

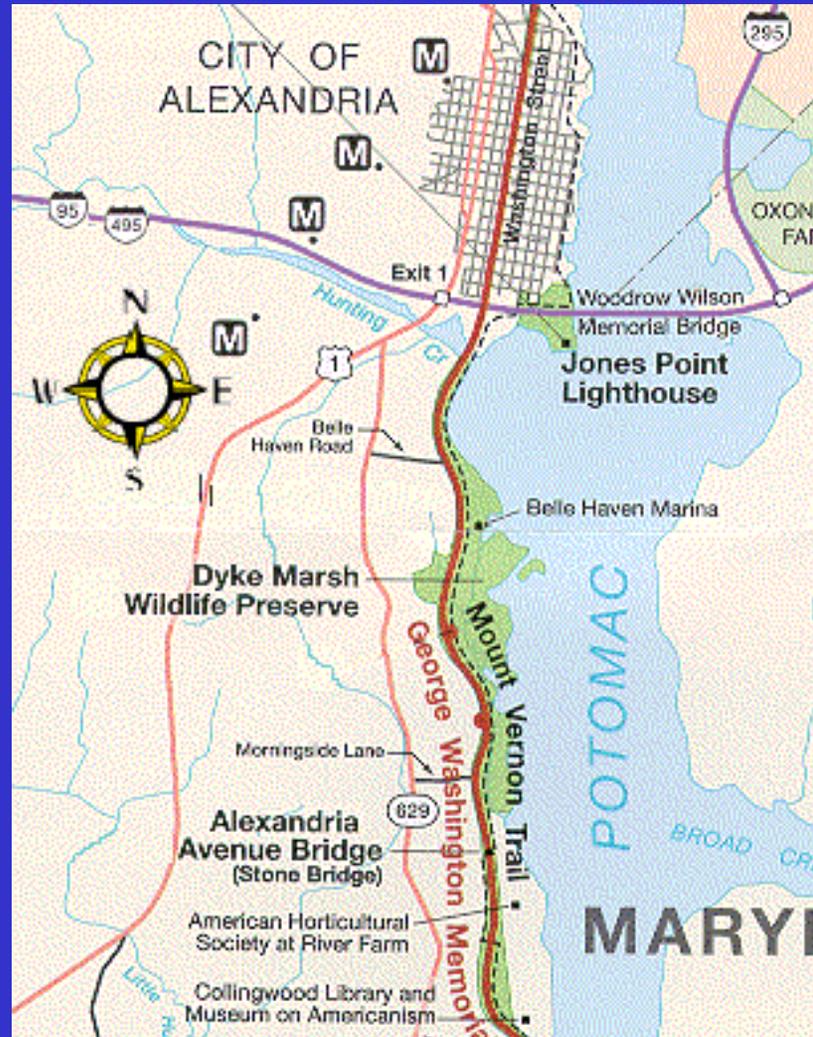
**Assessment  
of the Arthropod Fauna of  
Dyke Marsh Wildlife Preserve,  
Virginia**

**Edward M. Barrows  
Laboratory of Entomology and Biodiversity  
Georgetown University  
Washington, DC**

**Spotlight on National Park Resources Conference  
George Mason University, Fairfax, VA  
29–30 March 2006**

# Dyke Marsh Wildlife Preserve

- South of Alexandria
- About 95 miles from the Chesapeake Bay
- About 380 acres (formerly 650 acres)



# Table 1. Habitats of Dyke Marsh Wildlife Preserve

## I. artificial habitats

### A. road-side habitats

1. mowed-roadside habitat
2. nonmowed-roadside habitat

### B. rocky-shore habitat (rubble)

## II. natural habitats

### A. aquatic habitats

1. gut habitat
2. river habitat

### B. floodplain-forest habitats

1. low-forest habitat
2. tidal-swamp forest habitat

### C. marsh habitats

1. mixed-non-*Typha* habitat
2. mixed-*Zizania* habitat
3. *Nuphar-Peltandra* habitat
4. *Phragmites* habitat (most gone by 2006)
5. mudflat habitat
6. *Typha* habitat

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This classification is based on reports and personal observations.

# Open marsh of Dyke Marsh Wildlife Preserve, VA



July

# Open marsh of Dyke Marsh Wildlife Preserve, VA



April

# Low forest of Dyke Marsh Wildlife Preserve, VA



Dan Kjar and Alex Chang, August 2001.

# Forest-marsh ecotone of Dyke Marsh Wildlife Preserve, VA



Cathy McCall in the ecotone area, August 2004

# Why are arthropods important?

**food for other organisms (parasites, predators, scavengers)**

**honeydew feeders**

**nectar feeders**

**organism population regulators**

**parasites (animals, fungi, plants)**

**pollen feeders**

**pollinators**

**predators (all other kingdoms)**

**scavengers (all other kingdoms)**

**seed dispersers**

**soil aerators**

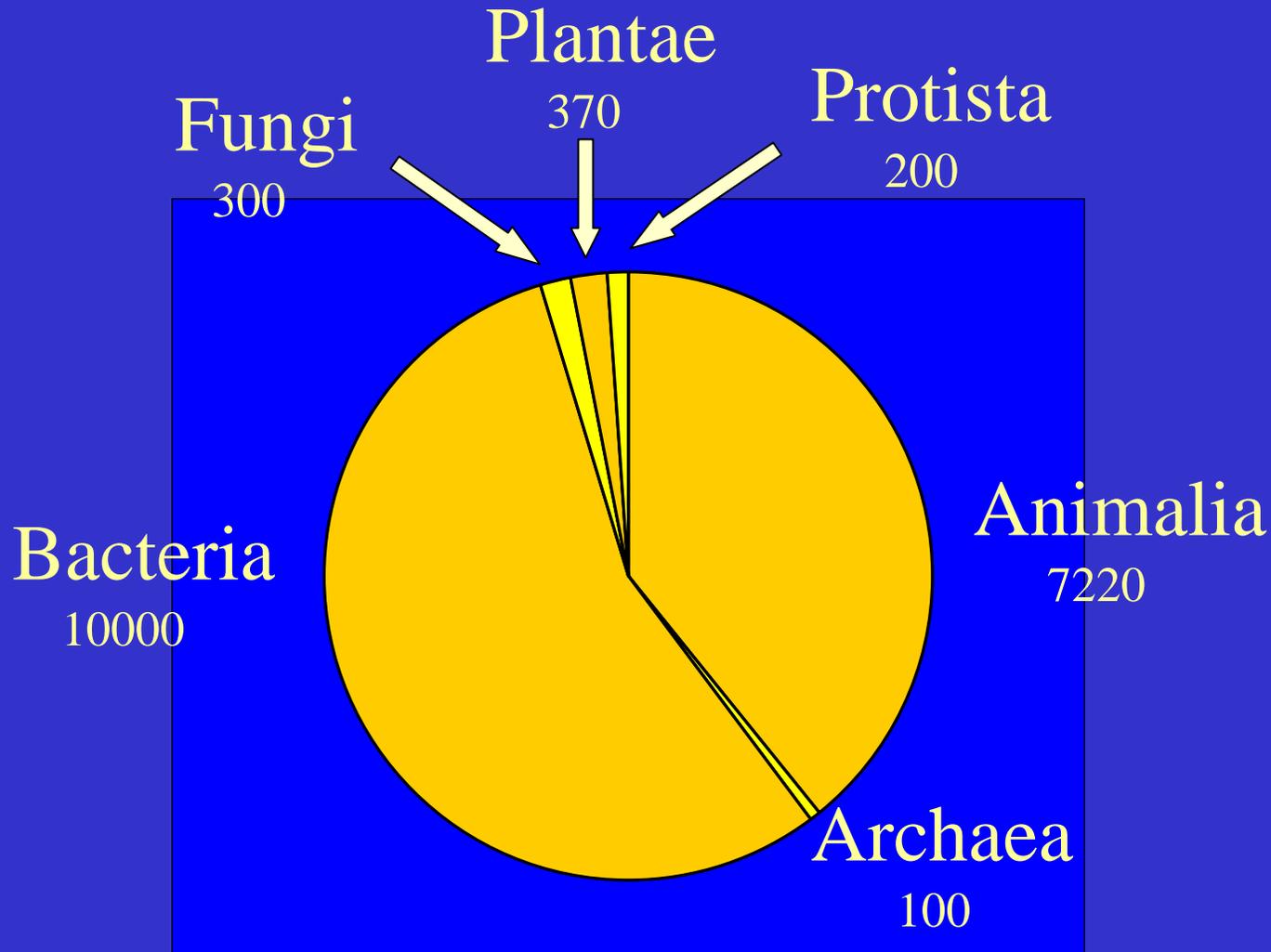
**“The little things that run the world,” E. O. Wilson**

**What do we need to know  
to manage and monitor  
DMPW arthropods?**

- **What are the species?**
- **How abundant are the species?**
- **Where are the species?**
- **How do their populations change through the seasons and among years?**
- **How do we sample species accurately & efficiently?**

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All 5 large life domains.  
A working-hypothesis pie chart: about 18,000  
species. (Johnston 2000, personal observations)

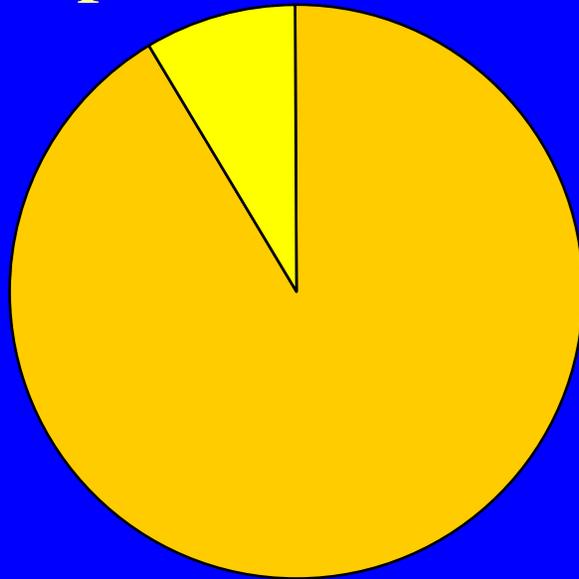


**What lives in DMPW? Animals.  
A working-hypothesis pie chart:  
about 7220 animal species.**

**Other animal species**



800



**Arthropoda**

6420



**About 1000 DMWP arthropod species and morphospecies are online:**

**Arthropods of Dyke Marsh Wildlife Preserve,  
Virginia: A Searchable Online Database (ADMWPD)**  
**([http://data.georgetown.edu/departments/biology/nps/  
dmwp.cfm](http://data.georgetown.edu/departments/biology/nps/dmwp.cfm))**

**(Just Google Biodiversity Washington, DC.)**

# Ants of DMWP: On Discover Life (by Dan Kjar):

[http://pick4.pick.uga.edu/mp/20q?guide=Ants&cl=US/  
VA/Fairfax/Dyke\\_Marsh](http://pick4.pick.uga.edu/mp/20q?guide=Ants&cl=US/VA/Fairfax/Dyke_Marsh)



*Campanotus cerberulus*



Dan

- What are the species?
- **How abundant are the species?**
- Where are the species?
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**Abundances vary within taxon:  
Rare, common, and abundant species.**

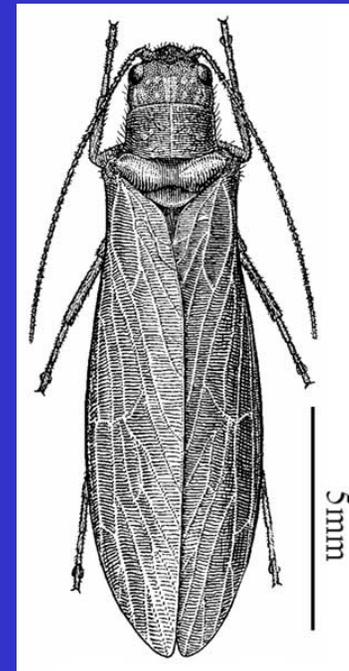
**Example: Sialids (alderflies)**

**3606 specimens:**

**3605 *Sialis iola***

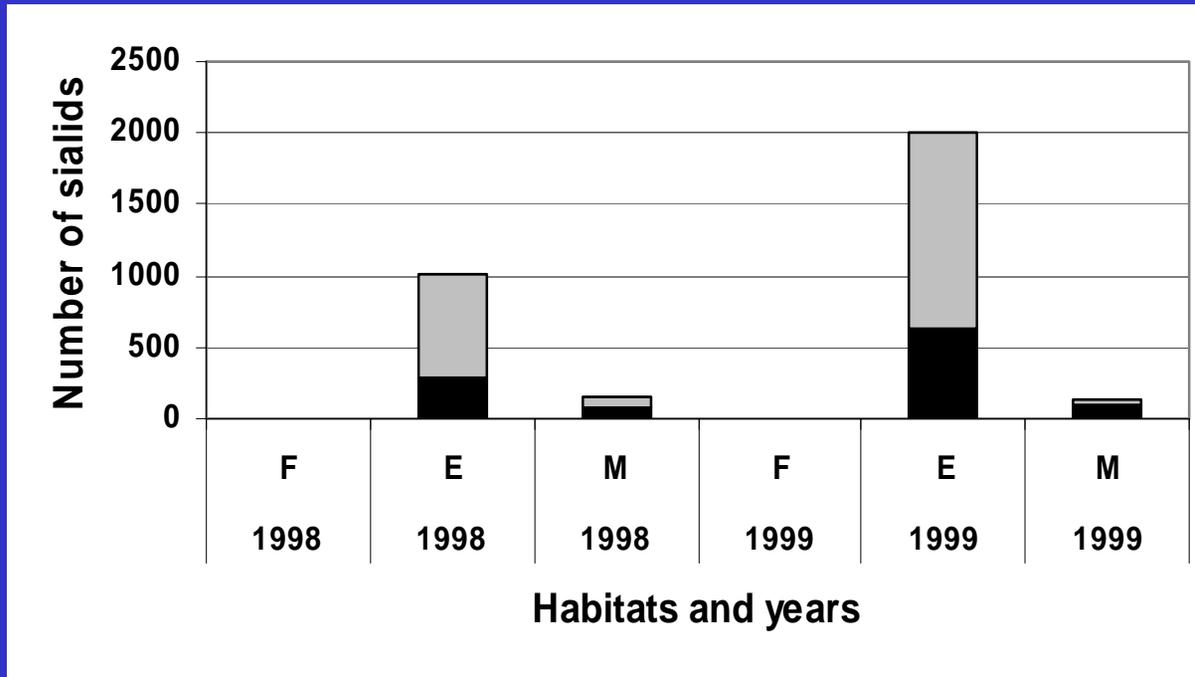
**1 *Sialis mohri***

**(Malaise trapping 1998—1999)**



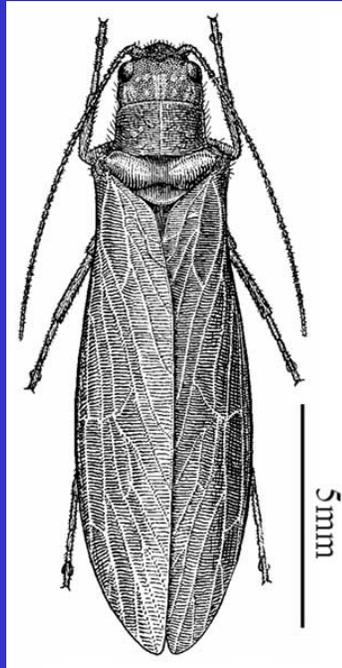
- **What are the species?**
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*Sialis iola*. Adult abundance varies with habitat and year.

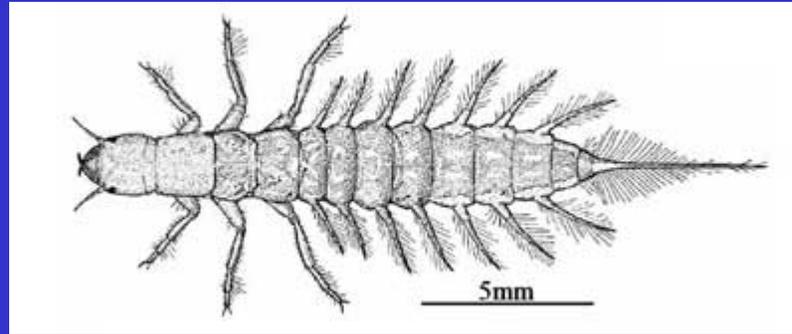


**Black part of bar = females; gray part of bar = male.  
A few sialids were in the forest (Barrows et al. 2005).**

*Sialis iola* Ross (alderfly) is a common insect  
in DMWP (arthropod predator, food for other  
organisms including fish).



*Sialis* sp.,  
terrestrial adult  
(Ross 1937)

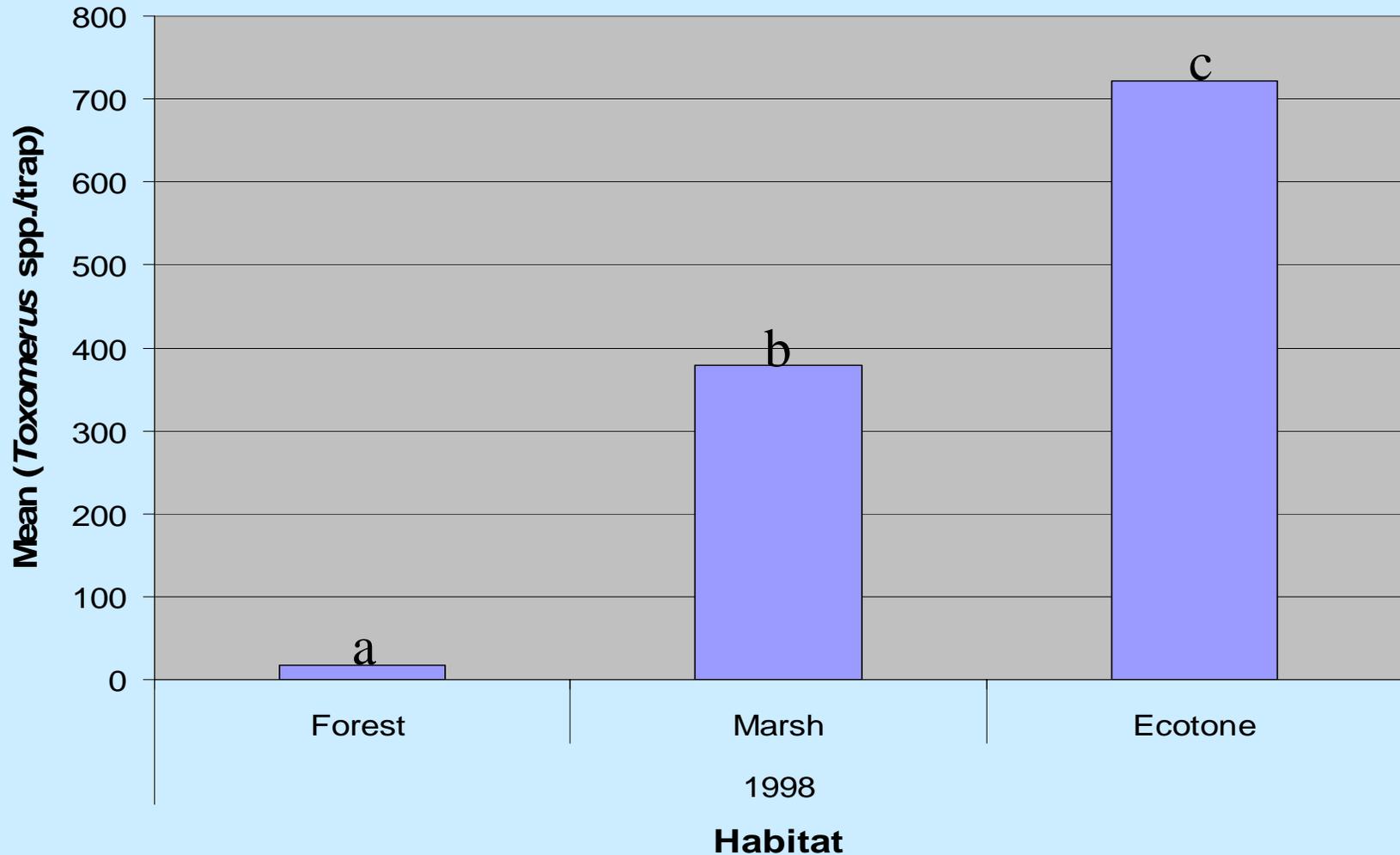


*Sialis* sp.  
aquatic larva  
(Ross 1937)



*Sialis* sp., terrestrial adult  
(photo by Oleg Korun)

# Abundance of *Toxomerus* spp. (flower flies) differed among all habitats in 1998.



( $P \leq 0.05$ , ANOVA, Duncan's Multiple Range Test, from Keith H. Post, 2002).

*Toxomerus* flower flies are aphid predators, pollen and nectar consumers, pollinators, and food for other organisms.



A female *Toxomerus* sp. feeds on pollen of *Gaillardia pulchella*.  
(photo by Dan S. Kjar)

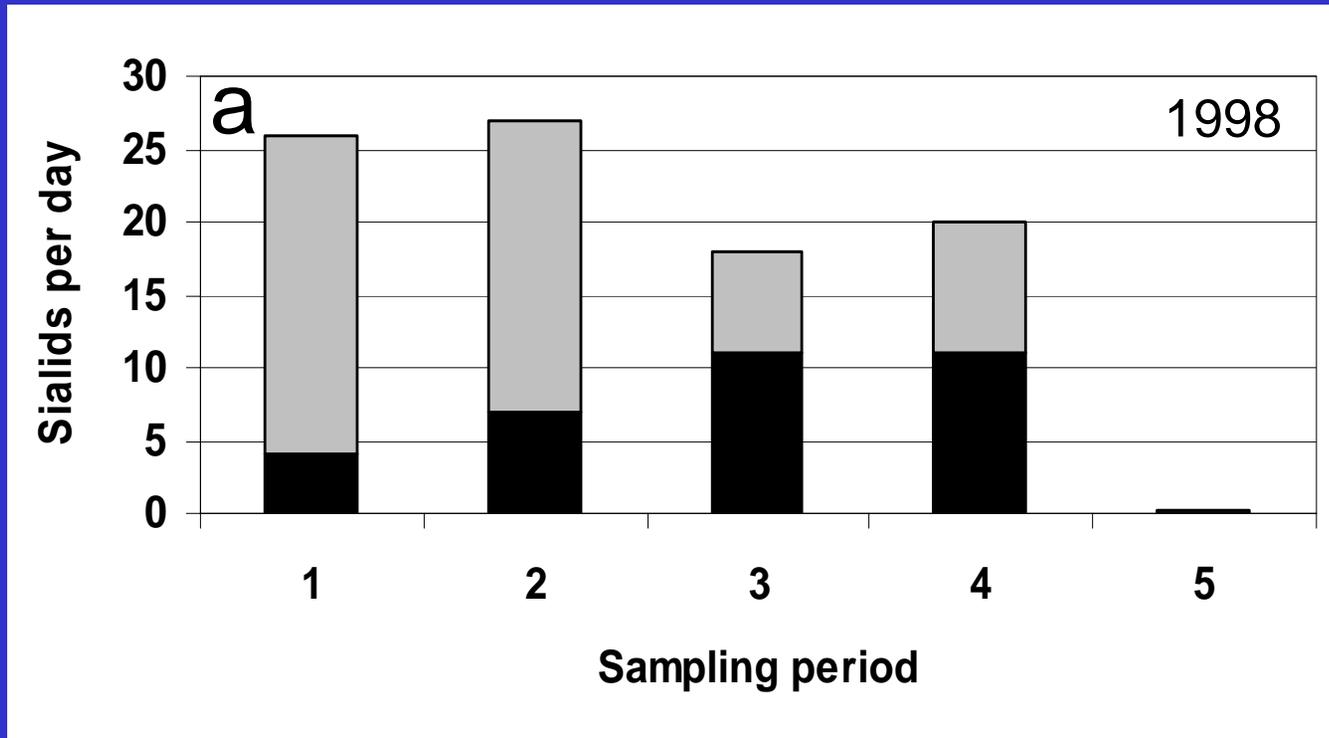
*Merope tuber* (scorpionfly, Mecoptera) is primarily in the low forest.



A male *Merope tuber* from a pitfall trap, September 2001.  
(photo by Dan S. Kjar)

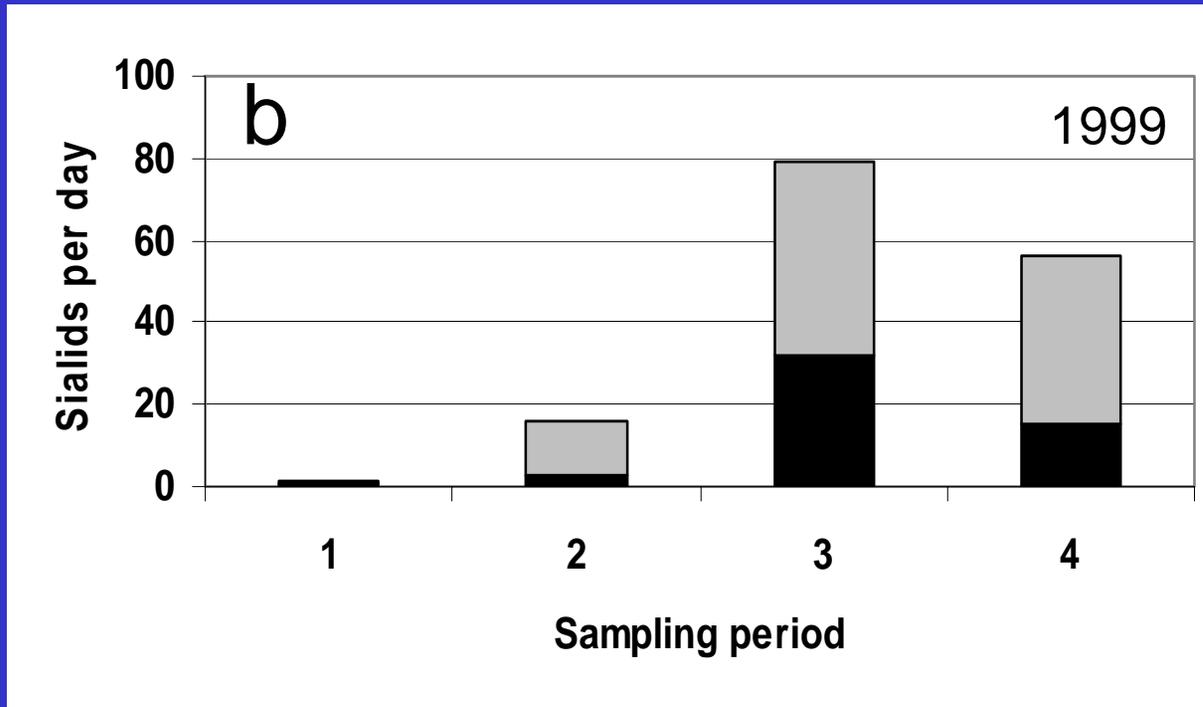
- **What are the species?**
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## *Sialis iola* fly in spring (from April through June).



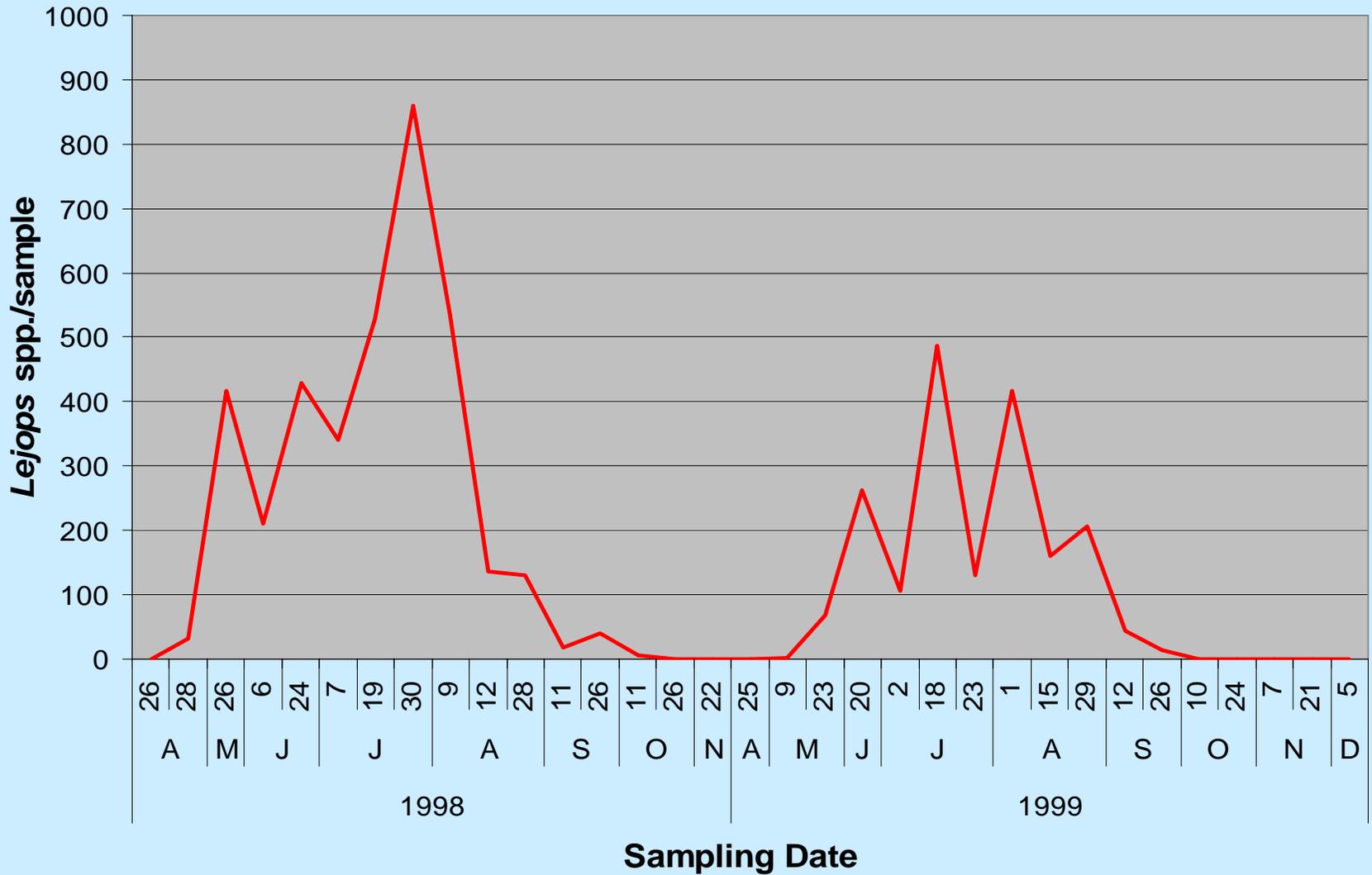
The flight season was from 11 April – 6 June.  
Black part of bar = females; gray part of bar = males.

*Sialis iola* fly in spring  
(from April through June).



**The flight season was from 11 April – 6 June.  
Black part of bar = females; gray part of bar = males.**

***Lejops* spp. (flower flies) have long annual flight periods** (Keith H. Post, 2002).



*Lejops* flower flies are aphid predators, pollinators, and food for other organisms.



Left, *Lejops grisescens*; right *Lejops distinctus*.  
(photos by Spiro Savov)

- **What are the species?**
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- **Sample through visual observations**
- **Sample through trapping**

**Things to consider include:**

- 1. time of day**
- 2. time of year**
- 3. type and model of trap**
- 4. habitat**
- 5. weather**

## GU Arthropod Sampling in DMWP

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**1995–2005. Visual sampling.**

**1998–1999. Malaise-trap sampling.**

**2000–2001. Pitfall-trap sampling in four forest plots.**

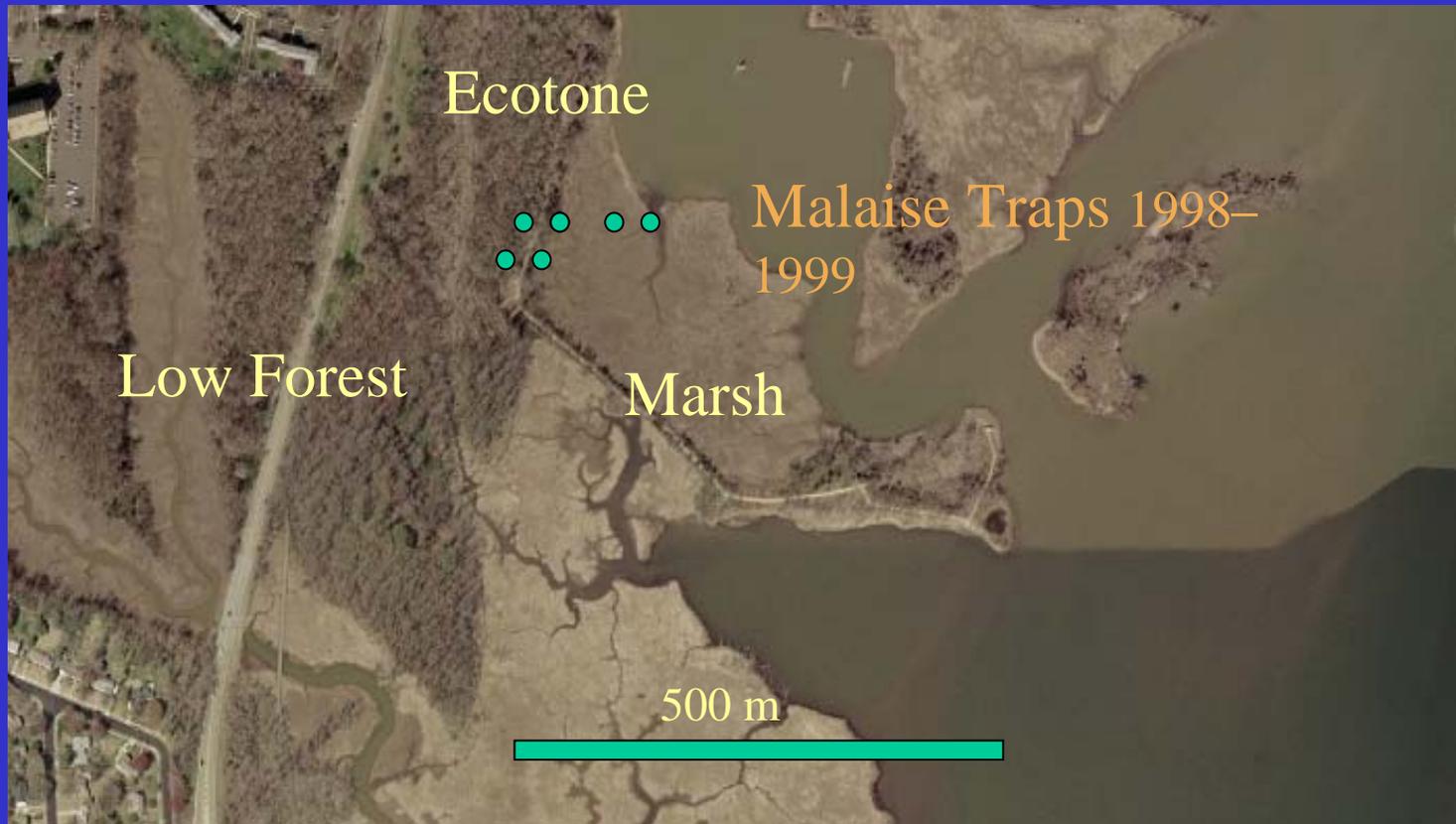
**2002–2003. Pitfall-trap sampling in 60 random forest plots.**

**2003–2004. Light-trap sampling.**

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# Malaise trapping, 1998–1999.

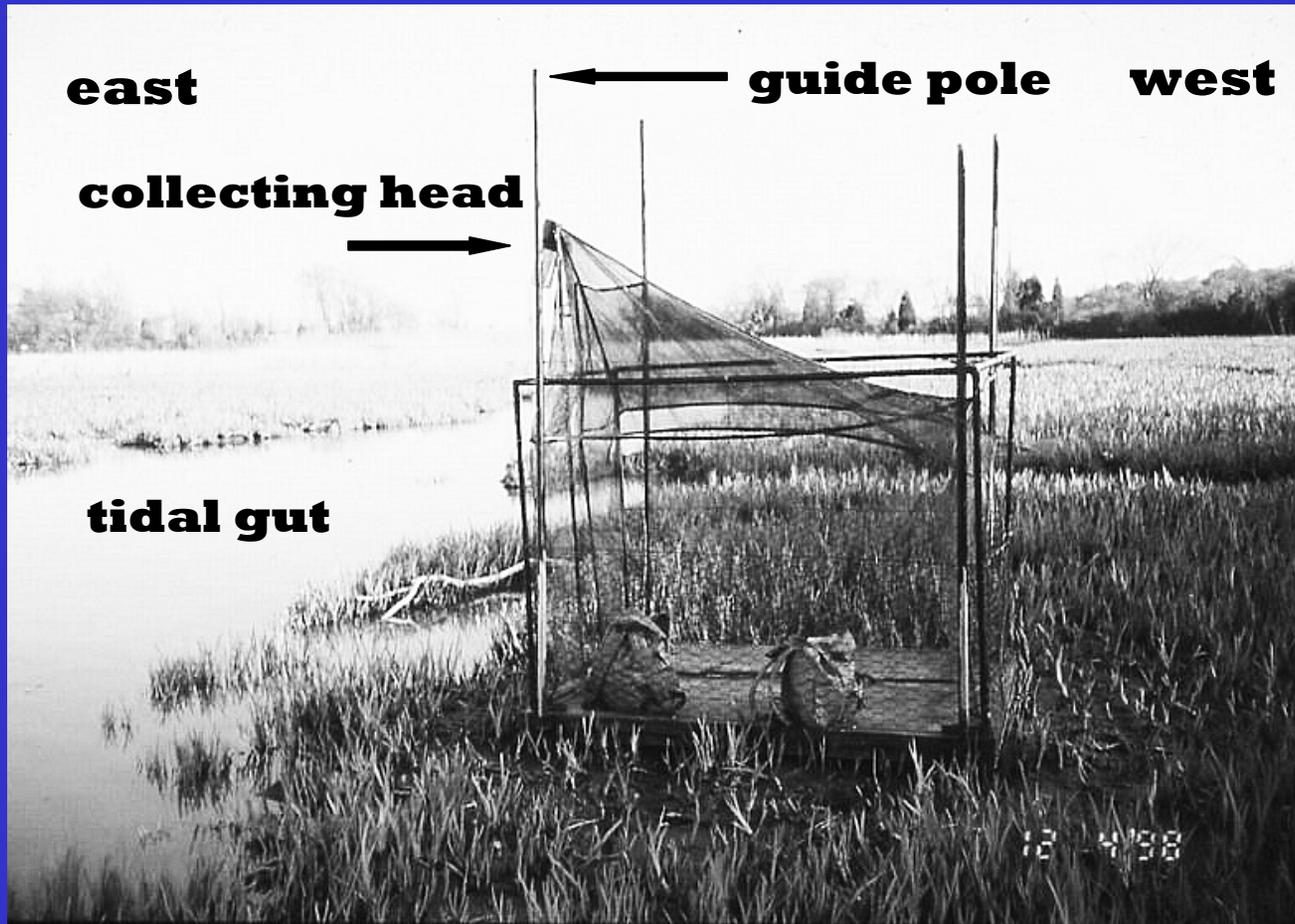
Two traps were in the low forest, two in the marsh,  
and two in the forest-marsh ecotone.



# Floating Townes-style Malaise in the DMWP forest, ecotone, and marsh, 1998 and 1999.



# Malaise trap M1 in the open marsh.



# Pitfall trapping in the DWMP low forest



Dan Kjar and Maya Patel, 2001

**There were 255 species and morphospecies  
of DMWP soil and ground arthropods in  
pitfall-trap sample, 2000–2001.  
(Kjar and Barrows 2004).**



A dipluran (photo by Dan Kjar)

**Arthropod abundance varies with the amount of coverage of alien, invasive plants (Dan Kjar, unpublished).**



**A thick carpet of Porcelainberry in a tree fall area, DMWP, 2000.**

# What are some rare arthropod species in DMWP?

*Copestylum sexmaculata* (flower fly) (Diptera: Syrphidae)  
(Virginia record)

*Phrontosoma belfragei* (sawfly) (Hymenoptera:  
Symphyta: Tenthredinidae: Allantinae) (Virginia record)

*Sialis mohri* (alderfly) (Neuroptera: Sialidae) (Virginia record)

*Sphyracephala brevicornis* (a stalked-eye fly,  
“Short-horned Ankle-headed Fly”) (Diptera: Diopsidae)



*Sphyracephala brevicornis* (a stalked-eye fly,  
“Short-horned Ankle-headed Fly”) (Diptera: Diopsidae)  
(photo by Dan Kjar)

# What are some alien-arthropod species in DMWP?

*Diapylaeus laetatorius* (ichneumon wasps\*) (Hymenoptera: Ichneumonidae)

*Exomala orientalis* (= *Anomala orientalis* Water) (Oriental Beetle) (Coleoptera: Scarabaeidae), uncommon

*Forficula auricularia* (European Earwig) (Dermaptera: Forficulidae), uncommon

*Harmonia axyridis* (Variegated Asian Lady Beetle) (Coleoptera: Coccinellidae), abundant

*Ophiulus pilosus* (Newport) (millipede) (Julida: Julidae)

*Oxidus gracilis* (Greenhouse Millipede) (Diplopoda: Polydesmida: Paradoxosomatidae)

*Pieris rapae* (Linnaeus) (Cabbage White, European Cabbage Butterfly, Imported Cabbage Butterfly) (Lepidoptera: Pieridae), common

*Popillia japonica* (Japanese Beetle) (Coleoptera: Scarabaeidae), uncommon

*Tachycines asynamorus* Adelung, 1902 (Camel Cricket, Greenhouse Stone Cricket) (Orthoptera: Raphidophoridae), common

*Vespa crabro* (European Hornet) (Hymenoptera: Vespidae), uncommon

*Vollenhovia emeryi* (a Japanese Ant) (Hymenoptera: Formicidae), uncommon?



*Forficula auricularia* (European Earwig) (Dermaptera: Forficulidae), common? (photo by Dan Kjar)



*Ophiulus pilosus* (Newport) (millipede) (Julida: Julidae)  
(photo by Dan Kjar)



*Pieris rapae* (Linnaeus) (Cabbage White, Dancing White, European Cabbage Butterfly, Imported Cabbage Butterfly)  
(Lepidoptera: Pieridae), common



*Tachycines asynamorus* Adelung, 1902 (Camel Cricket,  
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common (Photo by Dan Kjar)



*Vollenhovia emeryi* (a Japanese ant)  
(Hymenoptera: Formicidae), uncommon?  
(photos by Hirotami T. Imai and Masao Kubota)

**What are some new arthropod species  
in DMWP?**

# Diapriid wasps, several species from DMWP (Hymenoptera: Diapriidae)



*Trichopria* sp.



*Trichopria* sp.



diapriid wasp



*Belyta* “*dykemarshiensis?*”



diapriid wasp

**What studies of DMPW arthropods  
remain to be done at Georgetown University?**

**Front-burner studies**

**Middle-burner studies**

**Back-burner studies**

# **Front-burner studies**

**Ants (Dan Kjar)**

**Noctuid moths (Cathy McCall)**

**Selected Ichneumon Wasps (Anne Bobel)**

**Selected soil Mites (Bao Chung)**



**DMWP has at least  
92 species of  
large noctuid moths  
(Erebidae, Noctuidae)  
in 16 subfamilies.  
(Cathy E. B. McCall, unpublished)**





**Ann Bobel's 2006 study: *Diplazon laetitorius*  
(Flower Fly Parasite) (Ichneumonidae),  
possibly an alien, invasive species.  
(photo from the Bishop Museum, Hawaii)**



**Bao Chung's DMWP soil mites (Acari),  
2006 project.**

## **Middle-burner studies**

**Bees (Edd Barrows)**

**Fireflies (Shawna Arsenault)**

**Flower flies (Keith Post)**

**Odonates (damselflies, dragonflies) (Alex Taft)**

# Odonates found in Malaise traps, DMWP, VA, 1998–1999 (photos are by Giff Beaton.)

*Enallagma durum* (Odonata:  
Coenagrionidae), top down:  
male, female



*Ischnura posita* (Odonata:  
Coenagrionidae), top down:  
male, female, female



*Ischnura ramburii* (Odonata:  
Coenagrionidae), top down:  
male, female, female,  
female, pair



*Ischnura verticalis*  
(Odonata:  
Coenagrionidae), top down:  
male, female, female



*Enallagma signatum* (Odonata:  
Coenagrionidae), top down:  
male, female



# Odonates found in Malaise traps, DMWP, VA, 1998–1999

(The photos are by Giff Beaton, unless indicated otherwise.)

*Anax junius*, Green Darner  
(Odonata: Aesnidae), male  
(photo by Forrest Mitchell)



*Libellula lydia*, Common  
Whitetail (Odonata: Libellulidae),  
male



*Pachydiplax longipennis*, Blue  
Dasher (Odonata: Libellulidae),  
bottom down: male, female



*Perithemis tenax*, Eastern  
Amberwing (Odonata:  
Libellulidae), top down: male,  
female



*Arigomphus villosipes*, Unicorn  
Clubtail (Odonata: Gomphidae),  
male



*Libellula needhami*, Needham's  
Skimmer (Odonata: Libellulidae),  
male



## Back-burner studies: 100s of taxa including

**Acari (Mites)**

**Araneae (Spiders)**

**Blattaria (Cockroaches)**

**Coleoptera (Beetles)**

**Collembola (Springtails)**

**Dermaptera (Earwigs)**

**Diplura (Diplurans)**

**Diptera (many kinds of Flies)**

**Ephemeroptera (Mayflies)**

**Hemiptera (Stinkbugs and kin)**

**Homoptera (Aphids and kin)**

**Hymenoptera (Sawflies and other kinds of wasps)**

**Isopoda (Isopod Crustaceans)**

**Isoptera (Termites)**

**Lepidoptera (many kinds of Moths)**

**Mantodea (Mantids)**

**Mecoptera (Scorpionflies)**

**Microcoryphia (Bristletails)**

**Neuroptera (Lacewings and kin)**

**Opiliones (Daddylonglegs)**

**Orthoptera (Grasshoppers and kin)**

**Plecoptera (Stoneflies)**

**Protura (Proturans)**

**Pseudoscorpiones (Pseudoscorpions)**

**Psocoptera (Bark Lice)**

**Thysanoptera (Thrips)**

**Thysanura (Silverfish)**

**Trichoptera (Caddisflies)**

# **Acknowledgements**

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**Martha Weiss, John Sauer, Phil Sze**







**Thanks!**

**Questions?**



