

# Diptera or the two-winged Beauties

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photo: A. Outen  
*Neria cibaria*



photo: S. Falk  
*Laphria marginata*

# What are Flies (Diptera)?

- very diverse group of insects
- superbly adapted for flight
- in all habitats except the open ocean
- deliver many ecosystem services
- many beneficial – few bad
- pretty



# What are Flies (Diptera)?



- 2 wings + haltere
- head
- 3-segmented thorax
- multi-segmented abdomen
- as all insects – 3 pairs of legs (adults)
- tiny to large
- thick to thin



# How do they fly?

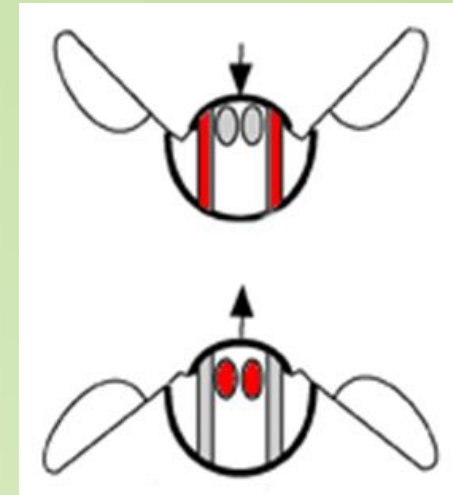
## Flight muscles



**Upstroke**

**Downstroke**

**Steering**



# Species-rich and very diverse



*Antrichus erinaceus*

163,943 species worldwide  
7088 species in Britain  
1522 species recorded from Bedfordshire

c. 160 families worldwide  
107 in Britain  
84 recorded from Bedfordshire



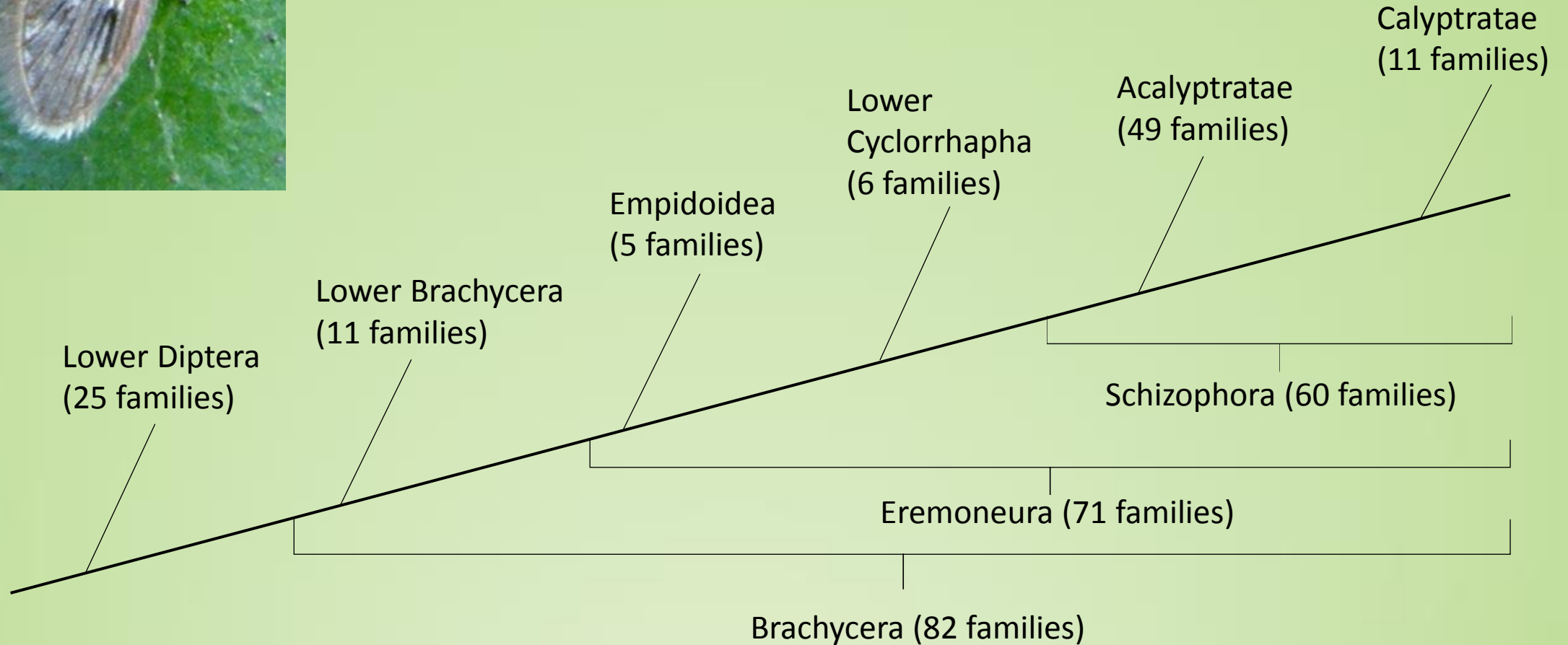
photo: S. Falk  
*Ochthera mantis*

# Relationships within Diptera

In Britain:

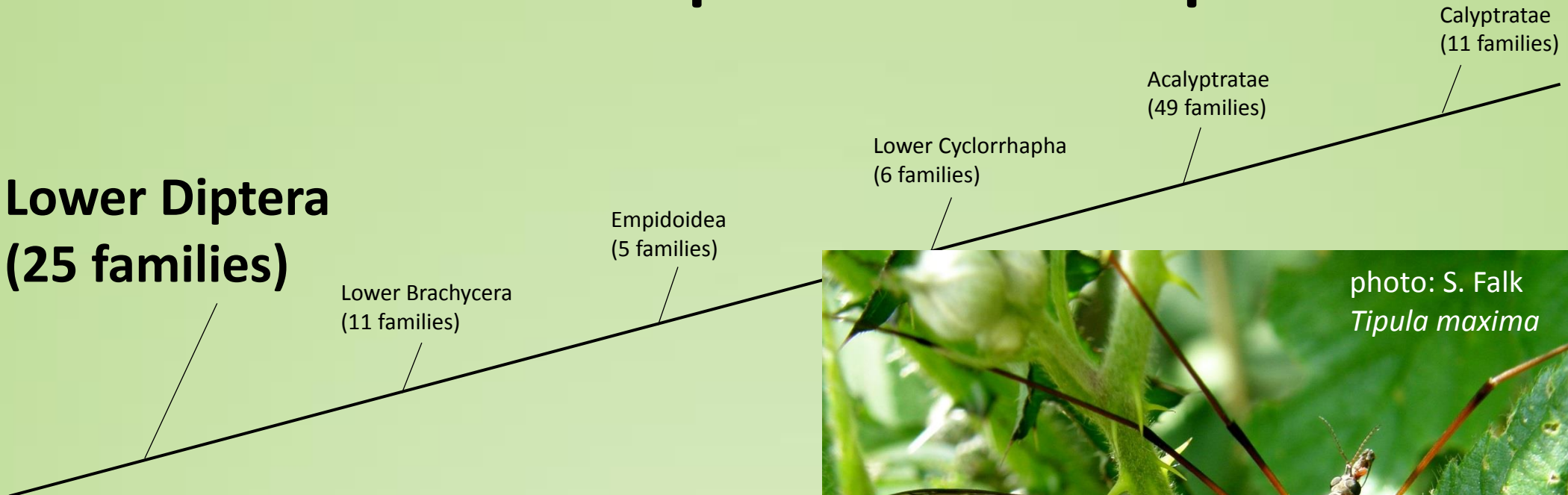


photo: S. Falk  
*Pericoma sp.*



# Relationships within Diptera

## Lower Diptera (25 families)



### Craneflies

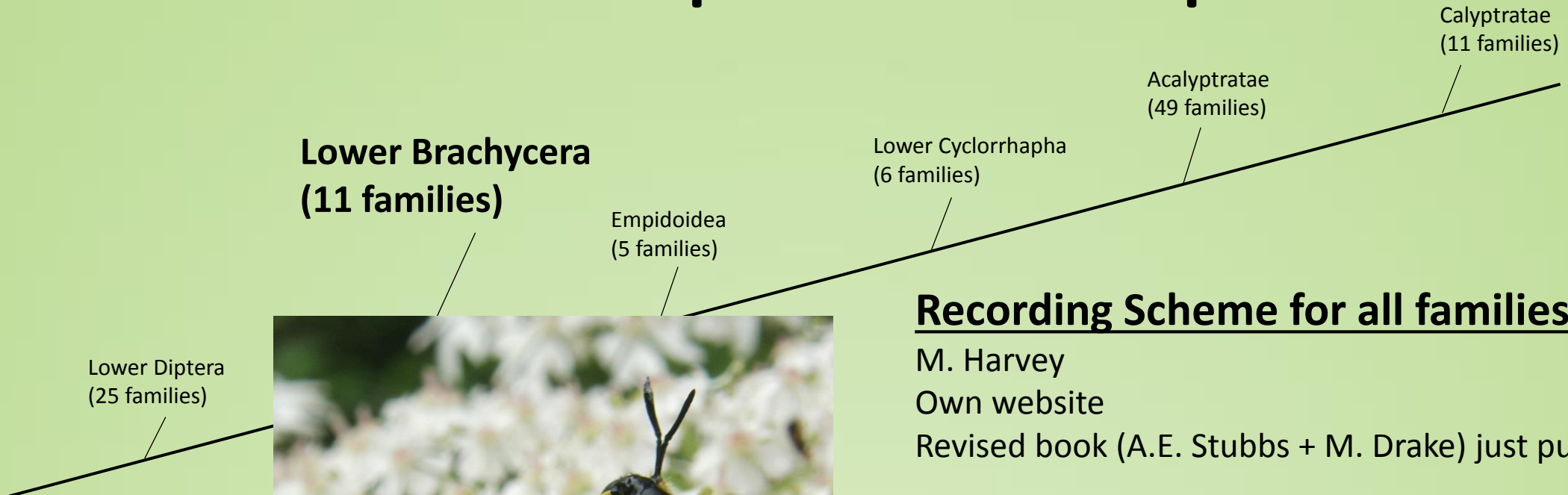
Tipulidae and closely related families  
long legs + complete venation  
Main habitats (wet woodland + wetlands)

Recording Scheme – A.E. Stubbs + J. Kramer  
Test key + book in preparation



photo: S. Falk  
*Tipula maxima*

# Relationships within Diptera



**Lower Brachycera  
(11 families)**

Empidoidea  
(5 families)

Lower Cyclorrhapha  
(6 families)

Acalyptratae  
(49 families)

Calyptratae  
(11 families)

Lower Diptera  
(25 families)



photo: S. Falk  
*Stratiomys potamida*

## Recording Scheme for all families

M. Harvey

Own website

Revised book (A.E. Stubbs + M. Drake) just published

## Soldierflies (Stratiomyidae)

small central cell (discal cell) in wing

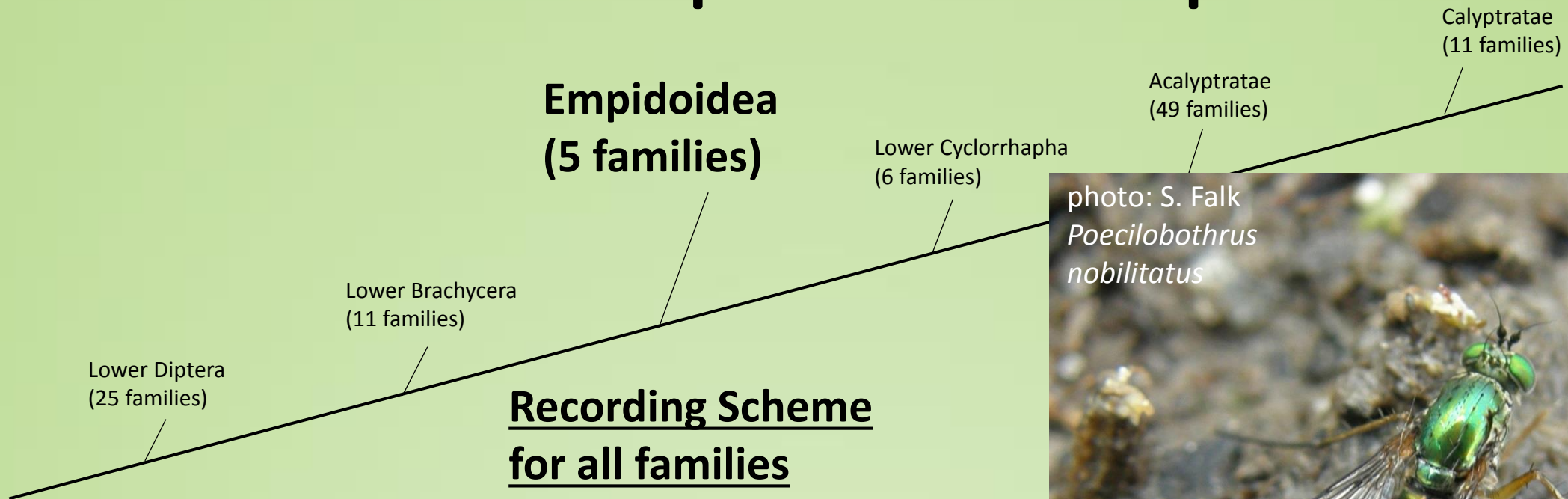
Main habitat (wetlands)

Good for assessing importance of wetlands

Include many species under threat



# Relationships within Diptera



## Recording Scheme for all families

M. Drake + A. Plant

Several books and test keys available

## Doli Flies (Dolichopodidae)

reduced wing venation + distinct genitalia

Main habitat (wetlands)

Good for assessing importance of wetlands

Include many species under threat

photo: S. Falk  
*Poecilobothrus*  
*nobilitatus*



# Relationships within Diptera

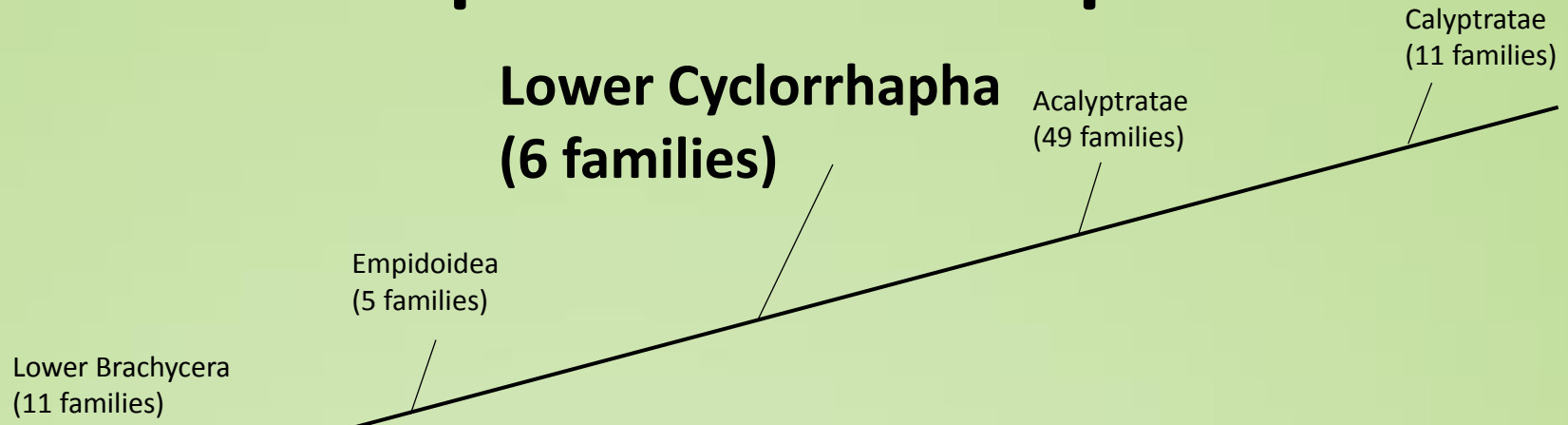


photo: S. Falk  
*Volucella zonaria*

## Hoverflies (Syrphidae)

Vena spuria

Major pollinators

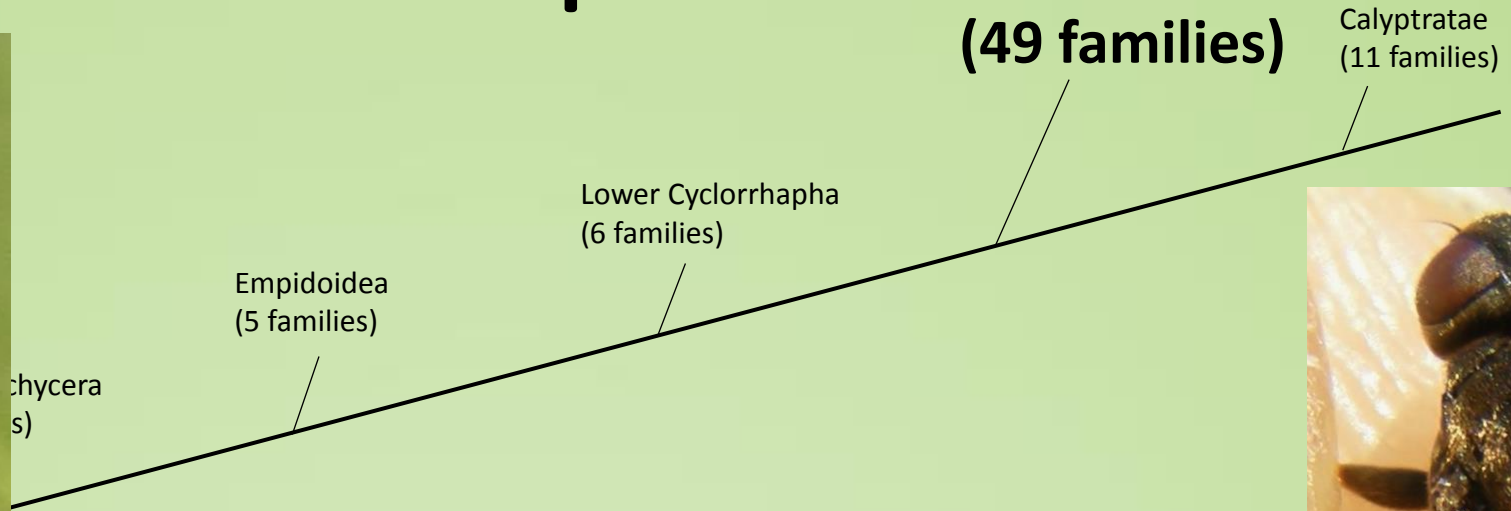
All habitats – often on flowers

Recording Scheme – S. Ball + R. Morris

Own website

Several books with good keys

# Relationships within Diptera



## Several Recording Schemes and study groups

This includes Picture-winged flies (D. Clements)  
Several books and test keys available

### Grassflies (Chloropidae)

- Kink in vein
- Main habitats (grassland + wetlands)
- Good for assessing importance of grassland and wetlands
- Include many species under threat + pest species
- Study group
- Book available



photo: S. Falk  
*Lipara lucens*

# Relationships within Diptera

Calypttratae  
(11 families)

Acalypttratae  
(49 families)

Lower Cyclorrhapha  
(6 families)

mpidoidea  
(families)

## Blowflies (Calliphoridae)

Bristle arrangement

Main habitat (parasites or in dead bodies)

Used in forensic work

Clean wounds

Includes pest species (clusterflies)

Book available

## Several Recording Schemes and 1 study group

This includes Tachinidae (Ch.  
Raper + M. Smith)

Several books and test keys  
available



photo: S. Falk  
*Lucilia caesar*



*Scathophaga stercoraria*

# What use are they?

## Ecosystem Services I

(=services provided by nature that benefit humans):

**decomposition** (compost, dead bodies, dead wood, dung, leaves etc.)

**pollination** (crops and wild plants including:

- Cacao
- Mango
- pepper
- Lords and Ladies (*Arum maculatum*)
- Taro
- rosaceous plants (bramble, raspberries), pears, apples....)



photo: S. Falk  
*Bombylius major*

# What use are they?

## Ecosystem Services II

**control of pests** (e.g. large and small white butterflies, snails, aphids and scale insects)



photo: S. Falk  
*Phasia hemiptera*

**food** - for humans (Kungu-cake in Africa – phantom midge larvae (Chaoboridae) and for animals (birds, e.g. Blue Tits, fish) and plants (sundew)



photo: S. Falk  
*Dilophus febrilis*

# What use are they?

## Ecosystem Services III

medical use (wound cleaning)

forensics



photo: S. Falk  
*Lucilia* female



photo: S. Falk  
*Calliphora vomitoria*

# What use are they?

## Ecosystem Services IV

recreation (dipterology)



photo: S. Falk  
*Thyridanthrax fenestratus*

**As part of Environmental Impact Assessments or assessments of SSSIs**



# Pest species

Unfortunately, a small proportion are also pest species or / and transmit diseases



photo: S. Falk  
*Fannia canicularis*



photo: A. Outen  
*Philophylla caesia*,  
Tephritidae



photo: S. Falk  
Mosquito

# Where can I find them?

found in all habitats, except marine, non-coastal ones

found on all continents



*Mormotomyia hirsuta* =  
Hairy Hobgoblin Fly



photo: S. Falk  
*Lipara* gall

# Woodlands



- in dying wood
- in rotholes
- on sap runs
- on fungi
- on flowers, e.g. along rides
- or on shrubs
- on leaves
- on tree trunks



**Best: mosaic of open and shaded areas**



photo: A. Outen  
*Dynatosoma fuscicorne*

# Woodlands

## Major fly groups

- Hoverflies (Syrphidae)
- Cranefly families
- Larger Brachycera
- Fungus gnats (Mycetophilidae s.l.)
- Dance flies (Empididae + Hybotidae)
- Parasitic flies (Tachinidae)
- Some Acalyptrata



## **Damp woodland**

- including  
Dolichopodidae

## **Parkland**

- including grassland  
groups

# Grasslands



- short turf
- long sward with / without flowers
- dense grasses with tussocks
- light scrub



# Grasslands

## Major fly groups

- Hoverflies (Syrphidae)
- Larger Brachycera
- Dance flies (Empididae + Hybotidae)
- Picture-wing flies (Tephritidae + Opomyzidae)
- Chloropidae
- Other Acalyptrata
- Parasitic flies (Tachinidae)



photo: A. Outen  
*Urophora cardui*



photo: A. Outen  
*Urophora cardui* gall

# Wetlands

- vegetation in water
- ditches (open to overgrown)
- tussocks
- open vegetation
- bare mud
- patches of scrub
- reed



# Wetlands

## Major fly groups

- Hoverflies (Syrphidae)
- Larger Brachycera
  - especially Stratiomyidae
- Craneflies
- Dance flies (Empididae + Hybotidae)
- Dolichopodidae
- Certain Acalyptrata
  - especially Sciomyzidae, Ephydriidae, Chloropidae

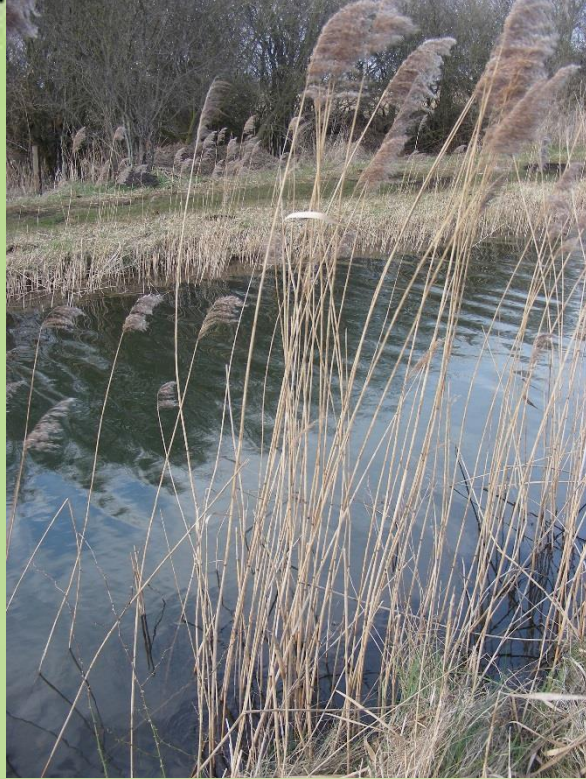


photo: S. Falk  
*Rhapsium crassipes*



*Sericomyia silentis*



# Disturbed ground including brownfield (=ex industrial) sites

- bare ground
- early successional stages  
(= cleared areas with young re-growth)
- short turf
- long sward with / without flowers
- dense grasses with tussocks
- light scrub
- ruderal areas, i.e. weeds
- water margins



# Disturbed ground including brownfield (=ex industrial) sites

- Larger Brachycera
- Syrphidae
- Empidoidea
- Tachinidae
- Chloropidae
- Tephritidae
- other Acalyptrata



photo: S. Falk  
*Dorycera graminum*



photo: A. Outen  
*Thaumatomyia glabra*

# Where can I learn more?

- Dipterists Forum



- webpage – includes Forums, wiki, checklist
- Facebook
- Recording Schemes – run by experienced dipterists
- courses – at various venues, beginners and advanced
- books, including the Dipterists Handbook and BENHS publications



photo: A. Outen  
*Rainieria calceata*

# Recording Schemes and Study Groups

- Sciomyzidae – Snail-killing Flies
- Conopidae and picture-wing Flies
- Tachinidae – Parasitic Flies
- Chironomidae – non-biting Midges
- Culicidae – Mosquitoes
- Craneflies
- Chloropidae - Grassflies
- Pipunculidae – Bigheaded Flies
- Anthomyiidae
- Syrphidae – Hoverflies
- Soldierflies and Allies
- Tephritidae – Fruitflies
- Stilt and Stalk Flies
- Mycetophilidae and Allies
- Empididae and Dolichopodidae
- Oestridae – Botflies
- Sepsidae
- Dixidae and Thaumaleidae

# Behaviour

- Cheating + nuptial gifts



photo: S. Gregg  
*Hilara* species

- Kissing
- nuptial gifts



photos: A. Outen  
*Sepsis* species

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