
Arthropoda:Entognatha	Collembola	0	9	9	9
Arthropoda:Insecta	Insects	832	895	778	1,610
Arthropoda:Myriapoda	Millipedes, Centipedes	0	6	6	6
Chordata:Actinopterygii	Fishes	28	14	3	31
Chordata:Amphibia	Amphibians	13	2	0	13
Chordata:Aves	Birds	231	87	0	231
Chordata:Mammalia	Mammals	37	6	1	38
Chordata:Reptilia	Reptiles	10	0	0	10
Fungi	Fungus, Lichens	191	84	60	251
Mollusca	Snails, Clams	0	18	18	18
Plantae	Plants, Mosses, Liverworts	901	103	20	921
Protozoa	Protozoans	3	3	0	3
	Total Species	2,246	1,433	1,102	3,348

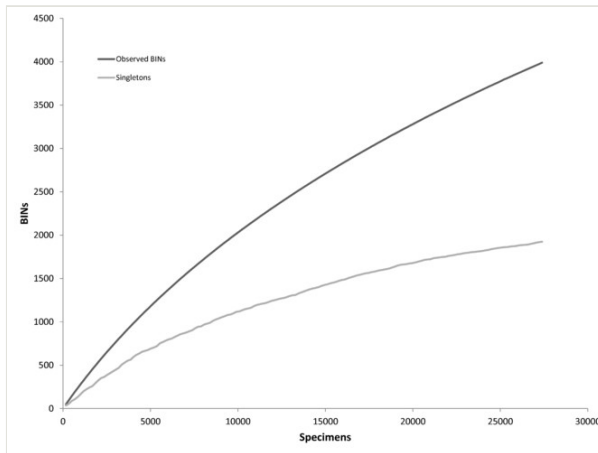


Figure 2.

Accumulation curves for singleton and total observed BINs for the 2015 survey of **rare Charitable Research Reserve**.

Resource Highlights

The biotic inventory of **rare Charitable Research Reserve** performed between May and August 2015 was noteworthy for a number of reasons. The taxonomic scope of the surveys, which covered fourteen phyla over several kingdoms, was only made possible by the integration of DNA barcoding and by assembling a diverse group of experts. Taxa that appeared under-represented on the prior species inventory were targeted where possible, and in many cases, increased significantly. Spiders (Araneae) for instance were completely absent from the prior inventory. Using the expertise of single specialist, focused collecting efforts, and a comprehensive barcode reference library for Canadian spiders (Blagoev et al. 2015) our survey resulted in the addition of 181 species (12.3% of Canadian fauna), two of which were newly recorded for BOLD (*Grammonota inornata*, *Philodromus praelustris*) and three representing new provincial records (*Cicurina pallida*, *Neoantistea gosiuta*, *Xysticus winnipegensis*) (Suppl. material 12). Likewise, only 21 lichen species were reported from **rare** previously, but 53 were collected in a single day at the reserve, increasing the species list to 66. Not all the significant increases were in understudied taxa however: 18 snail and slug species (Mollusca) were added, all new to the reserve; 14 species of fishes were observed, adding three to the previous list of 28; and one mammal (hoary bat, *Lasiurus cinereus*) of the six observed were added to the list for a total of 37. In terms of BINs, many under-represented taxa did not witness a dramatic increase in named species, but did see large numbers of individual (and unnamed) BINs inventoried; the mites (Acari; 268 BINs) and gall midges (Cecidomyiidae; 584 BINs) are remarkable examples.

Rapid Creation of the Resource

The rapidness of conducting this inventory was due to the acceleration of several steps that comprise the procedure. Firstly, several types of passive traps were employed to acquire large sample sizes for minimal collector effort. For instance, malaise traps often collect 2,000 specimens in a single week with only minutes of servicing time. Secondly, as discussed above, the addition of DNA barcoding streamlines sorting of the material, dividing the specimens into distinct units, minimizing the total number of specimens that require examination. Thirdly, in addition to the initial sorting, barcoding also provides nearly instant taxonomic assignment by querying against reference libraries using BOLD; the resolution of the assignment for queried records depends on the completeness of the reference library. Fourthly, the processing of the bioblitz material and analyses of the DNA barcode data were accelerated at all possible stages to test how quickly a large volume of specimens could proceed through all steps. The generation of data following the bioblitz was impressive: tissue sampling and lysis within 12 hours; DNA extraction and PCR within 24 h; cycle sequencing, cleanup and sequencer loading by 48 h; edited and validated sequences on BOLD by 72 h; taxonomic assignment, data release and manuscript presubmission by 96 h; final manuscript submission to BDJ by 108 h. The laboratory steps are mostly accelerated by automation, while data sharing is greatly facilitated by data release platforms such as BOLD and the Integrated Publishing Toolkit of Canadensys (Robertson et al. 2014), and finally, the manuscript stage is sped up considerably by the online writing tools introduced by Pensoft and other publishers.

Refinement of the Resource

Many BINs are presently identified only to family, subfamily, or at most, genus level. It's important to note that the inventoried taxa that lack species-level determination, including intractable groups such as mites and midges, will be refined over time. Not only does DNA barcoding, empowered by the BIN system, roughly sort the material to direct and minimize the efforts of taxonomic experts (deWaard et al. 2009), but it also facilitates crowd-sourcing of taxonomic refinement. For example, if two specimens are collected in unrelated projects and locations, but assigned to the same BIN, any taxonomic determination on one specimen will be applicable to the other, and the pertinent data (such as identifier and locality) is shared on the public BIN page. For the specimens of this study, their taxonomy could be honed by the efforts of completely unrelated (but now linked) projects.

In addition to this passive approach to refining the taxonomy of these specimens, we will be actively pursuing expert determinations for the unnamed BINs. For many groups, the experts among our coauthors will be able to provide species level resolution in a short period of time (e.g., J.F.-T. specializes in Braconidae, particularly the subfamily Microgastrinae). For other BINs, and over a longer period of time, it will be necessary to solicit determinations from our network of collaborators that specialize on Nearctic taxa. The public release of these data to multiple data repositories should also aid in recruiting active specialists presently outside our network. The vouchered material, all deposited in a single repository ([BIOUG](#)), can be quickly assembled and loaned out, along with the

associated data and files that may assist in determinations (e.g., tree files and image libraries: Suppl. materials 8, 9). There will however be taxa for which species names will be problematic, due to a lack of active specialists, keys, and/or revisionary work, and where a large proportion of that taxon awaits description. For example, the number of gall midges (Diptera: Cecidomyiidae) inventoried for rare (584) is nearly six times the number of Canadian species described to date (ca. 100, following Gagne and Jaschhof 2014).

When a significant number of species and other taxon categories become available, the refined dataset can be updated in the various data repositories and potentially in a second, updated version of the paper in BDJ. Any subsequent versions – each with a separate Digital Object Identifier (DOI) – would be linked to the original paper, allowing for continuing improvement and additions to the species list for the reserve. It is important to emphasize that the taxa awaiting species-level determination still have persistent identifiers as part of the BIN system; each BIN is assigned a BOLD-generated uniform resource identifier (URI) upon its establishment (e.g. [BOLD:AAA0001](#)). Until the species binomial is determined or described, this URI can be used in its place. For example, this URI permits assessing and comparing local diversity (Young et al. 2012) despite uncertainty in taxonomic placement.

Utility of the Resource

While the overarching objective of the study was to develop, assess and demonstrate a model for conducting and disseminating DNA barcode-assisted biotic surveys, a valuable resource was created in the process. The **rare Charitable Research Reserve** provides a unique urban reserve with the infrastructure necessary to conduct research in its diversity of habitats; a barcode reference library and updated species inventory can now both be added to the infrastructure shared with their researchers and educators. Ecological studies in particular, such as the ongoing prairie community field experiments (e.g., Harvey and MacDougall 2014), could benefit greatly from this resource that allows the investigation of ecological questions previously impossible to address (Joly et al. 2014, Kress et al. 2015). Moreover, these studies and others are increasingly using next generation sequencing (NGS) technologies, where validated reference libraries linked to voucher specimens are of critical importance, since this link is generally lost in NGS studies (Cristescu 2014). This reference library created can also be amalgamated with external barcode records, local inventories, and taxon-specific efforts to create regional and national libraries; this study for instance has enhanced the reference library for animals by providing 468 unique BINs to BOLD. Finally, as mentioned above, it is crucial that we begin to assess biodiversity change and disseminate these data widely -- the resource created here can form the baseline for accessible, repeated assessments, to gauge trends in an important temperate reserve.

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Author contributions

Author contributions: P.D.N.H. and J.R.D. designed the study; J.S., C.N.S. and M.R.Y. oversaw specimen and sequence analyses; A.C.T., J.R.D. and V.L.-B. conducted the analyses. J.M. and E.S. provided specimen images. All authors discussed the results and contributed to specimen collection, identifications, and to the manuscript, which was written by J.R.D., R.D., J.F.-T.

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Supplementary materials

Suppl. material 1: Species inventory of rare prior to May 2015

Authors: Telfer et al.

Data type: checklist

Brief description: Species inventory for *rare* Charitable Research Reserve in Cambridge, Canada as of May 2015, prior to the present study.

Filename: Suppl materials 1 - Existing Inventory.xlsx - [Download file](#) (156.97 kb)

Suppl. material 2: Bat protocols

Authors: Telfer et al.

Data type: protocols

Brief description: Protocols for the bat component of *rare* BioBlitz

Filename: Suppl materials 2 - Bat protocols.pdf - [Download file](#) (362.98 kb)

Suppl. material 3: Lysis, primer and marker details

Authors: Telfer et al.

Data type: laboratory

Brief description: Details for laboratory work.

Filename: Suppl materials 3 - Lab Details.xlsx - [Download file](#) (10.47 kb)

Suppl. material 4: Summary data for 2015 inventory

Authors: Telfer et al.

Data type: summary

Brief description: Summary data for the 28,789 specimens collected for the 2015 inventory, including BIN assignments and locality

Filename: Suppl materials 4 - Summary Data.xlsx - [Download file](#) (2.18 MB)

Suppl. material 5: Darwin core archive

Authors: Telfer et al.

Data type: occurrences

Brief description: Darwin core archive of 2015 *rare* species inventory

Filename: Suppl materials 5 - Darwin Core Archive.zip - [Download file](#) (1.05 MB)

Suppl. material 6: Contributors list

Authors: Telfer et al.

Data type: authors

Brief description: A list of all contributors who took part in the collection and identification of specimens collected as part of the 2015 inventory.

Filename: Suppl materials 6 - Contributors.xls - [Download file](#) (43.00 kb)

Suppl. material 7: Human observations during rare BioBlitz

Authors: Telfer et al.

Data type: occurrences

Brief description: Human observations during *rare* BioBlitz, of mostly plants, birds, etc.

Filename: Suppl materials 7 - Species sightings.xlsx - [Download file](#) (23.87 kb)

Suppl. material 8: BIN representative tree

Authors: Telfer et al.

Data type: tree

Brief description: A neighbour-joining tree constructed from a single representative of each distinct BIN collected in *rare*, along with a single representative of clusters without BINs.

Filename: Suppl materials 8 - COI Tree.pdf - [Download file](#) (242.06 kb)

Suppl. material 9: BIN image library

Authors: Telfer et al.

Data type: images

Brief description: A collection of representative images of each BIN collected from the *rare* Charitable Research Reserve. BINs are listed in the same order as the tree. Specimens without BINs are not included.

Filename: Suppl materials 9 - Tree Images.pdf - [Download file](#) (163.93 MB)

Suppl. material 10: Final combined inventory for rare Charitable Research Reserve

Authors: Telfer et al.

Data type: checklist

Brief description: The final combined inventory for *rare* Charitable Research Reserve as of August 2015; including previous checklist and all 2015 species added.

Filename: Suppl materials 10 - Final Inventory.xlsx - [Download file](#) (328.53 kb)

Suppl. material 11: Raw data for accumulation curve

Authors: Telfer et al.

Data type: occurrences

Brief description: Lot and BIN data was downloaded for each specimen that received a BIN from BOLD Systems. It was formatted for input into EstimateS (Version 9.1.0) for creation of an accumulation curve.

Filename: Suppl materials 11 - Accumulation Curve data.xlsx - [Download file](#) (477.00 kb)

Suppl. material 12: Sampling and new record images

Authors: Telfer et al.

Data type: images

Brief description: Images of sampling sites, sampling techniques, specimen processing, and three new provincial spider records.

Filename: Suppl materials 12 - Sampling and Specimen Images.pdf - [Download file](#) (1.16 MB)