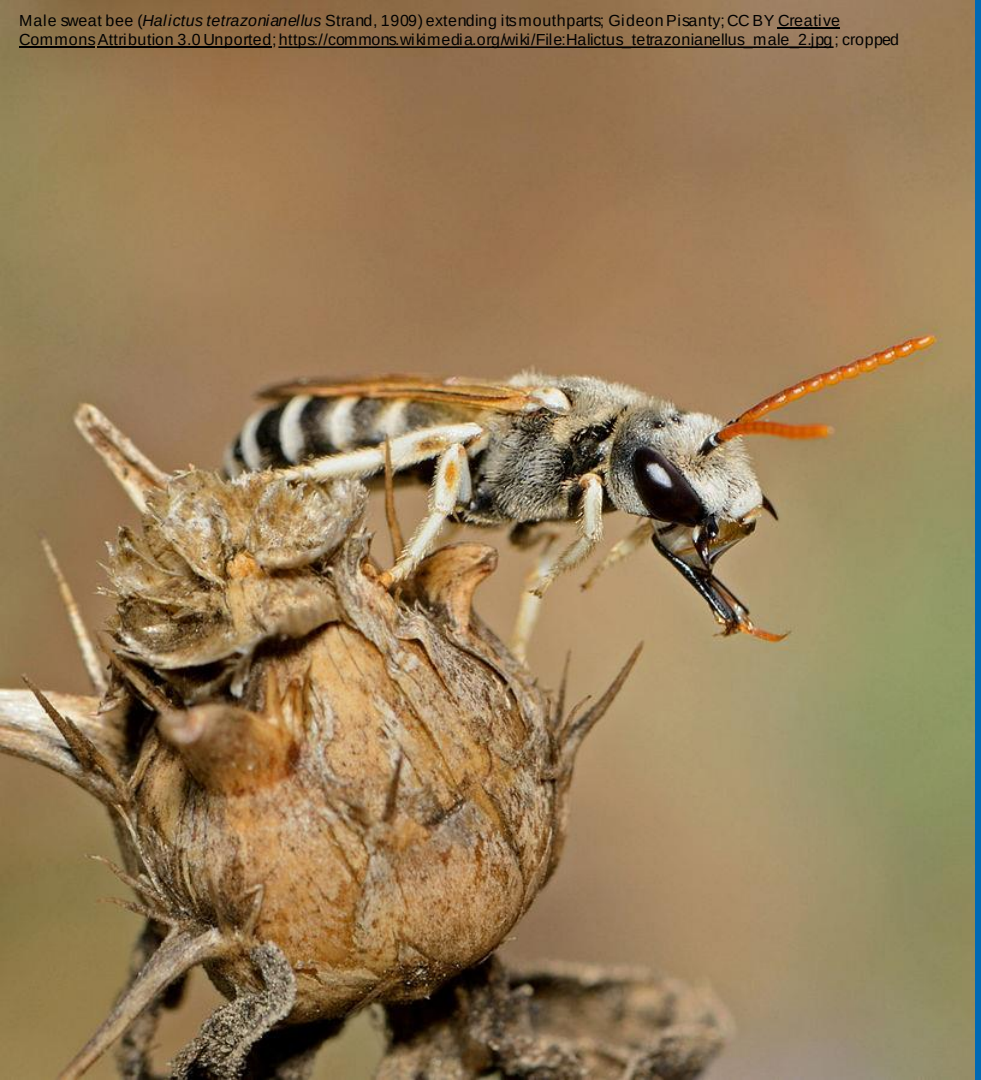


Male sweat bee (*Halictus tetrazonianellus* Strand, 1909) extending its mouthparts; Gideon Pisanty; CC BY Creative Commons Attribution 3.0 Unported; https://commons.wikimedia.org/wiki/File:Halictus_tetrazonianellus_male_2.jpg; cropped

All about them Bees

A short presentation on wild-bee diversity, ecology and how to use nesting aids (insect hotels) appropriately

Language: english (with some expressions in german)

Author: Ilja Svetnik (2024)

AUSTRIA: ~ 55.000 Species

> 40.000 species of Insects

~ 350 species of Birds

~ 90 species of Fish

~ 80 species of Mammals

> 10.000 species of Hymenoptera

~ 700 species of Bees


Lepidoptera


Diptera


Hymenoptera


Dermaptera


Orthoptera


Odonata


Auchenorrhyncha


Aphidoidea


Neuroptera


Mecoptera


Coleoptera

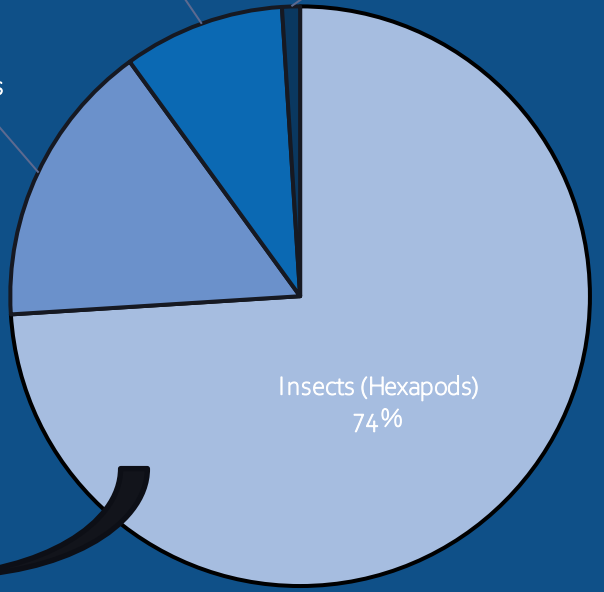

Hemiptera

NATIVE ANIMALS


other Arthropods (Spiders, Scorpions, Centipedes) 9%


Vertebrates (Fish, Reptiles, Birds, Mammals) 1%


other Invertebrates (Snails & Slugs) 16%



HYMENOPRTERA

Hexapods with 2 pairs of translucent wings

Lifecycle: Egg – Larva – Pupa – (Imago) – Adult

Reproduction & lifestyle vastly different!

Sawflies (Pflanzenwespen) ⟷ Apocrits (Taillenwespen)

No waist

Waist

Parasitica (Legeimmen)

Sting is ovipositor

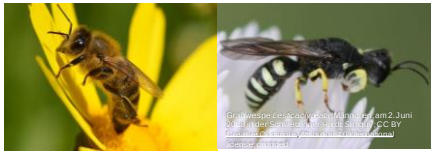
Aculeata (Stechimmen)

Sting is for protection

Jewel-Wasps (Goldwespenartige)

Paper-Wasps & Ants (Faltenwespenartige)

Bees & Sphecoid-Wasps (Bienen & Grabwespen)



Bees

Pollinators who exclusively consume pollen & nectar

Mason Bees (Mauerbienen)

Mining Bees (Sandbienen)

Carpenter Bees (Holzbienen)

Masked Bees (Maskenbienen)

Digger Bees (Pelzbienen)

Leafcutter Bees (Scherenbienen)

Bumblebees (Hummeln)

Honeybees (Honigbienen)

The Honeybee

One of only two **domesticated** insects in the world

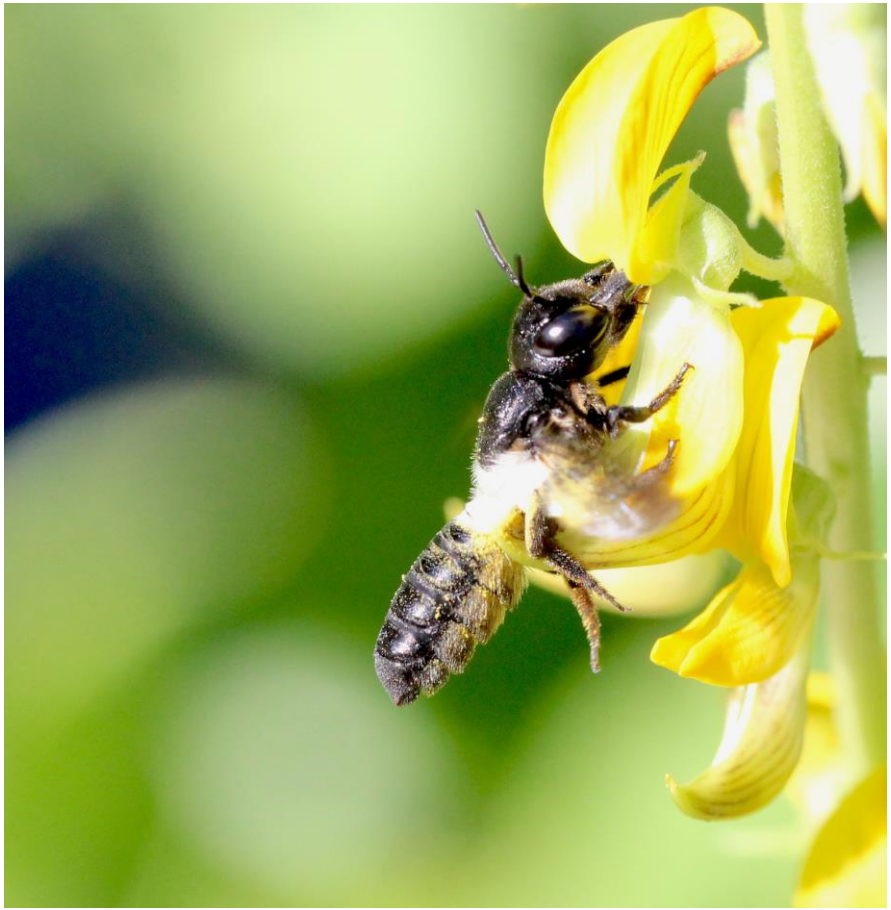
9 species globally (7 SE-Asian, 1 N-African, 1 global)

Apis mellifera (Western Honeybee)

Highly social – colonies of 70.000 individuals and more
Only the queen reproduces, other females are sterile

Life expectancy: ~ 3 months (queen up to 6 years, males < 2 months) → Colony spends winter together.

Larvae feed on **honey**
Feed on basically every plant (generalists)



The
Wild Bees

Many specialists – therefore often highly vulnerable

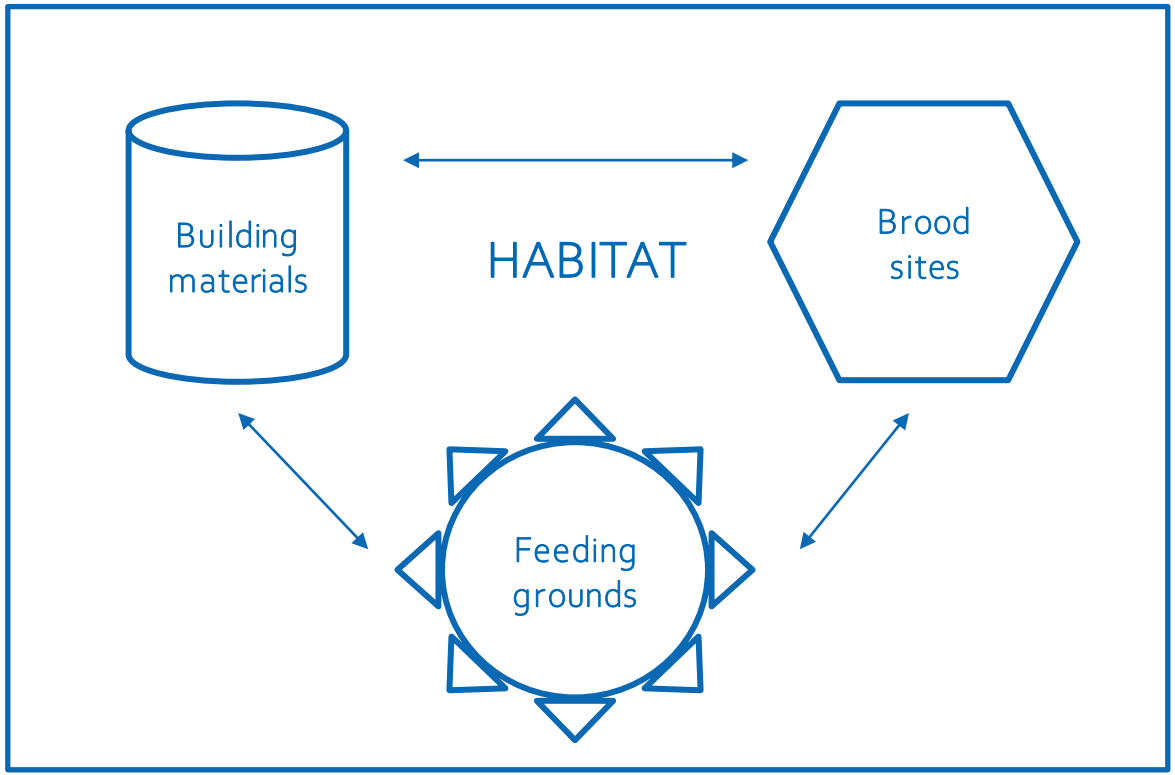
Live **mostly solitary** → Bumblebees in small colonies of 50 – 500 individuals (queen reproduces, makes ***honey***)

Extremely efficient pollinators, many **cuckoo species**!

Life expectancy (3-5 weeks as an adult, ~ 1 year)
Bumblebee queen up to 4 years

Larvae & pupa spend winter in brood-cells, adults in the ground or in wood. Bumblebees die in autumn, only the fertile queen survives.

What do Bees need?



1. Feeding grounds

Wild bees are specialist. Some species only feed on 1-5 different plants!

Diverse meadows disappear with a rapid pace and are not easily restored!

Male red mason bee (Osmia bicornis), Sandy, Bedfordshire; Orangeaurochs, CC BY Creative Commons Attribution 2.0 Generic license; https://commons.wikimedia.org/wiki/File:Male_red_mason_bee_(Osmia_bicornis),_Sandy,_Bedfordshire_(16949550820).jpg; cropped

Mason Bee - Osmia species, Meadowwood Farm SRMA, Mason Neck, Virginia; Judy Gallagher, CC BY Creative Commons Attribution 2.0 Generic license; https://commons.wikimedia.org/wiki/File:Mason_Bee_-_Osmia_species,_Meadowwood_Farm_SRMA,_Mason_Neck,_Virginia.jpg; cropped

Single shot of the female busy at a tube of a Bee Hotel in my garden near Christchurch Park; Martin Cooper; CC BY Creative Commons Attribution 2.0 Generic license; https://commons.wikimedia.org/wiki/File:Female_Blue_Mason_Bee_-_Osmia_(Chalcosmia)_caerulescens_(23878649971).jpg; cropped

2. Building materials

Plant material, resins, sand grains and earth are required, to close the brood cells.

Sealed with a piece of leaf, Gail Hampshire; CC BY Creative Commons Attribution 2.0 Generic license; https://commons.wikimedia.org/wiki/File:Mason_Bee_(_possibly_a_Megachile_)_(34879174094).jpg; cropped

Dead plants, sandbanks & natural clay walls disappear with spreading urbanization and land use!

Opened nest of a red mason bee (*Osmia rufa*); tpjunier; CC BY Creative Commons Attribution 2.0 Generic license; https://commons.wikimedia.org/wiki/File:Osmia_rufa_nest.jpg, cropped

Eggs and pollen stored within a stalk. One egg after another and compartmented. Hatched bees dig out

Mason Bee Females Laying and Storing Eggs; Tim Sheeman-Chase; CC BY Creative Commons Attribution 2.0 Generic license; https://commons.wikimedia.org/wiki/File:Mason_Bee_Females_Laying_and_Storing_Eggs.jpg; cropped

Osmia bicornis
(Red mason bee)

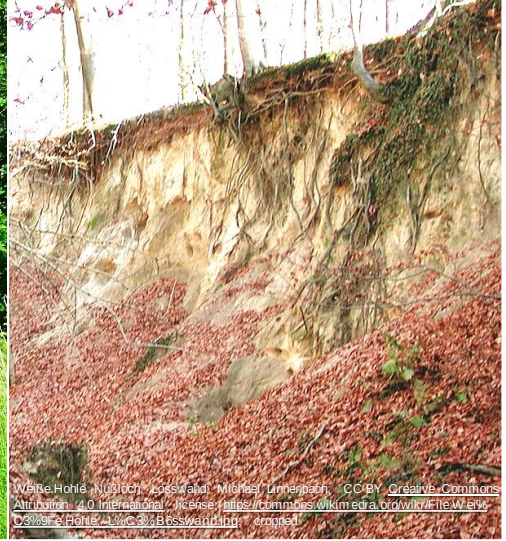
Red mason bee (Osmia bicornis) nest cells in a bee hotel, Sandy, Bedfordshire; Orangeaurochs; CC BY Creative Commons Attribution 2.0 Generic license; https://commons.wikimedia.org/wiki/File:Red_mason_bee_(Osmia_bicornis)_nest_cells_in_a_bee_hotel,_Sandy,_Bedfordshire_(11370317793).jpg; cropped

Can be very specific!

The poppy mason bee uses exclusively poppy leafs to build its brood cells!

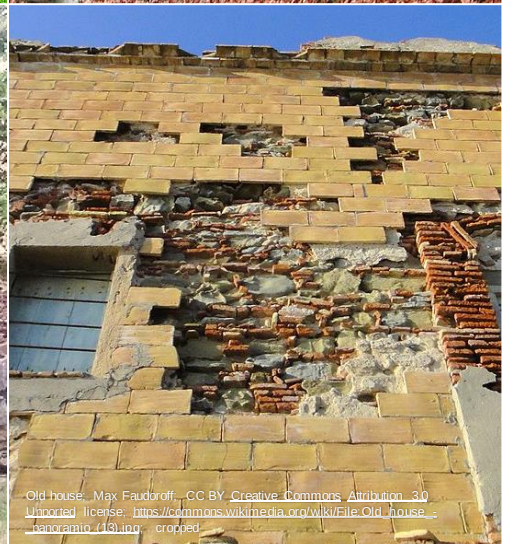
Hoplitis papaveris
(Poppy mason bee)

Once a proud tree, Stiller Beobachter, CC BY Creative Commons Attribution 2.0 Generic license, https://commons.wikimedia.org/wiki/File:Once_a_proud_tree_-_Flickr_-_Stiller_Beobachter.jpg, cropped



WeiBe Hohle Nußbach Kirschtal Michael Linnenbach, CC BY Creative Commons Attribution 4.0 International license, https://commons.wikimedia.org/wiki/File:Weiße_Höhle_-_Kirschtal_-_Michael_Linnenbach_-_Bösswardt.jpg, cropped

Trockenmauer, Granpa, CC BY Creative Commons Attribution 3.0 Unported license, https://commons.wikimedia.org/wiki/File:Trockenmauer_Schmitshöhe.jpg, cropped



Old house, Max Faudoroff, CC BY Creative Commons Attribution 3.0 Unported license, https://commons.wikimedia.org/wiki/File:Old_house_-_panoramio_(13).jpg, cropped

3. Brood sites

Structures to lay eggs, form brood cells and spend the winter in while protected from freezing temperatures and predation.

- Dead wood & plants
- Bare and loose ground
- Sand and clay walls
- Stone piles and murals
- Holey walls

Most of these structures are now deemed “undesired” and “ugly” in modern, “tended” urban areas.

Take a look around!


Tawny mining Bee's Nest, Gile, Hampshire, CC BY Creative Commons Attribution 2.0 Generic license; https://commons.wikimedia.org/wiki/File:Tawny_mining_Bee's_Nest_-_Flickr_-_gailhampshire.jpg; cropped


Cradley, Malvern, Worcs SO7347, Gail Hampshire; CC BY Creative Commons Attribution 2.0 Generic license; https://commons.wikimedia.org/wiki/File:Bombus_terrestris_Queen_(52708092521).jpg; cropped

Bombus terrestris
(large ground bumblebee)


SZ037853 Studland Bay, Dorset, U.K. Gail Hampshire; CC BY Creative Commons Attribution 2.0 Generic license; https://commons.wikimedia.org/wiki/File:Andrena_argentata_-_Small_Sandpit_Mining_Bee_(37455912285).jpg; cropped


Mining Bee - Andrena species, Meadowood SRMA, Mason Neck, Virginia; Judy Gallagher; CC BY Creative Commons Attribution 2.0 Generic license; https://commons.wikimedia.org/wiki/File:Mining_Bee_-_Andrena_species_Meadowood_SRMA_Mason_Neck_Virginia_March_11_2022_(52234627983).jpg; cropped

Andrena sp.
(Mason bee)

Many Structures = Biodiversity Hotspots!

Crossocerus sp.
(square-headed wasp)

Cradley, Malvern Worcs, SO7347; Gail Hampshire; CC BY Creative Commons Attribution 2.0 Generic license, https://commons.wikimedia.org/wiki/File:Crabronidae,_Crossocerus_species,_-_Flickr_-_gailhampshire.jpg; cropped

Crysis bicolor
(Emerald wasp)

Cradley, Malvern, Worcs, SO729470; Gail Hampshire; CC BY Creative Commons Attribution 2.0 Generic license, https://commons.wikimedia.org/wiki/File:Chrysura_radians_(Gurkon_or_Jewel)_Wasp_(35206832410).jpg;

Lucanus cervus
(Stag beetle)

Lesparres, France; CC BY Creative Commons Attribution 2.0 Generic license, https://commons.wikimedia.org/wiki/File:Lucanus_cervus_(33249236356).jpg

Xylocopa violacea
(Blue carpenter bee)

Tree trunk in a vacant lot east of the big church. I like the contrast with the tree that's still alive behind it; Accretion Disk; CC BY Creative Commons Attribution 2.0 Generic license, cropped

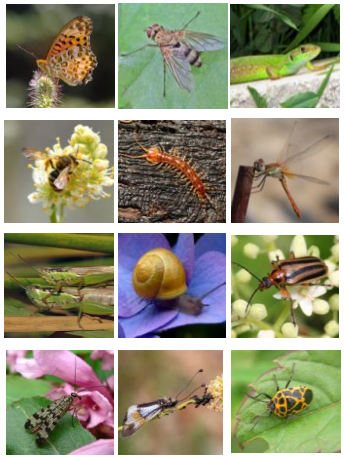
BIG vs small scale

Less structure - less everything

20180520_0132; Fake Shemp; CC BY Creative Commons Attribution 2.0 Generic license; https://commons.wikimedia.org/wiki/File:Meadow_(28514673288).jpg

North Common Meadow, Petersham Massachusetts; John Phelan; CC BY Creative Commons Attribution 3.0 Unported license; https://commons.wikimedia.org/wiki/File:North_Common_Meadow,_Petersham_MA.jpg; cropped

The importance of classic, extensive agriculture: **It keeps and promotes strucutre, thereby diversity!**



Strucutre is diversity!

Where do we go from here?

What do people do, who live here, and claim that they care for the environment?

Nesting aids (Insect Hotels)

Bringing structure to a place where it has been lost…

Not an essential element!

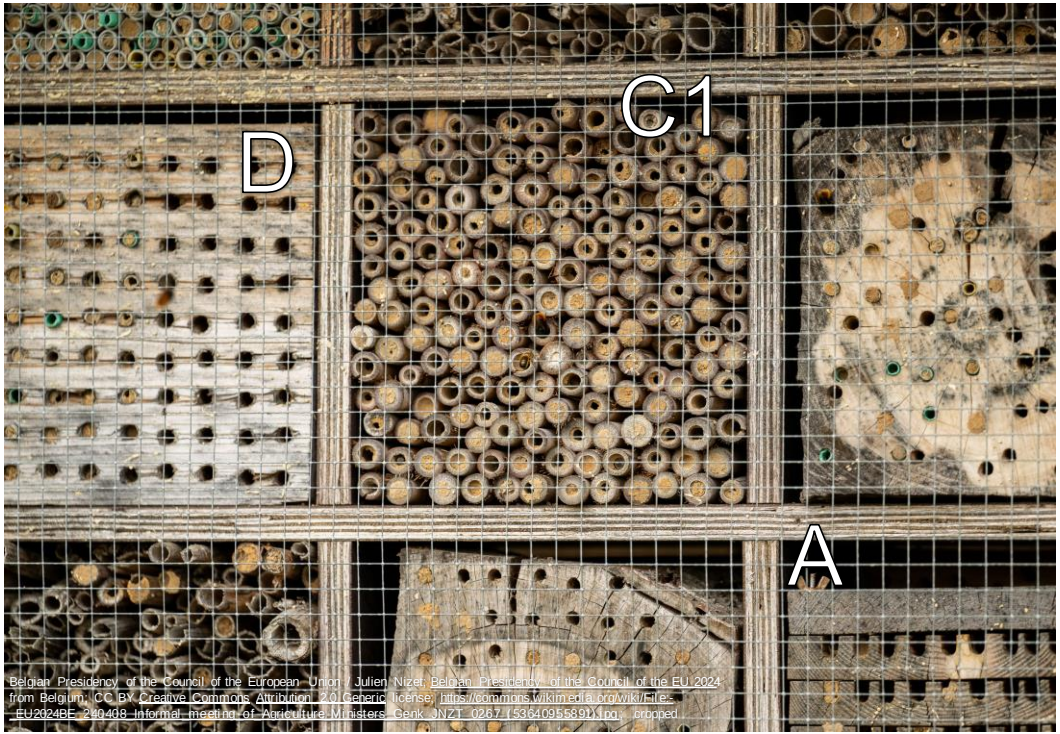
Nesting aids

the good

the bad

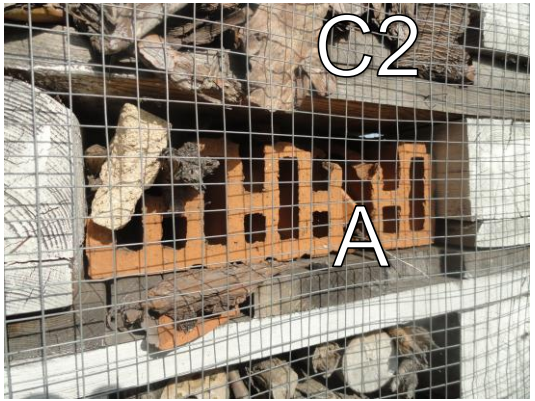
& the ugly

What makes a good nesting aid (for bees)?



(A) protection from rain & predators (B) inclusion of myelinated stalks (C1 & C2) clean stalks and drill holes of various sizes (D) large pieces of wood, drilled from the side (E) inclusion of sand & clay

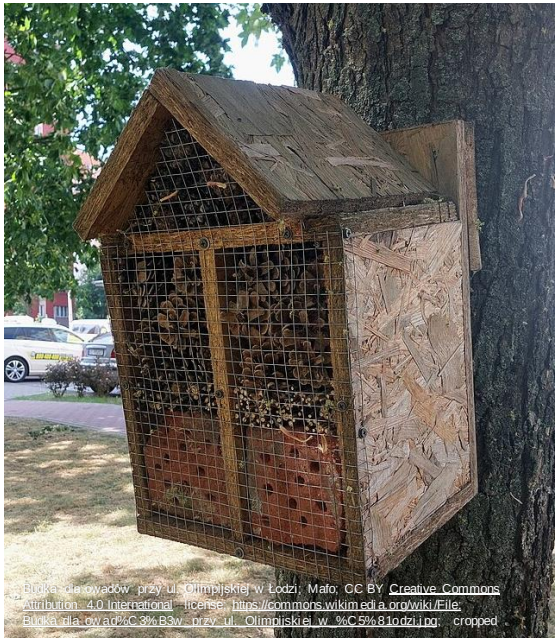
What makes a nesting aid useless?



(A) Bricks with giant holes/spaces (B) thin, big (unclean) straws (C1 & C2) completely useless filler

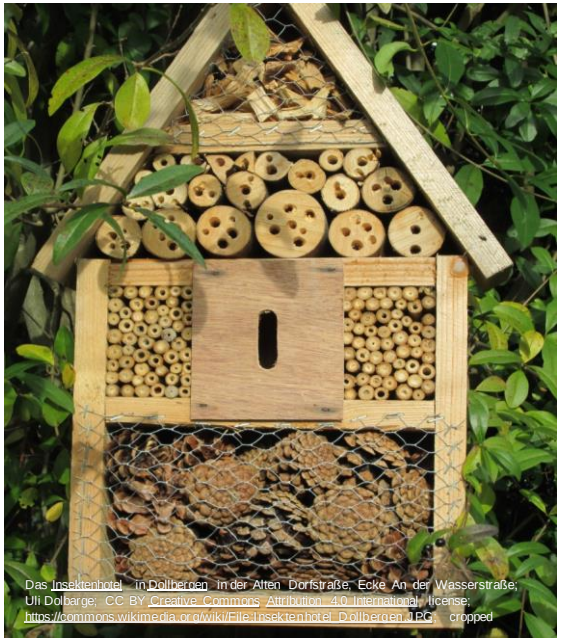
(D) wood drilled from the wrong side (E) depth of <15cm (F) inclusion of pinecones and straw

AWFUL Nesting aids



Budka dla owadów przy ul. Olimpijskiej w Łodzi, Mafo, CC BY Creative Commons Attribution 4.0 International license, https://commons.wikimedia.org/wiki/File:Budka_dla_owad%C3%B3w_przy_ul._Olimpijskiej_w_%C5%81odzi.jpg; cropped

Hôtel à insectes, à Belfort, Thomas Bresson, CC BY Creative Commons Attribution 4.0 International license, https://commons.wikimedia.org/wiki/File:2017-07-12_15-38-35_hotel-a-insectes.jpg



Das Insektenhotel in Dolbergen in der Alten Dorfstraße, Ecke An der Wasserstraße, Uli Dolberge, CC BY Creative Commons Attribution 4.0 International license, https://commons.wikimedia.org/wiki/File:Insektenhotel_Dolbergen.JPG; cropped

Poor nesting aids can both attract and promote parasites and neozoic species like asian ladybugs (*Harmonia axyridis*).

GOOD Nesting aids

Other viable options

General rules

- Protection from wind, rain & predators (birds, ants)
- Straws and stalks of different sizes (>15cm long)
- Wood & bricks with holes of different sizes (>5 cm deep)

Ideal:

- Vertical myelinated stalks
- Inclusion of sand and/or clay
- Flower strips & open ground nearby
- Dead wood nearby

Supplementary material

Find our instruction/componetens poster for building a proper nesting-aid for wild bees!

(available in German and English!)

https://zenodo.org/records/12543703

You can also visit https://wibie.at/
or contact the author ilja.svetnik@gmx.at
for further information or requests!