

Butterflies

An introduction



Marco Bonifacino

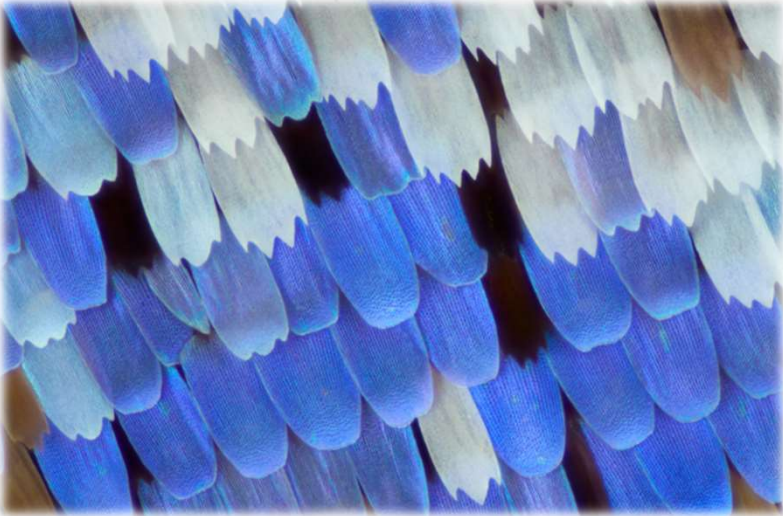


UNIVERSITÀ
DEGLI STUDI
FIRENZE

BIO
DIPARTIMENTO DI
BIOLOGIA

Lepidoptera

Scales (*lepis* = scale; *pteron* = wing)



Holometabolous
cycle

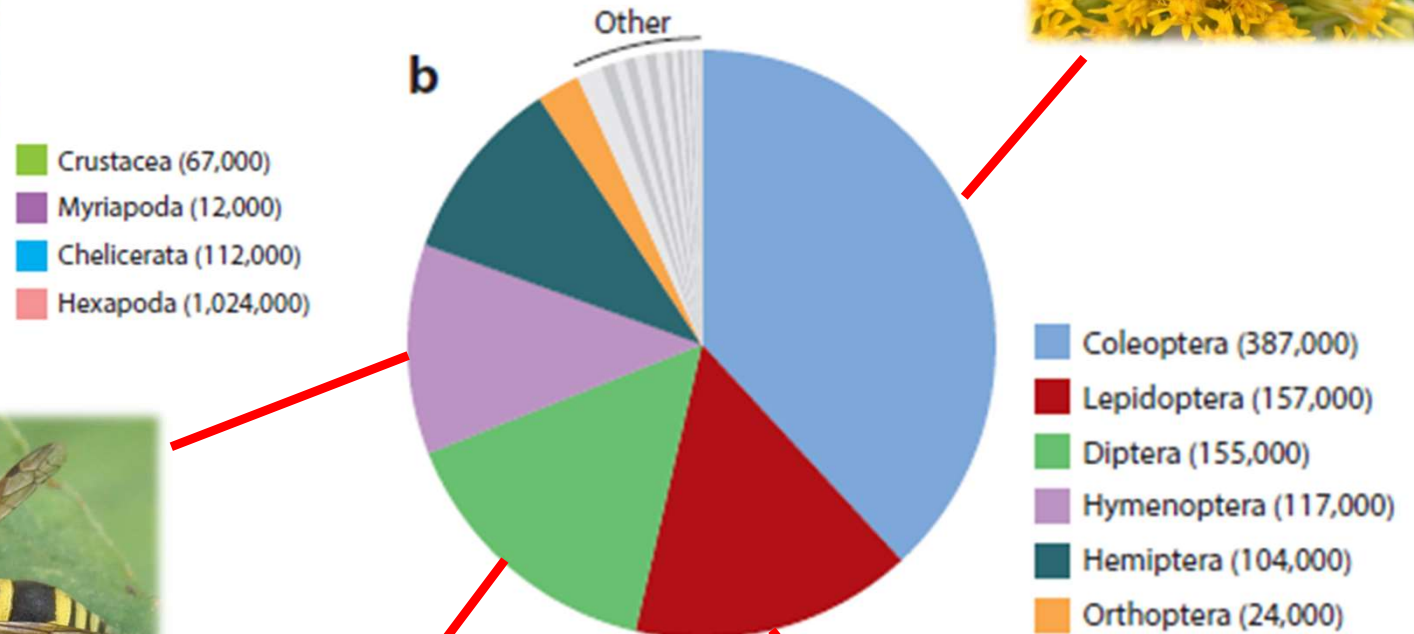
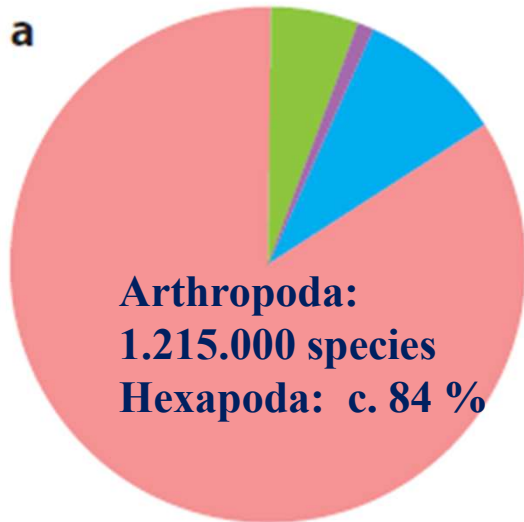


Proboscis



Number of species

Stork, 2018. How Many Species of Insects and Other Terrestrial Arthropods Are There on Earth? *Ann. Rev. Ent.* 63:31-35



Taxonomy

Animal biodiversity:

An outline of higher-level classification and survey of taxonomic richness

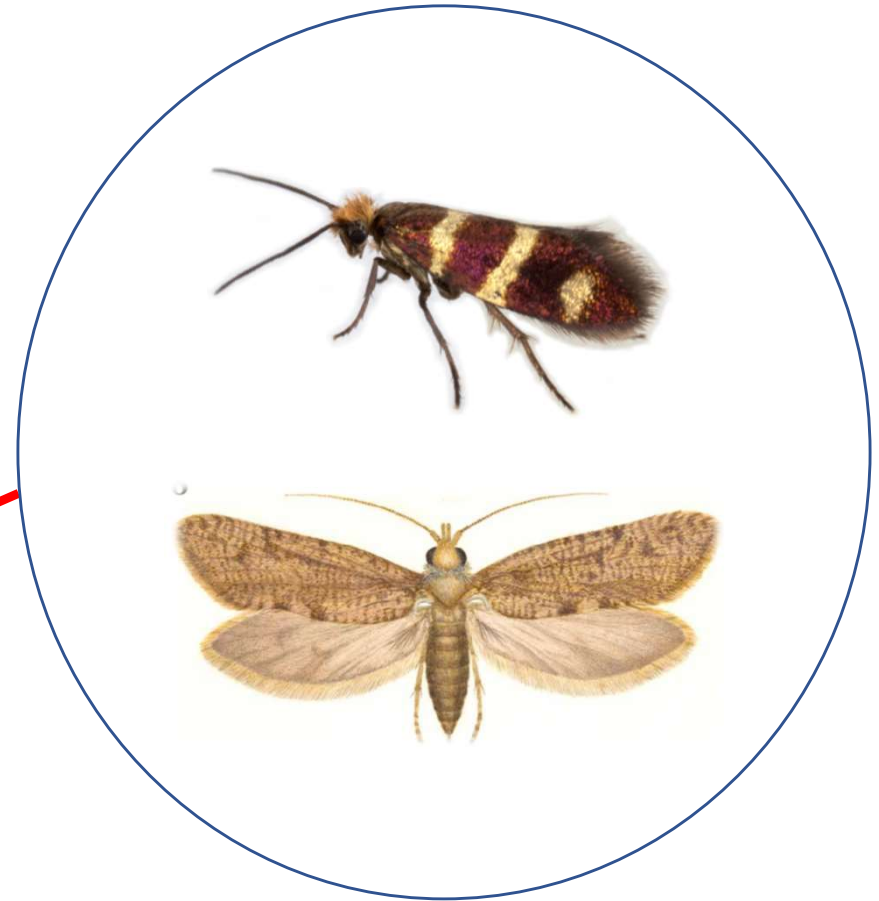
ZHI-QIANG ZHANG (ED.)

New Zealand Arthropod Collection, Landcare Research, Private Bag 92170, Auckland, New Zealand;
zhangz@landcareresearch.co.nz

Order Lepidoptera: 157.424 species

Suborders:

1. **Zeugloptera** (1 family, 160 species)
2. **Aglossata** (1 family, 2 species)
3. **Heterobathmiina** (1 family, 3 species)
4. **Glossata** (157.359 species)



Proboscis
Non functional mandibles
Mostly heteroneurans



Micropteryx



Saturnia pyri



Heterogynis



♂



pyrgus.de

♀



♂

leps.it

Lycia



♀

Butterflies & moths

Lepidoptera: 157.424 species (Zhang et al. 2011)

«**Heterocera**» (moths):
138.656 species



Papilionoidea
(butterflies): 18.768 species

Superfamily Papilionoidea Latreille, 1802 (7 families) ⁵⁶

Family Papilionidae Latreille, 1802 (32 genera, 570 species, 3/4) ⁵⁷

Family Hedyliidae Guenée, 1858 (1 genus, 36 species)

Family Hesperiiidae Latreille, 1809 (570 genera, 4,113 species, 2/2)

Family Pieridae Swainson, 1820 (91 genera, 1,164 species, 5/6)

Family Riodinidae Grote, 1895 (1827) (146 genera, 1,532 species, 3/4)

Family Lycaenidae Leach, 1815 (416 genera, 5,201 species, 1/1)

Family Nymphalidae Rafinesque, 1815 (559 genera, 6,152 species, 11/21)



Diurnal activity

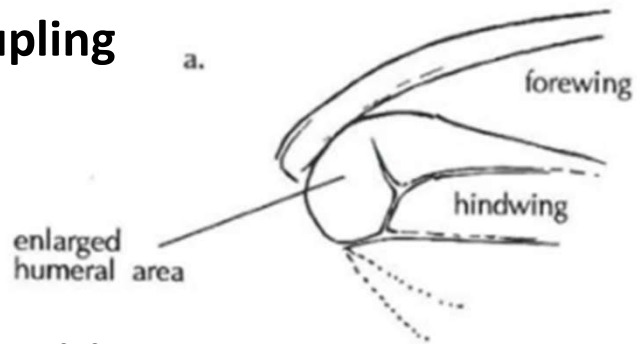


BUTTERFLIES

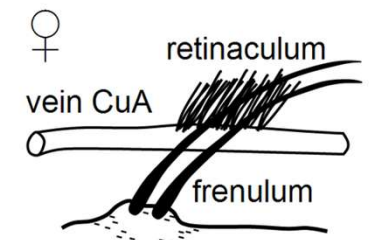
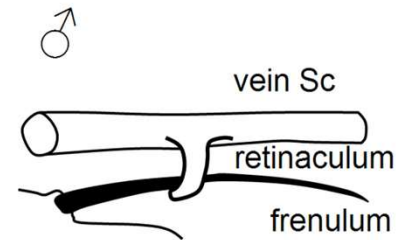
MOTHS

Clubbed antennae

Wing coupling



Resting position



Eggs

Melanargia russiae



Pieris brassicae



leps.it



Phengaris alcon rebeli

Larval morphology



3 leg pairs

5 proleg pairs

scoli

Nymphalidae



Charaxes jasius

Apatura iris



Plebejus argus



Hesperiidae - *Pyrgus malvoides*



Pieridae - *Pontia edusa*



Lycaenidae -
Callophrys rubi



Nymphalidae
Satyrinae -
Hyponephele lycaon



Nymphalidae -
Euphydryas cynthia



Melitaea phoebe



Melitaea cinxia



Melitaea didyma





Colias alfacariensis



pyrgus.de

Colias hyale



Melitaea phoebe



Melitaea ornata



leps.it



Zerynthia cassandra



Zerynthia polyxena



leps.it

Gregarious larvae



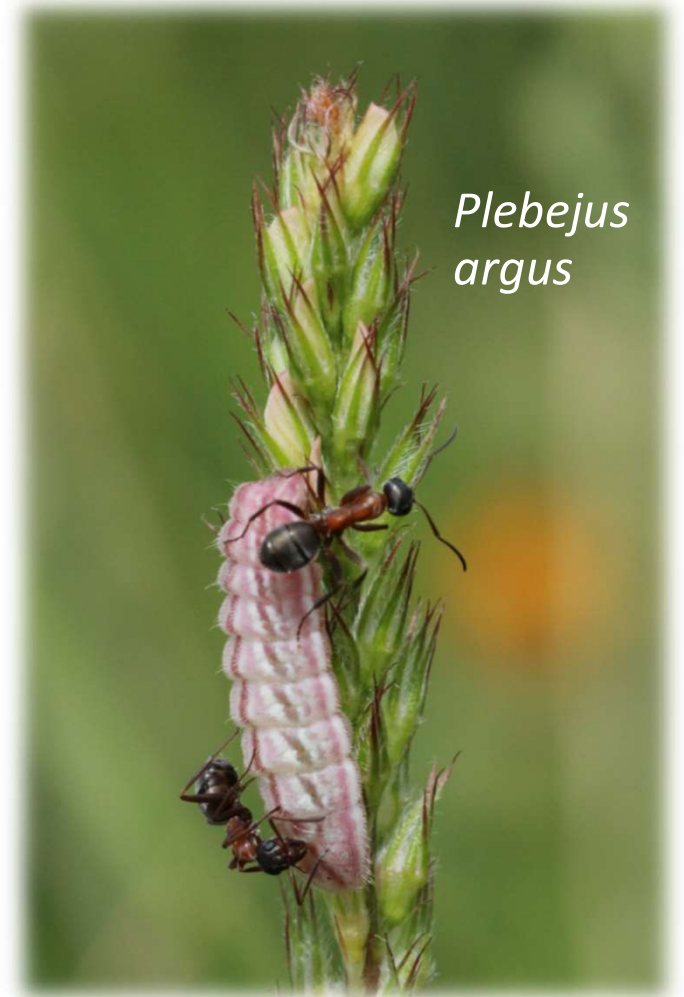
Pieris brassicae



Sheltered larvae

*Carcharodus
alcea*

Myrmecophilous larvae



*Plebejus
argus*

Nocturnal larvae



Maniola jurtina

Larval diet

European butterfly larval foodplants
(Clarke 2022):

- **50% oligophagous species**

Euchloe crameri

→ 27 Brassicaceae species



- 30% poliphagous species



Ilex aquifolium



Hedera helix

Celastrina argiolus → 60 plant species, 19 families

- 20% monophagous species



Iolana iolas
→ *Colutea arborescens*



Euphydryas maturna



Phengaris arion



pyrgus.de



<https://www.researchgate.net>

Pupae

Suspended pupa



Vanessa cardui



Melitaea trivia

Girdled pupa

Cocoon



*Parnassius
mnemosyne*



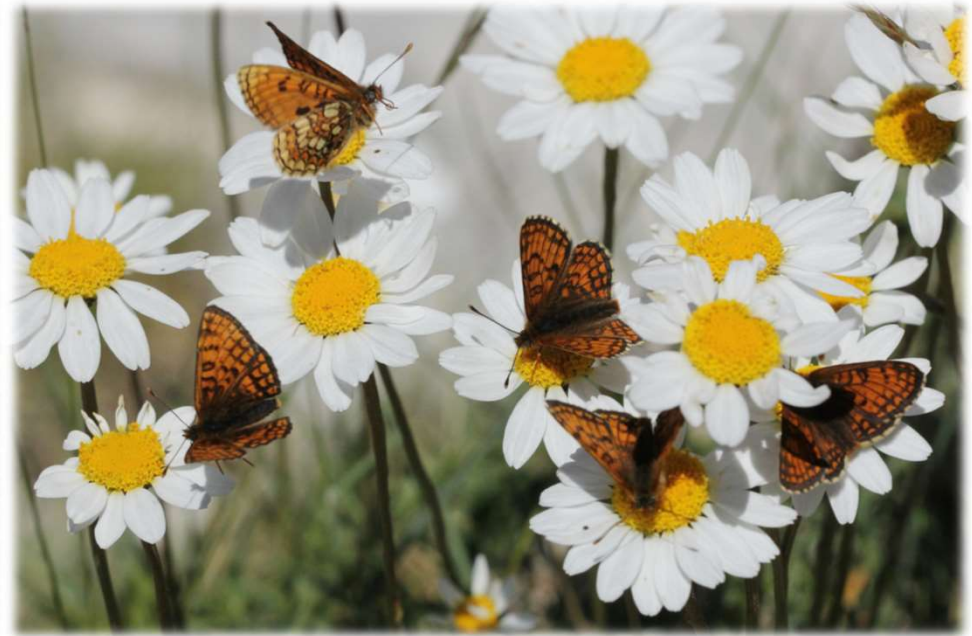
*Aporia
crataegi*

Adult diet

Thymelicus lineola



Satyrium ilicis



Melitaea varia

Aporia crataegi on *Carduus*



Papilio machaon on *Scabiosa*



Argynnis paphia
on *Eupatorium*
cannabinum



Lycaena alciphron on *Sambucus ebulus*



Chazara briseis on *Eryngium amethystinum*



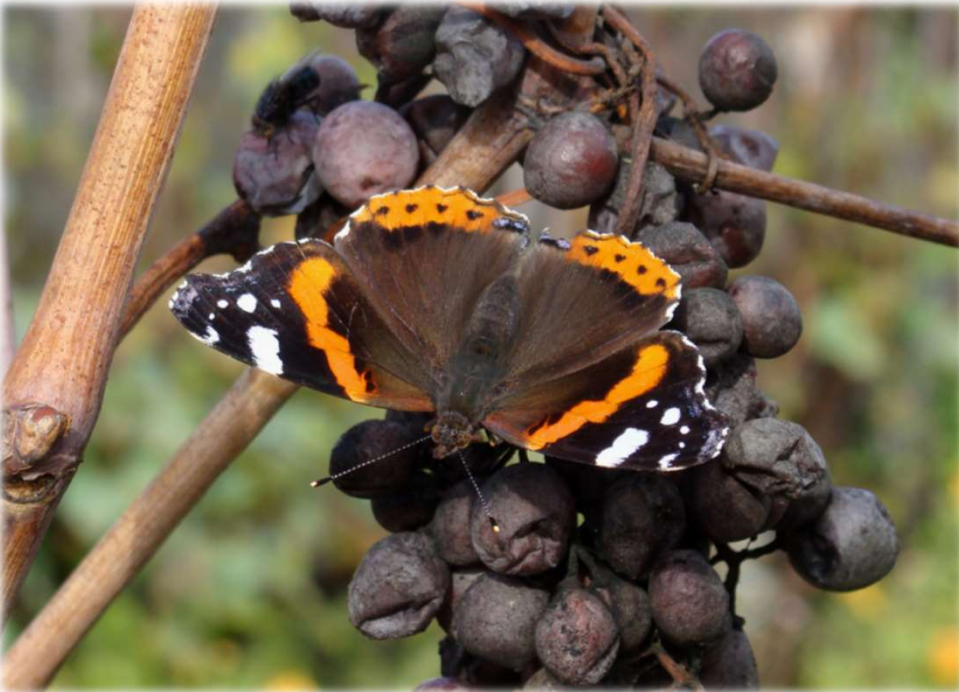
Apatura ilia



Hipparchia statilinus



Vanessa atalanta



Puddling



Heteropterus morpheus



Pieris rapae & *Pieris napi*

Apatura iris



Polygonia c-album



Cyaniris semiargus & *Lysandra bellargus*



Limenitis reducta

Territorial behaviour



Pararge aegeria



Charaxes jasius



Papilio machaon hill topping



Gegenes nostradamus

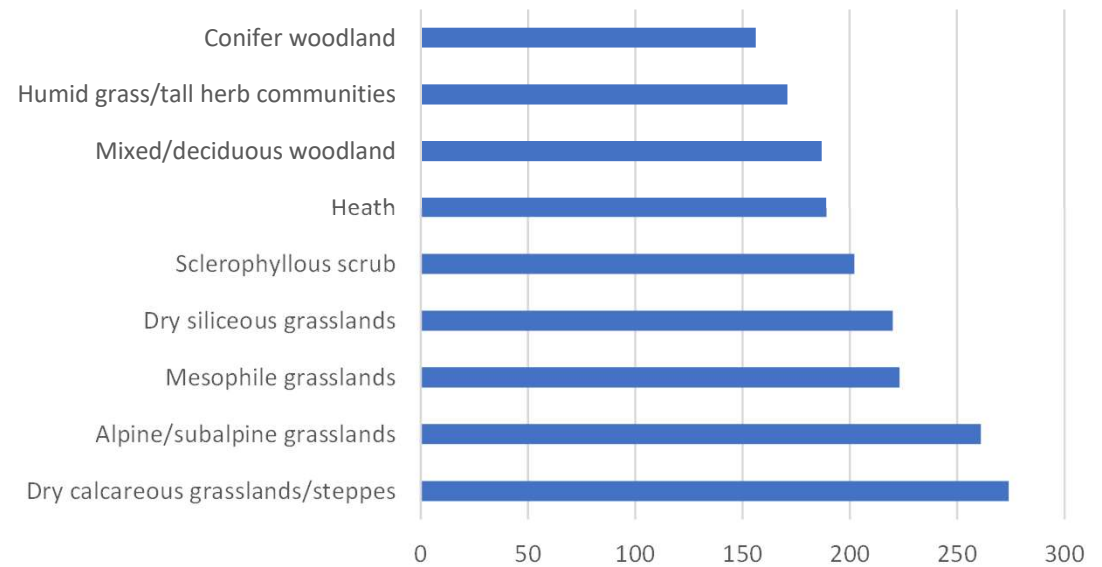


Anthocharis euphenoides

Butterfly habitats

- Dry calcareous grasslands and steppes support 63% of butterfly species in Europe (van Swaay et al. 2006)

Number of species per habitat type



Erebia pandrose



Parnassius phoebus



Euphydryas cynthia



Lycaena helle



Shrublands and woods



Callophrys avis



Pararge aegeria



Satyrium ilicis



Favonius quercus



Apatura iris



Charaxes jasius

Cultivated and urbanized areas



Cacyreus marshalli



Pieris brassicae



Aglais io



Erebia gorge



pluto



epiphron



cassioides



ligea



mnestra



albergana



Colias hyale



Maniola jurtina



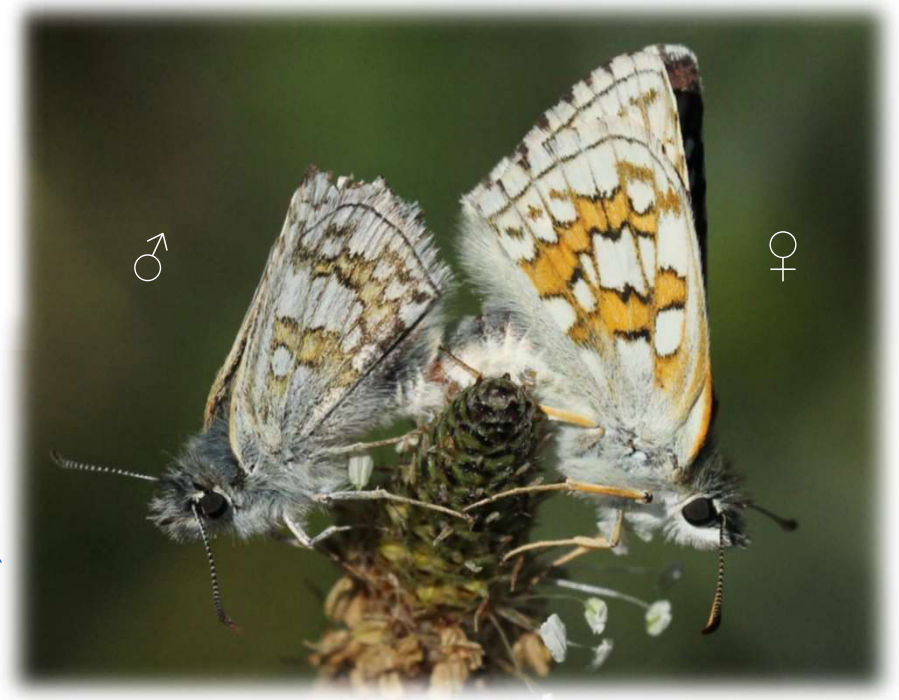
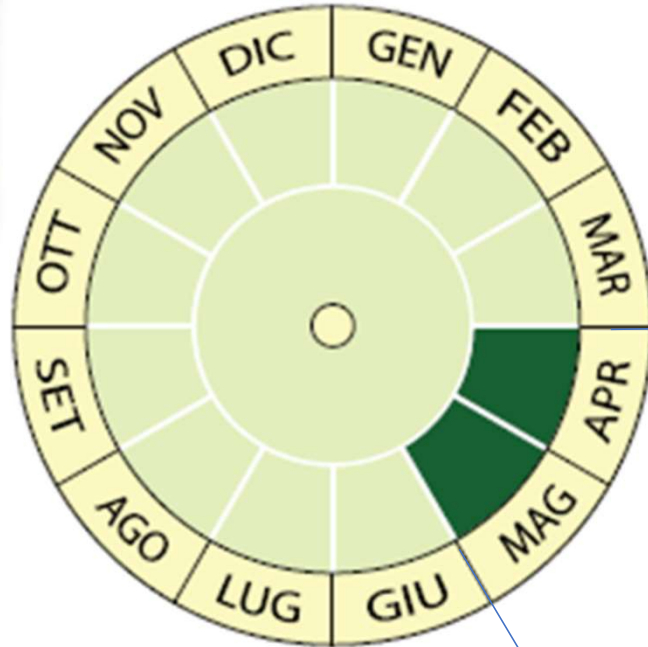
Colias alfacariensis



Hyponephele lycaon

Phenology

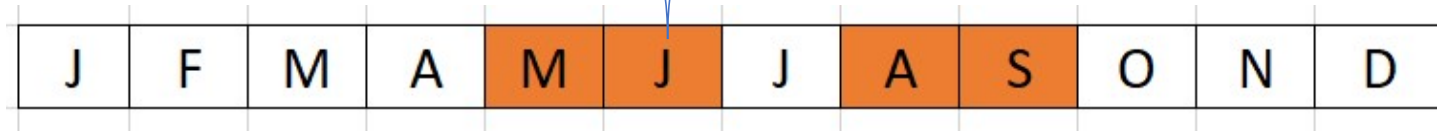
Pyrgus sidae



- Univoltine species: 1 generation/year
- Flight period -> species, latitude, altitude

- Polivoltine species: 2+ generations/year

Charaxes jasius



- Biennial species:
1 generation/2
years



Oeneis glacialis



Pyrgus andromedae

Adult wintering

Gonepteryx (Pieridae)

Libythea celtis (Nymphalidae)

Aglais, *Nymphalis*, *Polygonia*,
Vanessa (Nymphalidae)

Gonepteryx rhamni



*Nymphalis
polychloros*

Pyrgus alveus: univoltine
(VI-VIII)



Pyrgus armoricanus: bi-
trivoltine (IV-IX)



Lysandra coridon: univoltine (VII-IX)



Lysandra hispana: bivoltine (V-VI, VIII-IX)

