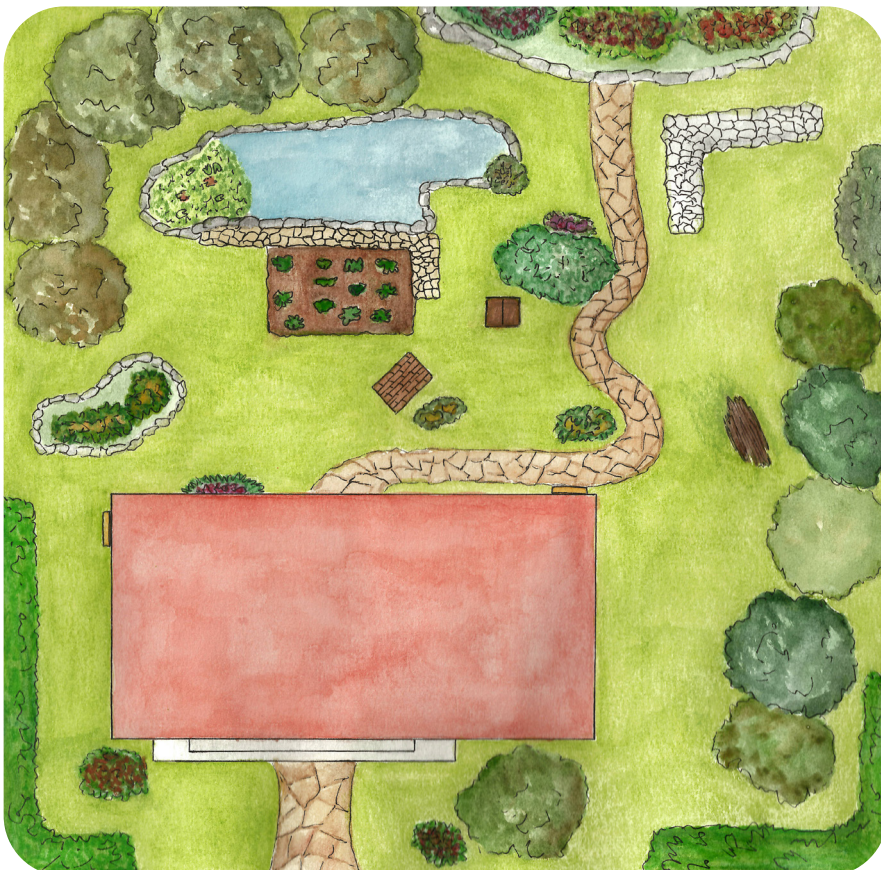


# The importance of *wild garden*





# The garden of aromatic plants

## Lavender

**Binomial nomenclature** → *Lavandula* spp.

### General characteristics

The genus *Lavandula* includes about 30 species originating in Mediterranean countries. It's a perennial shrub, evergreen, that fits well to different types of soil. Produces spike-shaped inflorescences, each of which contains a variable number of lilac-blue flowers with an intense scent.

### Cultivation

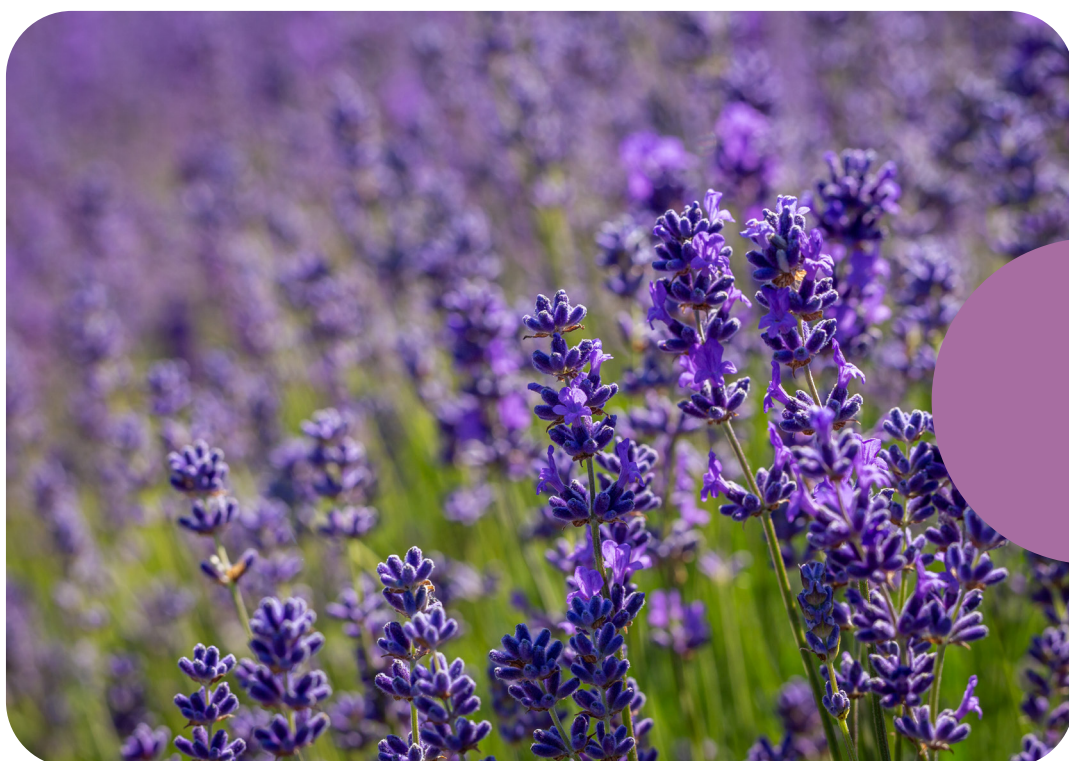
It is a rustic plant, does not need any special care, loves the sun, so it must be planted in a sunny corner of the garden and in a well-drained soil. It does not fear the summer heat, bears also severe and extended frosts, rarely gets watered.

### Trimming

It's trimmed at the end of summer to remove dry stems and in March-April to encourage new buds.

### Connection with the fauna

Lavender attracts pollinating insects such as bees, bumblebees and butterflies.





# The garden of aromatic plants

## Mint

**Binomial nomenclature** → *Mentha* spp.

### General characteristics

Mint is one of the most cultivated aromatic plants of the world. It's a perennial herbaceous plant, whose leaves have glands that produce essential oils that give it the characteristic aroma. The flowers, white or pink-violet, are held by inflorescences. The flowering takes place from spring to summer, but can last until autumn.

### Cultivation

It's a plant that can grow both in full sun and in shaded areas, but the brightest places allow it to produce more essential oils. Requires regular and generous watering during the summer. Most species do not love stagnant water, so the soil must be porous. Also is very important that the soil is fertile, that's why it's good to renew it every 2-3 years.

### Trimming

It does not require to be trimmed regularly, only dry or damaged parts must be removed.

### Connection with the fauna

Mint attracts pollinating insects, especially belonging to the Orders of the Diptera and the Hymenoptera.





# The garden of aromatic plants

## Thymus

**Binomial nomenclature** → *Thymus* spp.

### General characteristics

Thymus is a plant found throughout Europe, Anatolia, Mediterranean Asia and North Africa. It can be herbaceous or perennial shrub, up to 40-50 cm tall. The leaves are small in almost all species, lengthened and covered with a thick fluff. The white-pink flowers are held by spike inflorescences.

### Cultivation

It must be planted in sunny places, stands drought but does not bear stagnant water, especially in winter. Thymus adapts well to any type of soil.

### Trimming

It does not require to be trimmed regularly, only dry or damaged parts must be removed.

### Connection with the fauna

Its nectar-rich flowers are particularly appreciated by bees





# The garden of aromatic plants

## Rosemary

**Binomial nomenclature** → *Rosmarinus officinalis*

### General characteristics

It's a bushy perennial shrub that can reach up to 2 meters. Rosemary has deep roots strongly anchored to the soil and woody stem. The leathery leaves are rich in glands that secrete the oils responsible for the aroma of the plant. The blue-violet flowers are clustered and are present most of the year.

### Cultivation

It loves sunny and warm areas, can suffer very low temperatures. Rosemary prefers dry soils, must be watered little, but needs more water when is young.

### Trimming

It does not need any particular trimming, only dry parts must be removed.

### Connection with the fauna

Its nectar-rich flowers are particularly appreciated by bees.





# The garden of aromatic plants

## Salvia

**Binomial nomenclature** → *Salvia* spp.

### General characteristics

The Genus *Salvia* includes more than 700 species of plants distributed throughout the world. It's a bushy perennial shrub, from 30 to 150 cm tall, with branched and woody stems at the base, green-greyish leaves, thick and wrinkled. The flowers, held by inflorescences, are blue-violet and appear on the peak of the stem in spring-summer.

### Cultivation

Its optimal exposure is in full sun, does not need to be watered much. Stagnant water should be avoided, as it represents the main cause of death for the plant.

### Trimming

Towards the end of the summer, after the flowering, it would be advisable a trimming in order to support the development of new vegetation.

### Connection with the fauna

Its flowers are particularly appreciated by bees.





# The lawn

## Dame's violet

**Binomial nomenclature** → *Hesperis matronalis*

### General characteristics

It is spontaneously spread along the edges of hilly roads, in rough fields and in humid woods from 0 to 1,200 mt a.s.l. Perennial or biennial fast-growing herbaceous plant that in full vegetative development exceeds 90 cm in height. The violet flowers, send out an intense smell, especially in the afternoon and in the evening.

### Cultivation

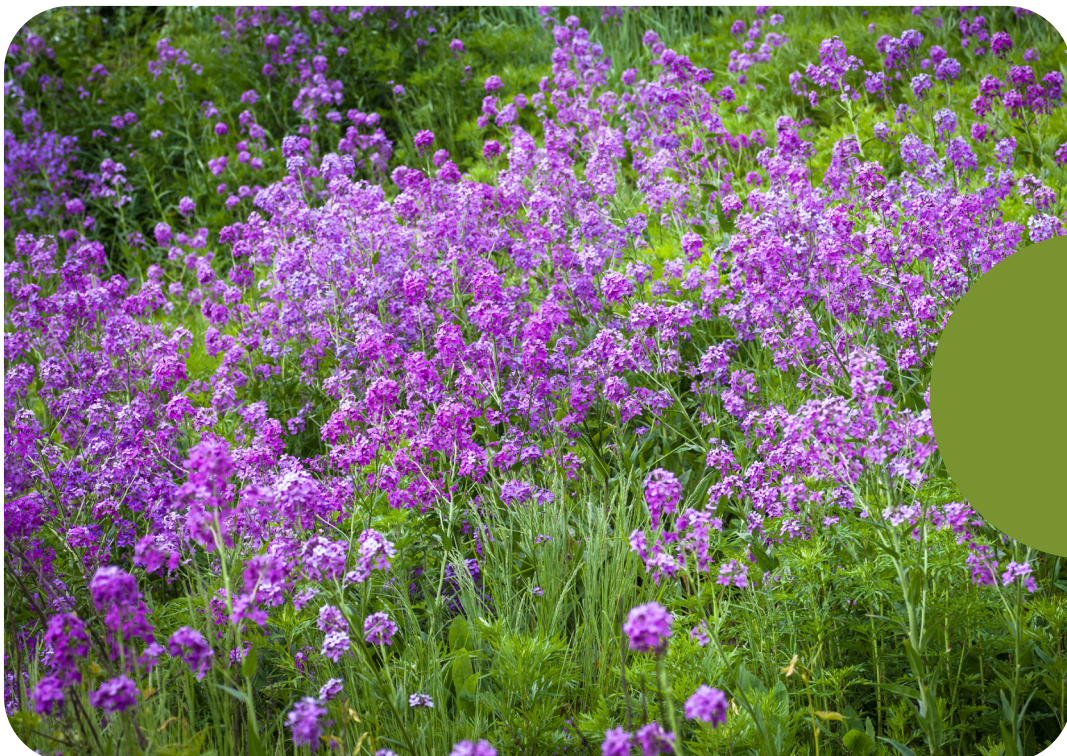
Seeds are planted in summer, seedlings in autumn. In order to produce many flowers, it should be cultivated in sunny areas. It fears the dry soil and is very durable to temperatures up to -20°. It must be grown in the open ground, the water supply provided by the rain is enough, but sometimes it is to be watered during the vegetative period, from March to October.

### Flowering period

May - July

### Connection with the fauna

Pollination by bees and butterflies





# The lawn

## Veronica

**Binomial nomenclature** → *Veronica spp.*

### General characteristics

It's a rather variable genus, that can be found in nature in many different habitats: from marshy areas to mountain meadows. Perennial herbaceous plant, native to Europe and Asia, it develops compact tufts, formed by thin stems. The violet-blue flowers, united in long corns tall up to 25-40 cm, bloom at the apex of the stems.

### Cultivation

Planting takes place in spring. Exposure should be in full sun at major latitudes and altitudes, while in mid-shade where the climate is warmer. It prefers the cold to the dry heat, it needs a rich soil, quite humid and well drained.

### Flowering period

June – October, depending on the species

### Connection with the fauna

It produces nectar in abundance, frequented by bees, bumblebees, butterflies and beetles.



# The lawn

## Forget-me-nots

**Binomial nomenclature** → *Myosotis* spp.

### General characteristics

The genus includes about fifty species, mostly native to Europe and Asia, even if it is however a cosmopolitan plant. Rustic perennial plant, naturally present in the meadows, along the waterways and in the mountain clearings. About 30 cm tall, it's a shrubby plant. The flowers, depending on the species, range from blue to pink to white with yellow centre.

### Cultivation

The sowing must be done in September, while the planting of the seedling must be done in spring. It is a rustic plant that adapts to any type of soil, prefers damp but well drained soils, likes sunny places, protected from the wind.

### Flowering period

April - September

### Connection with the fauna

Pollination by bees and butterflies.





# The lawn

## Mullein

**Binomial nomenclature** → *Verbascum thapsus*

### General characteristics

Perennial or biennial herbaceous plant, is able to grow in a large variety of habitats due to its great genetic differentiation. This plant initially makes a thick carpet of leaves at ground level and then from it rises a tall flowering stem, which can reach 85 cm. The flowers are yellow with orange anthers, but other species have red, purple, blue and violet.

### Cultivation

It is sown in spring, while planting must be done in autumn or spring. Rustic plant, prefers a quite sunny exposure or in half shade, it bears well the cold and the drought too. It needs humid but well drained soil.

### Flowering period

From late spring to autumn

### Connection with the fauna

The flowers are much appreciated by the bees and are structurally developed to promote the connection of the ligula.



# The lawn

## Common dandelion

**Binomial nomenclature** → *Taraxacum officinale*

### General characteristics

Cosmopolitan perennial herbaceous plant, available from the flat areas up to about 2,000 meters, grows up to 30 cm. The flowers, typical of the Asteraceae, are composed of yellow-gold ligulae and are sustained by long stems from which comes out a white liquid. The fruits are oblan-ceoloid and linked to a pappus, a modified calyx in shape of an umbrel-la that allows the transport of its bristles by the wind.

### Cultivation

Its seeding is possible from March to June. Rustic species, at ease in a well sunny area. Although not needing much water, it benefits from frequent irrigations. The soil should be rich in organic matter.

### Flowering period

April - September

### Connection with the fauna

Its golden florets heads are among the most loved by bees.





# The hedge

## Hawthorn

**Binomial nomenclature** → *Crataegus monogyna*

### General characteristics

It's a shrub that in specific conditions can reach even 5-6 m in height, and whose branches are characterized by long and strong thorns. Hawthorn blooms between the end of March and May, producing white flowers that will yield coral-red oval fruits, less than 1 cm long, containing only one yellow seed.

### Cultivation

It must be placed in a sunny or semi-shaded place and needs some hours of sun every day at least. It's a plant that needs no special care, the newly planted shrub must be watered in the summer, especially in case of particular drought.

### Trimming

It is expected only after flowering, to remove the branches compromised by the winter cold.

### Connection with the fauna

The nectar of its flowers attracts pollinating insects, while its fruits are particularly appreciated by birds such as the blackbird. The thorns on the branches make it a tangled shrub, so that can provide protection for host animals.





# The hedge

## Wild privet

**Binomial nomenclature** → *Ligustrum vulgare*

### General characteristics

Wild privet is a shrub. It's deciduous in the coldest regions and evergreen or semi-evergreen in temperate and warm ones. It's 0.5 to 2(3) meters tall and has strong roots, produces white and perfumed flowers in panicles, held on the peak of the sprigs. The fruits come in the form of small black berries.

### Cultivation

Wild privet prefers sunny areas, can grow even in mid-shade, but total shade may compromise flowering. It does not require special soils.

### Trimming

In late winter, it's necessary to remove the dry branches or the ones damaged by the weather.

### Connection with the fauna

The flowers are visited by the pollinating insects. Some species of birds feed on fruits and here they find both refuge and an ideal place to nest.





# The hedge

## Elderberry

**Binomial nomenclature** → *Sambucus nigra*

### General characteristics

It's a shrub, from 2 to 4 mt tall, that rarely can grow as a tree. The flowers, blooming from April to June, are milky white, little and borne in corymbs. The ripe fruits are black-violet and produced in clusters of drooping inflorescences with brown-red stems (thin element that sustains leaves, flowers or fruits in plants).

### Cultivation

The plant must be put in a place where it can receive sun for several hours per day. Elderberry adapts well to any type of soil, does not fear the cold, bears the drought and does not need to be watered often.

### Trimming

During the winter, from November to January, trim too big branches.

### Connection with the fauna

Its flowers are visited by bees and butterflies. The fruit-eating birds, provide to release the seeds many km away from the plant. All this ensures the multiplication of the elderberry.





# The hedge

## Blackthorn

**Binomial nomenclature** → *Prunus spinosa*

### General characteristics

Blackthorn is usually a shrub-bushy plant, but can sometimes reach even 5 mt. It's one of the first plants to bloom in spring. The white flowers are produced in March, shortly before the leaves, and the flowering continues throughout the month of May. The fruit is a bluish little drupe, turning black close to the full ripeness in October.

### Cultivation

It's a rustic plant, that fears neither intense frost nor heat and does not need any particular soil. Rainwater is enough, but it's good to irrigate it regularly, especially during flowering and fruit production.

### Trimming

Remove the dry branches and the damaged by the winter ones.

### Connection with the fauna

Its nectar-rich flowers are particularly appreciated by bees. The fruits represent an important food resource for the birds that nest between the branches, and for some species of mammals.





# The hedge

## Rose hip or dog rose

**Binomial nomenclature** → *Rosa canina*

### General characteristics

It's a thorny shrub that rarely get over 2-3 meters in height. The flowers, blooming in spring, are pale pink. The false fruits, whose correct term is rose hips, are shiny red and reach the ripeness between autumn and early winter.

### Cultivation

The best positioning for its planting is between the sun and half shade. No particular soil is needed, growing also in poor and stony soils. It does not fear the cold, but needs to be steadily watered in the first year after planting, afterwards it's possible to continue supplying low amounts only during the flowering and in summer, or in case of intense drought.

### Trimming

Remove the dry branches and the damaged by the winter ones.

### Connection with the fauna

Its flowering attracts a large number of pollinating insects (bees, bumblebees and butterflies). The rose hips are appreciated by several species of birds during the winter.



# The bee



**Binomial nomenclature** → *Apis mellifera*

It's a eusocial insect with a complex organization in families, each of which has thousands of individuals up to over 50.000. The leader is a queen, whose mission is to lay eggs. It's larger than the other bees of the hive, comes out only for the mating and/or for "changing house" (swarming). Bees have a longevity that change from a few weeks to a few months (depending on the time of year), only the queen can live up to 5 years.



The drones are the male bees of the hive, their primary purpose is to fertilize the queen. They don't have the stinger. Mating occurs in flight, and once finished, each drone falls to the ground and dies.



All the remaining bees are workers, thousands are born each year and carry out different job in the hive. During its life, a worker bee changes tasks several times. Queen attendants bees take care of the queen; nurse bees feed the larvae; cell cleaning bees take care of the cells and the hive; collecting nectar bees receive the nectar, turn it into honey and store it in the cells; honeycomb building bees take wax and build the comb with it; fanning bees direct airflow into the hive to regulate the temperature and internal humidity; guard bees defend the hive from any invaders. The foraging bees collect nectar, pollen, water and carry them to the hive. They have a structure in the hind legs, called basket, where to store the collected pollen; the nectar instead, once sucked by the flower, is stored in another organ, the honey stomach.

The thick fluff of the body, the skill to communicate with each other through a "dance", the industriousness and fidelity to a flowering, make the bee an efficient and successful pollinating insect!



# The bumblebee

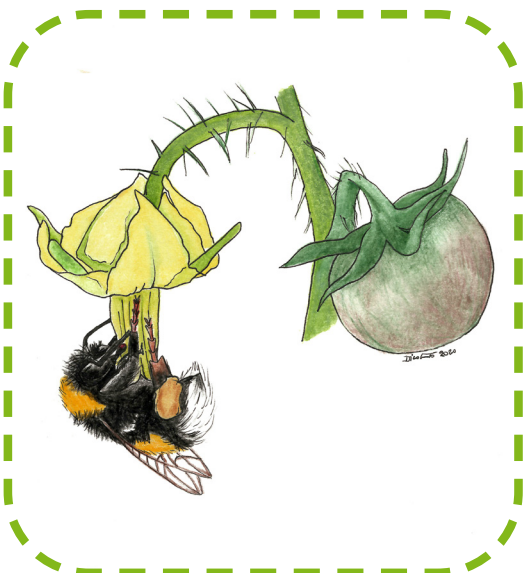


**Binomial nomenclature** → *Bombus terrestris*

There are about 300 species of bumblebees in the world. One of the most common in Europe is the *Bombus terrestris*.



It's larger than the bee and has a round body covered in soft hair (long branched setae) called pile. The bumblebee is a social insect too, but unlike *Apis mellifera*, its society is made up of a few individuals. There is a queen, about 300 workers and a hundred males, who are born only at the end of the season. The queen leaves the dormancy at the beginning of the year and nidifies in underground holes. In a cell above a soft surface of moss, dried leaves and herbs, lays some eggs, from which the first workers of the colony will develop. The queen can live up to a year, the workers from a few weeks to two months maximum. The new queens are generated only at the end of summer, are then fertilized by the males and go into dormancy to face the winter.



The densely furry body, the ability to visit a large number of flowers, to transfer a huge amount of pollen from one flower to another (greater than other pollinating insects) and being operative from early morning until late evening (even in cloudy and windy conditions), make the bumblebee the pollinator par excellence. They are also peaceful in nature, that's why are especially utilized in agriculture for the pollination of many fruit plants and vegetables.

# The life cycle of the butterflies

## From pupa (chrysalis) to adult butterfly

At the end of its larval life, the caterpillar locks in a hard cocoon, where undergoes other transformations until it becomes an adult butterfly. In most species the chrysalises remain fixed to the nurse plant and receive a mimetic colour, mixing with the leaves and branches. When the conditions of the habitat will be suitable, the cocoon will begin to break and the adult butterfly will start going out. After that, in about 1 hour, it will be able to open the wings and begin its flight.

## The caterpillar

Has a cylindrical body and often a mimetic colour. The mouthparts are adapted for chewing and its powerful mandibles allow it to eat up a lot of leaves. In some species of lepidoptera the caterpillar eats even wood. During the growth, the larva sheds the exoskeleton, normally 4-5 times. This process is called moulting.

## The egg

In many species of lepydoptera there is a close relationship between butterfly and "nurse plant". This is the place where the adult lays its eggs, the plant that will provide the leaves the caterpillar will feed and on which it will settle to become a chrysalis. These species of butterflies lay few eggs on the leaves of the nurse plants. Other species spread hundreds of eggs on a meadow and the caterpillars that will be born will have to go and look for their own nurse plant.



Life cycle of *Aglais io* (*Inachis io*), commonly called peacock's eye due to the beautiful spots on the wings seeming an eye, used to frighten the predators.





## Lepidoptera: the species attracted in the wild garden

# European peacock

**Binomial nomenclature**

→ *Inachis io*

**Common name**

→ European peacock

### Description

Medium size butterfly (wingspan: 54-60 mm). Distinctive eyespot on wingtips. Resident from sea level up to about 2,500 meters of altitude, can be found in many types of environments such as edges of woods, glades, thin forests and gardens.

### Behaviour

The adults (1 annual reproduction) flit from May to October, but live until the following year.

### Nurse plant

Nettle.

## Lepidoptera: the species attracted in the wild garden



# Common blue butterfly

**Binomial nomenclature**

→ *Polyommatus icarus*

**Common name**

→ Common blue butterfly

### Description

Small size butterfly (wingspan: 28-36 mm). It has a characteristic sexual dimorphism: males usually have wings that are blue above with a black-brown border and a white fringe, while the females are usually brown above with a blue dusting and orange spots. Very common species, found up to about 2.000 mt of altitude in different habitats: meadows, wide wooded glades, gardens, flowerbeds and kitchen gardens.

### Behaviour

Further reproductions per year. Adults flit between April and October.

### Nurse plant

Leguminous plants, including the Genus *Trifolium*.



## Lepidoptera: the species attracted in the wild garden



# Holly blue

**Binomial nomenclature**

→ *Celastrina argiolus*

**Common name**

→ Holly blue

### Description

Small size butterfly (wingspan: 23-30 mm). Sexual dimorphism with the female having a wide black band along the edge of the wings, clearly visible when these are open. Common species, resident from the plain to the 1500 mt: easily found near hedges and woody glades.

### Behaviour

2 - 3 generations a year, with eclosions between March and August. Second generation chrysalises are wintering, they spend all the winter in the cocoon.

### Nurse plant

The eggs are laid mostly on the holly in spring and on the ivy in summer.

## Lepidoptera: the species attracted in the wild garden



# Black-veined white

**Binomial nomenclature**

→ *Aporia crataegi*

**Common name**

→ Black-veined white

### Description

Butterfly with white livery, characterized by boldly black veined wings (wingspan: 45-60 mm). The wings of the male are white with black veins, the female has brown veins. Resident in open environments, is also located near streams, from sea level up to over 2,000 mt.

### Behaviour

Adults fly, between May and July, in a single generation.

### Nurse plant

Hawthorn, blackthorn, rosehip and several fruit trees.



## Lepidoptera: the species attracted in the wild garden



# Hummingbird hawk-moth

**Binomial nomenclature**

→ *Macroglossum stellatarum*

**Common name**

→ Hummingbird hawk-moth

### Description

Wingspan: 50 mm. Diurnal moth, is equipped with a flight control exceptionally efficient that allows it to stand hovering in front of the flower from which it seals the nectar. It has a particular long proboscis. Found in gardens, meadows, thickets, and at the edges of woods.

### Behaviour

Three reproductions per year, between April and October. The adult winters at the southern latitudes.

### Nurse plant

Honeysuckle, valerian, vervain, viola, lavender.

## Lepidoptera: the species attracted in the wild garden



# Painted lady

**Binomial nomenclature**

→ *Vanessa cardui*

**Common name**

→ Painted lady

### Description

Wingspan between 54 and 58 mm. Maybe the only diurnal butterfly present in all continents except Antarctica and South America. Migratory species with fast and powerful flight. Found in every type of environment, preferring the uncultivated ones.

### Behaviour

Adults flit from April to October (2 reproductions per year).

### Nurse plant

Thistle, nettle.



## Lepidoptera: the species attracted in the wild garden



# Common brimstone

**Binomial nomenclature**

→ *Gonepteryx rhamni*

**Common name**

→ Common brimstone

### Description

Medium size species (wingspan 52-60 mm). Sexual dimorphism: males have yellow wings while females have greenish-white wings. Adult brimstones are leaf-mimics, this allows them to blend in with their surroundings. Resident everywhere, from meadows to open woods, in gardens and cities.

### Behaviour

Can be observed from February to November. Adults winter hiding among the leaves of plants such as ivy and holly.

### Nurse plant

Buckthorn (*Frangula alnus*).

## Lepidoptera: the species attracted in the wild garden



# Swallowtail

**Binomial nomenclature**

→ *Iphiclides podalirius*

**Common name**

→ Swallowtail

### Description

Presence of blue crescent markings in hind wings, with an oblong, orange spot at the back corner and a relatively long tail. The wingspan is quite important, up to 8 cm. Prefers hilly areas, orchards, sparse woods located in the plains, meadows and gardens.

### Behaviour

2-3 reproductions per year. Adults flit from March to September.

### Nurse plant

The larva feeds on various shrubby species, including blackthorn and hawthorn.



## Lepidoptera: the species attracted in the wild garden



# Convolvulus hawk-moth

**Binomial nomenclature**

→ *Agrilus convolvuli*

**Common name**

→ Convolvulus hawk-moth

### Description

Wingspan 80-120 mm. Moth able to move the wings very quickly, with the skill to nourish and to lay its eggs remaining in flight. When perching, it closes the front wings like a roof, covering the rear wings and the abdomen. The caterpillar feeds from July to September, and with the cold season digs in the ground a tunnel where it turns into chrysalis to overcome the winter.

### Behaviour

Adults flit between June and September. 2 reproductions per year.

### Pianta nutrice

Convolvulaceae, sunflowers.

## Lepidoptera: the species attracted in the wild garden



# Red admiral

**Binomial nomenclature**

→ *Vanessa atalanta*

**Common name**

→ Red admiral

### Description

Medium size butterfly (wingspan 56-63 mm). The characteristic livery allows it to camouflage with the bark of the trees and with the shrubs. Migratory species, located in every type of environment, from sea level to 2000 mt of altitude. Can be commonly found in meadows, in wooded glades, along shrubby bands and in gardens.

### Behaviour

Adults flit from June to October (2 reproductions per year). It is not unusual to observe red admirals flying in full winter during mild days.

### Nurse plant

Nettle.



# Ladybug



**Binomial nomenclature** → *Coccinella septempunctata*

Coleoptera with a rounded shape and bright colours. The most common one is red with black dots, whose number changes depending on the species. Its presence in gardens and kitchen-gardens is important because of its greed towards aphids, the so-called plant lice. They feed on them both at the larval and adult stages. It is estimated that a single ladybug can devour up to 5,000 aphids in a year!

# Mason bee



**Binomial nomenclature** → *Osmia spp.*

Belongs to the order of the Hymenoptera and to the family of the Megachilidae (solitary bees). Mason bee has the habit of choosing some cavities as their nest, where it lays various eggs and creates the cells with mud, so that each egg is alone in its own "space". This bee is considered to be a more efficient pollinator than her "domestic" sister, especially on a smaller range (orchard, kitchen garden or cultivated field).

# Earwig



**Binomial nomenclature** → *Forficula auricularia*

Belongs to the order of Dermaptera, its name is given by the presence of caudal forcep-like cerci, short and straight in the female, longer and curved in the male. Chooses his shelter in humid and shady places, not loving the light. It's an omnivorous insect, but more often it plays the role of predator, nourishing of eggs and larvae of many harmful insects in agriculture.

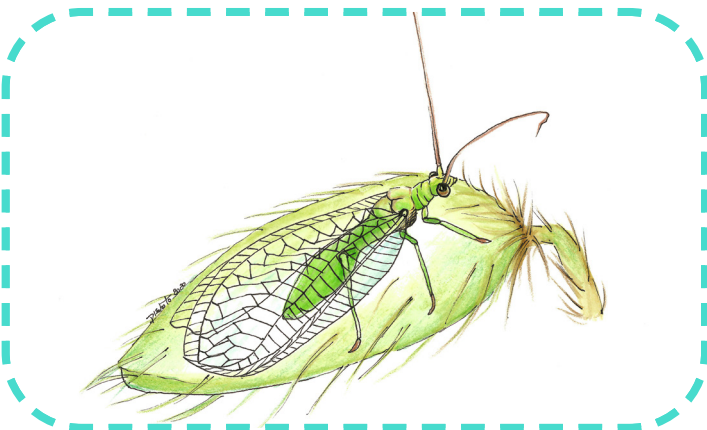
# Hoverfly



**Binomial nomenclature** → *Syrphida*

Small "housefly disguised as a wasp" belonging to the order of the Diptera, utilizes what is called "protective mimicry". It has a body with yellow and black stripes like a wasp, that's why it is easy to confuse them. They stand out thanks to the shorter antennae and the compound eyes, typical of a housefly. The Syrphidae, besides being good pollinators, at the larval stage are also hungry predators of aphids.

# Green lacewing



**Binomial nomenclature** → *Chrysoperla carnea*

Insect belonging to the order of Neuroptera, its name means "golden-eyed", due to the metallic colour of its eyes. Another distinctive feature is the bright green colour of the body. They are skilled flyer and are nocturnal, feed on aphids (both in the larval and adult stage) but also on green bugs and scale insects.

# Black and yellow mud dauber



**Binomial nomenclature** → *Sceliphron destillatorium*

Females catch, paralyzes and brings back to the nest small preys, like aphids, for nourishing the larvae. At the young stage it feed on insects, at the adult one, on nectar. The way of nidification is very similar to that of the "cousins" solitary bees, that is, in cavities divided by mud septa, for the deposition of the eggs. Solitary too, of peaceful nature. Unlike the wasps living in colonies, it stings only if disturbed.



# Phytophagous insects

## Who are the phytophagous insects?

Through the biological control, we try to rule and contain the action of insects harmful to the cultivated plants, thanks to the presence of some allies such as ladybugs, earwigs, chrysopae, and others. Being their natural opponents, they are their main predators.

You have already met the main useful insects visiting your wild garden, now we find out who they can "fight".

They feed greedily on plant tissues, including leaves, stems and roots, often causing damage to plants grown in the lawn and vegetable garden.

Here are two of the best known:

## The aphids

Surely you have already seen them, they are the so-called "plant lice". How do they feed? They suck and absorb the sap of the green organs of the plants, through their piercing-sucking mouthparts.

There are many species (all small) from 1 to 4 mm of length; the colour may vary from green to black, from grey to reddish. In a short time, they create countless colonies.

The exceeding lymph is ejected in the form of honeydew, a sugary substance that is a source of food for several insects. Ants, in particular, practically "breed" aphids to sweat their production of honeydew: they move them from one food source to another and protect them from predators, basically like humans do with their livestock.

Who feeds on aphids in the wild garden? Ladybugs (both larvae and adults), larvae of sirphids and chrysopae, earwigs, several insectivorous birds, such as tits, blackheads, swallows.



## The cochineals

Also equipped with a piercing-sucking mouthpiece, they feed on the sap of the host plants, even if it is only the female who does it, because the male does not have such mouthpiece "equipment". Cochineals are soft-bodied, flat, and oval-shaped; if observed under the microscope, these insects look like oval naps existing on the leaves of the plant, their target. The adult cochineal is essentially immobile, produces waxy substances that form a sort of shield, under which it finds protection.

There are wasps that lay their eggs inside the waxy shield of some species of cochineals. The larvae then become parasites of the phytophagous insect, killing it.

Who feeds on cochineals in the wild garden? Without doubt the ladybug, both larval and adult.





## 4 basic rules for the health of your wild garden and its guests:

Do not use pesticides: insects are the indicator of a healthy garden and an important source of food for birds, toads, newts, reptiles, hedgehog and bats.

Attract ladybugs, earwigs, mud daubers, dragonflies and other natural enemies of parasites. The native plants that you have chosen for your wild garden and the bug hotel that you have created, will help you to attract these little “killer” friends.

If you have a pest infestation, we suggest you to proceed with manual removal.

Avoid pesticides, because they also damage pollen and plant nectar, as well as plants and pollinators.



# Blackbird

Binomial nomenclature

→ *Turdus merula*

Listen to the singing



Its natural habitat is the forest, but it has adapted to go around many environments, such as orchards, parks and gardens, because it's not afraid of humans.

The male is bright black, with a shining yellow-orange beak; the female instead, has brown plumage.

It mainly feeds on fruits, berries and small invertebrates.

The nest is built by the female, on the branches of the trees and between the bushes.

# Chaffinch

Binomial nomenclature

→ *Fringilla coelebs*

Listen to the singing



It is one of the most common European birds, resident both in urbanized areas and in open country, provided there are bushes and trees.

Male has a more brightly colour than female, but both sexes have two contrasting white wing bars and white sides to the tail, highly visible during the flight.

It mainly eats fruits and seeds, but during the reproductive period, it feeds also on invertebrates.

The nest, very well hidden, is built on the trees and in the bushes.

# Eurasian blue tit

Binomial nomenclature

→ *Cyanistes caeruleus*

Listen to the singing



It mainly lives in the hilly and flat woods, but is also a usual visitor of orchards and gardens, has an exceptionally lively plumage, with shades of blue, sulphur yellow, white and black.

The blue tit is a mainly insectivorous bird, between its preferred prey are the aphids. In winter, it feed also on seeds, berries and fruits.

It nidifies in the hollows of trees, in the crevices of the walls and in the artificial nests; utilizes also the same nest year after year.

# Great tit

Binomial nomenclature

→ *Parus major*

Listen to the singing



Living on the edge of woods, orchards, fields with rows of trees, gardens and urban parks. It's a distinctive bird: has black head and neck, with prominent white cheeks.

The great tit is a hungry insectivorous, but likes very much seeds, fruits and berries too, accepts in addition the food offered by man in mangers.

Great tit nidifies in the cavities of the trees, of the walls and in the nest boxes.



# House sparrow

Binomial nomenclature

→ *Passer domesticus*

Listen to the singing



It's a species strongly associated with human settlement, and can live in urban or rural settings. Plumage with grey-brown shades, the female differentiates from the male for the black throat.

Especially granivorous, it mainly feeds on cereals, mostly wheat, but does not despise fruits and invertebrates. It nidifies in the hollows and cracks of the buildings but also on rocks and cliffs, more rarely between the branches of the trees.

It is not rare to see its nests combined to those of other species of Passeridae.

# Goldfinch

Binomial nomenclature

→ *Carduelis carduelis*

Listen to the singing



It prefers the orchards, the vegetable gardens, the lawns close to the houses and can be found in great volume in the groves and in the parks.

Goldfinch has a bright plumage colouration: black head, red face, white cheeks, beige body, black wings streaked of yellow.

It feeds mainly on seeds (the thistle ones are its preferred), which it breaks thanks to its robust beak.

The nest is usually built at an average height, at the ends of the branches of firs and other conifers, or on fruit trees.



# Great spotted woodpecker



Binomial nomenclature

→ *Dendrocopos major*

Listen to the singing



Can be found in forests of conifers and in hardwoods, in the wooded countryside and in the city parks, but it does not despise even the gardens. The male differs from the female due to the visible red spot on the neck.

Mainly insectivorous, it catches its preys putting the long tongue in the galleries it has dug into the wood with the beak. In autumn and winter, it feeds also on fruits, berries and seeds. For example, it fits in pinecones and hazelnuts in a space of the bark; then, with hits of the beak, pulls out and eats the seeds. The woodpecker nidifies in hollows dug in the trunk of the trees, can also use nests and mangers provided by the man.

# Starling

Binomial nomenclature

→ *Sturnus vulgaris*

Listen to the singing



It is probably the most common passerine in the world. Able to suit to different environments, visits plains, hills, cultivated countryside, and urban areas, where he takes refuge in the evening with hundreds of mates, creating "group dorms".

Starling has glossy black plumage with a metallic sheen, characterized by violet-green reflections and white spots.

Opportunist species, it feeds on a wide variety of food: insects, seeds, berries, fruits, amphibians, and also of waste thrown by the man. The starling nidifies in the cavities of trees or rocks, in the crevices of the buildings and on the roofs of the houses, among the tiles.





# Magpie



Binomial nomenclature

→ *Pica pica*

Listen to the singing



It visits cultivated countryside, thickets, parks, and degraded zones, even without vegetation, but it can be also found in the cities, where it aims to occupy the outskirts or the suburban areas. The plumage of males and females does not differ, both are characterized by a white and black colouration, with reflections ranging from grey to metallic green.

The magpie feeds on fruits, spiders, insects, carrions, but also on eggs and nestlings of other birds.

The nest, made up of intertwined twigs and mud, is built on the top of tall trees; it does not use nest boxes supplied by the man.



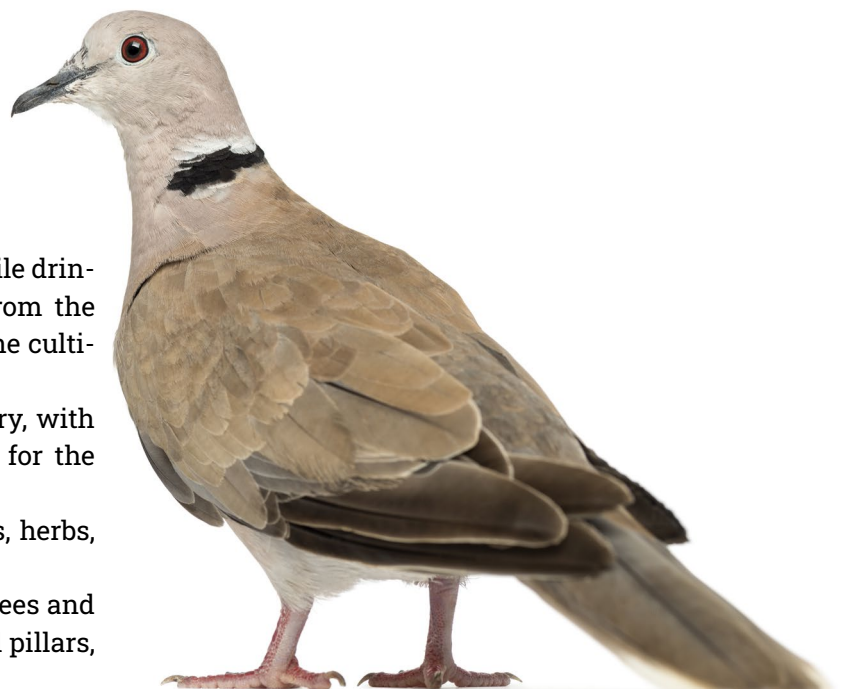
# Eurasian collared dove



Binomial nomenclature

→ *Streptopelia decaocto*

Listen to the singing



It is a typical guest of towns, easy to observe while drinking from the troughs of farm animals and from the fountains of the gardens, can be found also in the cultivations, especially for the alimentation.

The collared dove has a pale beige-greyish livery, with a characteristic black collar (that's the reason for the name).

Its basic diet is seeds, but it also feeds on fruits, herbs, insects and other small invertebrates.

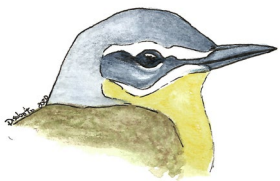
It builds the nests, rather rough, especially on trees and shrubs, but often also on artefacts such as metal pillars, scaffolding, sheds, etc.

# To each bird its beak

What's the  
beak for?

The beak of the birds can fulfil several functions: opening the seeds, to defend themselves, to capture the prey and to build the nest. Some species use it for fishing or for collecting pollen, almost all for smoothing their feathers.

Depending on the diet and the way the food is taken, the beak will have a specific shape that will help us to understand which of the following categories belongs to a bird. Keep in mind that many species have adapted to eat more types of food, taking advantage of what each season makes available to them:



## Insectivores

Feed on insects, the beak is thin and pointed, sometimes quietly long.

## Frugivores

They feed on fruits. In some species the beak is curved or concave in order to extract the pulp of the fruits, in others it is thinner in order to feed on smaller fruits, which can be eaten whole.



## Granivores

The food is represented by the seeds, the beak is stocky and strong. Some granivores chop the seeds, others open them speckling with the beak, others shell them. The dimensions of the beaks are related with those of the seeds.



# To each bird its beak



## Nectarivores

They have long beaks and tongues “designed” to collect nectar. The species belonging to this group can be found in America, Africa, Asia, and Australia.

## Aquatics

The beaks of the aquatic birds, are different depending on what they feed on, and we can briefly divide them into:

- long and strong for those who eat fish
- long and thin for the mud-dwellings, which feed on the invertebrates found in the dregs
- broad and flat for the anatidae, which feed on the aquatic vegetation



Among the aquatic birds we also find insectivores, granivores, raptors.



## Raptors

They are predators: kill and eat mammals, reptiles, amphibians, insects, rodents and other birds. They have a distinctive hooked beak, characterized by an upper jaw strongly curved and by sharp edges, for tearing the prey and ripping up pieces of them.

# The nocturnal raptors

Who are the nocturnal raptors?

They are the “Lords of the night”: owls, little owls, scops owls, tawny owls, barn owls and all other birds of prey which, like every species belonging to this group, have a hooked beak and strong and sharp claws for catching and killing the prey. Being active from the dusk for all the night, the nocturnal raptors differ from the diurnal ones for some distinctive skills that allow them to hear the prey moving in full darkness and to capture them in a silent way. What are these skills?



## Sight

Exceptionally developed in all raptors. In the diurnal ones (ex. golden eagle or peregrine falcon) it allows a greater definition of the images, while in the nocturnal it allows an excellent view in the darkness. The particularly large eyes are able to intensify at the maximum the low available light. An owl, for example, will be able to see during its nocturnal movements, without collide with obstacles, but will not have a perfectly clear vision of the small prey that is moving in the undergrowth. For this, it has another highly developed sense...



# The nocturnal raptors

## Hearing

It's the most developed sense, because night hunting is basically due to the location of the noises emitted by the prey. For this reason, the nocturnal raptors have some anatomical characteristics, such as the presence of asymmetrical auricular cavities, placed one higher than the other. In this way, the sounds arrive first in one ear and then to the other, giving a more exact information about their origin. They also have a structure of the face that works as an "amplification dish".



## Plumage

The feathers are fringed and covered with a kind of velvet, which makes them particularly soft and give silence to the flight of these birds. In this way, they can catch their prey counting on the element of surprise. The plumage also has colours that allow the nocturnal raptors to "blend" perfectly with the surrounding environment. A tawny owl will therefore be able to study its prey for some time without the risk of being discovered.

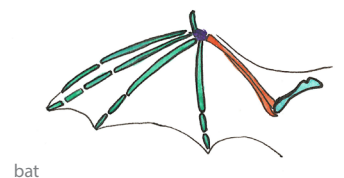
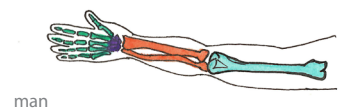
# Winged hands

Who are the bats?

They are the only mammals to own wings and be able to fly actively. Scientifically they are called Chiroptera, a greek term meaning winged hand: khéir (hand) and pterón (wing). As mammals, bats have a "hand" very similar to ours. The phalanges of the fingers are elongated, and between them, as well as between the arm and the leg, a membrane has been created, called patagia, which allows it to perform an active flight. They are able not only to glide from one tree to another (such as the flying squirrel), but to flap their wings and fly for a few meters or even some hundred km.

The only finger free from the patagia is the thumb, which is equipped with a claw used by bats to climb. The patagia is a very thin membrane covered with skin, used not only for flight, but also for thermoregulation. It's through it that bats, which don't have sweat glands, release the excess heat produced during the flight.

Precisely because are flyer, bats are often mistaken for birds: the clearest feature that marks them is that bats are characterized by the presence of hair, while birds have feathers. In practice, these animals are not "relatives", but simply both conquerors of the air environment.





# Do I see or don't I?

Among the many beliefs about bats, one of the most widespread is certainly that they are blind creatures. This is not true, because bats have great sight, but simply do not use (only) this sense to move in the most complete darkness. The adaptation to the night flight has produced the development of a complex system of echolocation, based on the emission and reception of ultrasound.

To build a map of what surrounds them, bats emit ultrasound (from the mouth or nose) that, going to collide with the surfaces, bounce and return in the form of echo, and are perceived by the ears (or nose in some species). Ultrasounds, however, are not only used to find their way, but also to classify the prey, know the shape and size of insects, as well as their speed and direction, in order to capture in flight even a mosquito of a few millimetres!

Chiropterologists, the observers of bats, use an instrument called bat detector to reveal ultrasound. How does it work? The identified ultrasound is converted into sounds perceptible to the human ear and, through their analysis, allows the recognition of many species of Chiroptera. This allows to know the species of bats existing in a specific area.

Chiropterologists have detected that in Europe there are 45 species of Chiroptera, very difficult to detect in most cases. It's necessary indeed to observe some distinctive characters (some are very small, like teeth), can therefore be made only by expert chiropterologists.



# One year as a bat

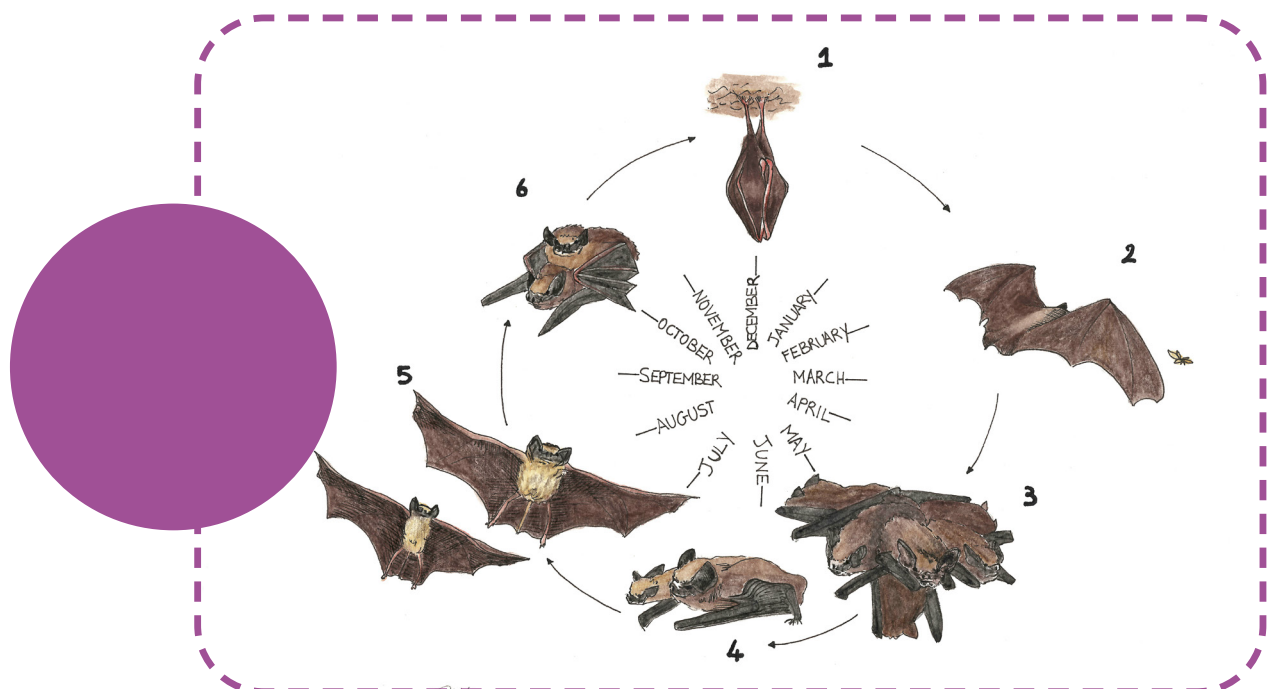
The year of life of a bat is marked by the rotation of the seasons.

In the severe winter months, when prey is no longer available (the species of bats living in Europe are insectivorous, that is feed on insects), bats move to a shelter where to spend this hostile season and get into a condition of extended torpor. The vital functions slow down and the body temperature drops almost to 0°C. This condition is called hibernation. The energy expenditure is minimized and bats survive with previously collected fat reserves. It's important to avoid disturbing them during the winter period, because the awakening causes a waste of energy and the bat may not be able to survive until the next spring.

In early spring they wake up from this state of torpor and begin their moving towards the summer refuge, looking for food. There are species which carry out also long travels, as real migrations. The shelters in spring are used only in the daytime, when the bats rest, while at dusk they go out for hunting.

Between the end of spring and the beginning of summer, the females move in warm and protected shelters for giving birth, establishing colonies formed also by thousands of individuals. They develop these colonies to ensure that there is less heat dispersion from the new born, which are initially hairless. Usually, each female gives birth to only one baby, few species which may give birth to two.

The mating period starts between the end of summer and the beginning of autumn, but the fertilization of the ovule will happen only in spring, in order to allow the birth of the young in summer. Autumn is the season in which bats must collect the fat stores needed to approach the hibernation and in which the displacement to winter shelters takes place.





# To each his own home

The shelters chosen by bats, can be very varied and used differently during the several periods of the year. There are summer shelters, which bats use especially during the day (but also at night to take a break during the intense insect hunting!), and winter shelters, used in the cold season when they fall into hibernation.

If we wanted to classify them according to the type of shelter most used during the year, we could divide them in: phytophilous (those that use trees), anthropophilic (those that use buildings), troglophilic (those that use caves and cavities). As it always happens, in nature there are no fixed rules, so there are many species that use different types of shelters during the year.

## The phytophilous species

They find protection in the old trees rich in cracks and cavities: a few centimetres raised bark, is enough to offer them a warm shelter! These bats need therefore woods with many old trees, full of cavities and cracks that unfortunately are ever more difficult to find. In addition, a forest with old trees will also be an environment rich of biodiversity that will offer bats plenty of insects.

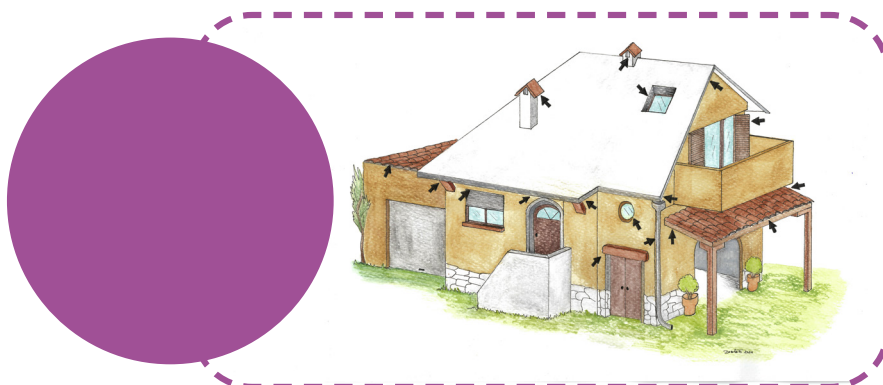
## The troglophilic species

They find refuge in caves and cavities, both natural and artificial (like a tunnel!). There are caves that are used during the summer, and others in winter, while some, large and with heterogeneous characteristics inside, can be suitable throughout the year. In caves and cavities, bats can find shelter in crevices or simply hang from the ceiling.

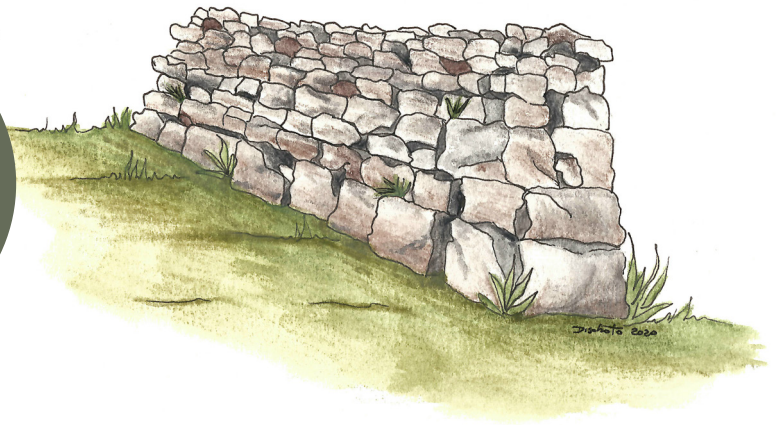
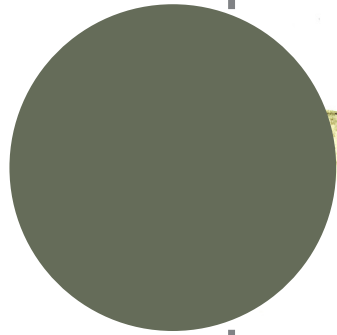
## The anthropophilic species

These species (from the Greek *anthropos* -man- and *philos* -affinity-) are accustomed to the man and find shelter in our homes: the basements, the garrets, the roofs, the cracks between the tiles, the gutters, the shutter boxes, the beams, the cracks of the stones and bricks, the plaster; in other words, all the available solutions related to our homes are perfect, as long as they ensure silence and quiet.

Just because our modern homes are often unable to provide protection to the species of bats linked to buildings, a good substitute is represented by the bat boxes. These are artificial shelters built of different materials (wood, cement, cement and sawdust...), with the purpose of providing a suitable home to our friend bats, if ours is devoid of cracks, cavities and other small holes.



# Dry stone walls



A dry stone wall is nothing more than a wall made of stones that are not joined together by a binder, such as concrete, but "simply" placed on each other. Its realization could seem simple since it is made with humble materials (almost always available directly on the spot) and refers to the labour and poor of the background in which they were built in the past. The dry stone walls were in fact used to shelter crops from the wind, to define the borders, for terracing the rugged terrain, and represented the basic technique for the construction of buildings, mostly in rural environments.

The truth is that the construction of dry stone walls is a real art, recognized as a World Heritage Site by UNESCO (organisation established to promote peace and cooperation between Nations, through education, science, culture, communication and information).

The dry stone walls are a part of the traditional landscape that reflects the historical, cultural and natural heritage of a Country. They are simple and complex at the same time, they are unique in their range of shapes and stones used but equally universal and widespread throughout the world. They also represent a model of sustainability and circular economy, because "every stone is good" and finds its place in the wall: there are therefore no waste materials.

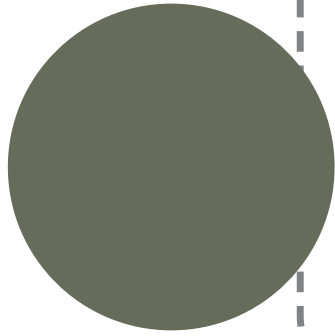
There are no fixed rules for the construction of dry stone walls: each one must be tailored to the area where it is built, to the material available and to the people who make it.

The spaces between the stones, without cement mortar, represent a perfect habitat for many animals (insects, spiders, snails, reptiles, amphibians, etc...) and plant species, thanks to the presence and alternation of warm, cold, humid, dry, sunny and shaded spaces.

To begin, it will be necessary to make a small dig to give strength to the foundations of the wall, that will have to be built up starting from the larger stones, and then reduce in size going up. It may seem complicated and difficult to achieve, but to host the fauna in the wild garden, even a pile of stone is enough. Find out more in the next pages!



# The dead wood



Making a pile of wood in the wild garden, could be a good idea. As well as dry stone walls and piles of stone, the spaces that are shaped are an excellent shelter for many animal species, mainly for smaller ones such as insects, spiders, amphibians, reptiles, etc.

In addition, the decaying wood represents a real treasure of biodiversity. For this reason, when a tree falls or dies, it would always be useful to leave it in its place (obviously if it does not represent a safety problem!) as it can offer shelter and food to several animal species.

Just think of the xylophagous beetles (the insects that feed on wood) such as the great capricorn beetle (*Cerambyx cerdo*), whose life cycle is closely linked to the presence of rotting wood: the eggs, laid under the bark of old trees, generate the larvae which feed on the fibres of the wood. The larva takes three years to complete its development, digging large tunnels a few centimetres wide, and obtaining at the end a large cell where it turns into nymph. After almost a year, it will flit and become an adult who will continue to visit the trees where it has developed, not moving far away from them.

Other species too, even if their vital cycle is not so closely connected to the presence of dead wood, find shelter in the old trees fallen on the ground, and in the piles of wood. Reptiles will use it as a site for thermoregulation (you'll find out more in the next pages) but also to go into hibernation during the winter. Amphibians hosted in your pond, will find shelter there, both in the hottest days (as a site of aestivation) and in the coldest ones (as a site of hibernation). The same goes for hedgehogs and many other small mammals!

# Reptiles and thermoregulation



Reptiles are called cold-blooded animals: why? The answer is very simple: they are (as well as the invertebrates, the fishes and the amphibians) ectotherm animals, that is, not able to regulate their own body temperature, which therefore depends on the environmental one.

The word thermoregulation means indeed the ability of organisms to increase or reduce their body temperature, depending on environmental factors.

While mammals and birds (called homeotherms) are able to regulate their temperature (also thanks to the fur and feathers!), for reptiles (as well as for invertebrates, fish and amphibians) this can only be done by their behaviour: to increase body temperature, they expose themselves to the sun, and are forced to rest when the weather is not suitable, as in winter.

For this reason, they are looking for shelters such as dry stone walls, piles of stone or wood. These are indeed a shelter if there's a danger, thanks to the many crevices where they are able to insert, but at the same time they can stay on rocks and stones that, heating, allow them to increase their body temperature.



# The hedgehog



**Binomial nomenclature** → *Erinaceus europaeus*  
**Common name** → Hedgehog

It's a small insectivorous mammal (not a rodent, be careful!), from 22 to 30 cm long and with a weight varying from 300 to 1500 grams, depending on the age and the season. The hedgehog has a grey-brown fur, it's unmistakably characterized by a coat of spines, covering front, sides and back. An adult hedgehog is covered by 6.000-8.000 spines, striped black-beige-white, about 2 cm long. They are nothing more than hairs, modified to defend against predators: when in danger, the hedgehog curls up and immobilizes, becoming a "ball" of spines. It is almost nocturnal, when it can find more prey, and gets to cover up to 3 km to look for food.

## So, what does he eat?

It feeds on earthworms, millipedes, slugs, snails, beetles and caterpillars, rarely on small rodents and eggs of birds brooding on the ground.

## And in winter... Let's sleep!

With the approaching of the cold season, the hedgehog no longer finds food, so the best solution is to go into hibernation: in autumn it takes refuge in a den under piles of branches and dried leaves, minimizing its body activity and thus saving energy. The important thing is that before entering this phase of "pause", he was stuffed and ate food particularly nutritive, since during hibernation he may lose almost 20% of his body weight.

## The habitat

The hedgehog visits different kinds of environments, both open (like the countryside) and rich of vegetation (such as woods and bushy areas). It is particularly easy to observe it even in vegetable gardens and lawns, so it will definitely be a guest in your wild garden! The den can be built under the piles of branches that are sometimes left after pruning, or under the wood for the fire piled up covered, sometimes even under anything that gives them a shelter. The shelters created specifically for them in the garden, are very appreciated  
 (→ see laboratory sheet "Let's build a shelter for the hedgehog").

# The hedgehog



## Fun fact

The female can give birth up to 10 small hedgehogs. During the summer, a hedgehog can change the den up to 20-30 times. When he is looking for food, he makes characteristic sounds, like puffs and sneezes. During the courtship period, strange noises are emitted, both by the male and the female. Generally, the hedgehog can blow, pant, whistle and shout to express different emotional states and needs.

## Beware... crossing hedgehogs!

The existence of an increasingly dense road network, makes particularly dangerous the crossing of those animals that need to move looking for food, for a new lair and for a new partner in the mating season. The hedgehog too, which as mentioned above can cover up to 3 km per night, falls among these. The chance of getting hit for him is very high, because when he sees the lights of a car, instinctively he does not run away, but rolls into a ball. This is the technique he uses to protect himself from predators, which unfortunately is not fruitful in front of a car. When the traffic allows it, if you see a hedgehog about to cross or that is already crossing, it should be picked up gently and placed away from the road as much as possible.



# The toad



**Binomial nomenclature** → *Bufo bufo*  
**Common name** → Toad

It's the largest native amphibian in Europe. In particular, the toad belongs to the order Anura, that is, without the tail; it has a stocky and strong body, of colour varying from dark brown to dark red, or yellowish grey. The skin is dry and covered with small warts.

## What do they need these warts for?

They are glands that secrete a kind of protective mucus that the toad uses to keep his skin moist, thus protecting it from dehydration.

If it feels at risk, from the glands placed behind the eyes (called paratoid), it produces a toxic substance called bufotoxin, dangerous if it comes into contact with the mucous membranes. What it means? If a predator like the grass snake, bites the toad, its mouth will come into contact with this toxic substance. So, it's nothing more than a toad's defensive weapon!

## Remember

The bufotoxin is not dangerous to the touch, so if you touch a toad, nothing will happen; the important thing is not to touch your eyes, because they might get irritated and burn. The basic rule, however, is not to touch the toad and amphibians with your bare hands, because you could be a vehicle of some pathology. The skin is a particularly essential organ for the amphibians, they also use it to breathe!

The eyes of this amphibian are big, little protruding, and of copper, orange, dark gold or reddish-brown colour. The horizontal pupils are especially functional to the night and downward view, considering that the search for the prey takes place mainly on the ground.

# The toad

## What do they feed on?

Insects, worms, isopods, arachnids and snails.

It holds the tongue bent at the front of the lower jaw, then quickly push it outwards when capturing an animal. The prey remains taped to the sticky tongue, then is carried in the mouth and swallowed whole.



## Habitat

The toad can be found in woods, cultivated fields, meadows, vegetable gardens and lawns. It lives in wet places such as lakes, rivers, ponds and moats, only during the periods of the reproduction, the coupling and the deposition of the eggs, but only if the waters characterizing them are steady or slow-flowing, and not too deep.

Moving mainly at night, it spends the daytime under stones, in the rocky crevices or in dens dug in the ground with the strong forelegs; it is not unusual, however, to see it move during the day when it rains.

## Other information about the toad

When attacked, the common toad adopts a characteristic stance, inflating its body and standing with its hindquarters raised and its head lowered. It's habitual, it uses to go back to the same breeding site every year. In the first warm days, towards the end of the winter, the toads begin to move from the hibernation sites up to the reproduction places, making a sort of mass migration. They are able to travel up to 2 km to get to the chosen wetland! Unfortunately, they need to cross very busy roads, risking of being run over.

The female lays a long gelatinous string which may contain 3000 to 6000 eggs.

## A tricky situation

The toad and generally all the amphibians, at the present day, are still strongly under threat and steadily decreasing, mainly due to the slow destruction that are suffering their habitats, mostly the aquatic ones where they reproduce.

# Amphibians: animals living a double life

Do you know who the amphibians are? Salamanders, newts, frogs, toads and others, belong to this group. But what does the word "amphibians" mean? It comes from the Greek *amphibios*, which means "both kinds of life"; this is because, despite having colonized the terrestrial environment, in their vital cycle they preserve an aquatic stage. Remember that amphibians were the first vertebrates to appear from the water and colonize the landmass more than 400 million years ago!

## Some characteristics of amphibians

- Ectothermic (cold-blooded) animals, their bodies are not able to produce heat and their temperature changes according to the environmental one.
- Their skin is uncovered and has glands that secrete some sort of mucus necessary to keep it moist and protect it from bacteria or other microorganisms. In some species, these glands produce poisonous substances.
- The skin is also used in breathing.
- The four legs are suitable for moving on the ground, but also for swimming.
- Some have a tail, others don't.
- The eggs laid, are covered by a gelatinous envelope.
- The males of some amphibians, are able to emit sounds to attract the females and drive away the competitors, thanks to the presence of air sacs.
- Many have bright colours, especially to discourage any predators. Each colour is associated with the ability of amphibians to produce toxic substances.



## Amphibians: animals living a double life

### ...with the tail and no tail

Amphibians are divided into Urodela and Anura.

The urodela (meaning "visible tail") are those amphibians with the tail, both in the larval and in the adult phase, such as salamanders and newts. Many people, for this characteristic, confuse them with the lizards, but be careful, they are reptiles and not amphibians!



The anura (meaning "without tail") on the opposite, lose the tail during the metamorphosis from tadpole to adult, such as frogs and toads.

## The life cycle... aquatic and terrestrial stages

## Amphibians: animals living a double life

Most amphibians have a two-phase life cycle: the adults, able to live on the mainland, during the reproductive period move in small and big water collections for laying the eggs. When they hatch, come out the larvae which breathe through the gills, and have therefore, an aquatic life. But let's go with order:

- The adults lay the eggs in water during the reproductive period, which changes depending on the species and the place, but in general, matches to the spring or the end of the cold season (between February and May). Some amphibians move from the place where they have spent the winter in hibernation, towards the collection of water where they will lay the eggs. Others spend the hibernation period directly near the breeding site. This also changes according to the species and the place.
- Eggs may be laid in gelatinous piles between the vegetation of stagnant waters or streams with weak current, such as some frogs. Toads lay their eggs in gelatinous strings, linked between the stems of aquatic plants. The newts finally, lay eggs singularly, not in clusters, fixing them also to the aquatic vegetation.
- From the eggs of the Anura (without tail) develop tadpoles, from the Urodela ones (with the tail) the larvae. The tadpoles, completely different from how they will be when adult, do not have the legs, have outer gills and a strong and waving tail that allows them to swim. The larvae have external gills too, but on the contrary, they look like miniature adults.
- The metamorphosis. In the Anura, the tadpole begins first to develop the hind legs, soon after will follow that of the forelimbs. At this point, the distinction between head and trunk begins to be seen, with a progressive reduction of the tail, until its complete disappearance. During the metamorphosis develop the lungs, which take the place of the gills when the young individual will leave the aquatic life. In the Urodela, the larva develops early the legs, and during the metamorphosis does not lose the tail, but undergoes a progressive reduction of the membrane that surrounds it. The growth is accompanied by the development of the lungs, which at the end of the metamorphosis, take the place of the gills.

At the end of this process, Anura and Urodela are ready to go out on mainland.

# Aquatic insects: life cycle

Ponds, puddles, small lakes, small water courses and other smaller wetlands, often appear as a habitat of low importance, when in practice they are rich in biodiversity.

There are many insects that live in the still or flowing waters, and that can spend inside them all the vital cycle or only the larval phase.

Think that the presence of some of them in these environments, is so important that it is used to evaluate the health of the body of water where they are located.

## How they breathe in water

Some have evolved to be able to absorb the oxygen available in the water, others continue to need the oxygen existing in the air, thus emerging from the water to breathe. Among the latter are the nepidae, also known as water scorpions. It's a hemipteran with a particular structure called siphon, which allows it to take the necessary oxygen, rising to the surface. In other species, the air is trapped to form an air bubble under the sclerified and hardened wings (called elytra) as in the great diving beetle, or under the abdomen as in the backswimmers; in this way, the oxygen passes from water to the air bubble, and is then absorbed by the organism. The larvae of the dragonflies and some mayflies, have instead adapted to absorb the loosed oxygen in the water, developing special organs, the spiracles.

As mentioned above, some aquatic insects are linked to water for the entire vital cycle, from the egg to the adult stage, whilst in others only the larval one. Let's see some examples:



## Aquatic insects: life cycle

### Water scorpion



**Binomial nomenclature**

→ *Nepa cinerea*

It's so called for its resemblance to scorpion, especially for the developed forelegs (used to grab the prey) and for the siphon, used to breathe the air. The female lays the eggs in spring, on the aquatic vegetation. The larvae that are born, live in the water and perform 5 moults before becoming adult. The young look like miniature adults.

### Great diving beetle

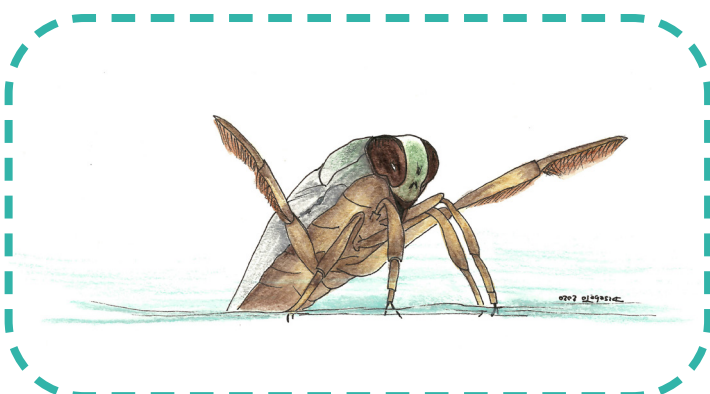


**Binomial nomenclature**

→ *Dytiscus marginalis*

The eggs are laid on aquatic plant leaves, and being an operation that requires time and accuracy, it can go on even for ten weeks. The developing larva looks completely different from the adult: it has a narrow and slender body, rather than oval and flattened. At the time of the final metamorphosis to become adult, the larvae stay hidden in the mud of the pond. All stages of development are aquatic.

### Common backswimmer



**Binomial nomenclature**

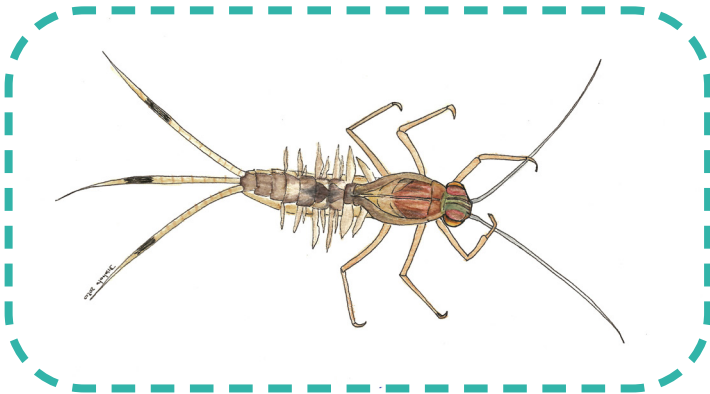
→ *Notonecta glauca*

It swims upside down, "rowing" with the hind legs. In the adult stage, it can fly to move from one water basin to another. In spring, the female lays the eggs in the stems of aquatic plants. The young stages are aquatic and similar to the adult one, but without wings.

## Aquatic insects: life cycle

### Mayfly

The larva is aquatic, the adult is terrestrial. Its name is due to the particularly short adult life, 1-2 days. The larvae breathe through the spiracles, feed and grow by systematically changing the exoskeleton, making the moults. They live in the mud or stuck to the rocks on the seabed. They have "wing bags" containing those that will become wings in the short adult phase.

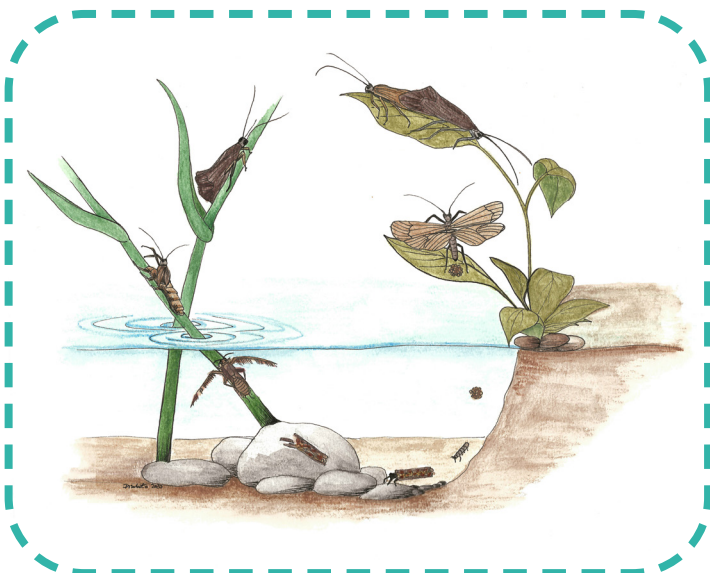


Binomial nomenclature

→ *Cloeon dipterum*



### Caddisfly



Binomial nomenclature

→ *Trichoptera*

It's so called because the wings of the adults are covered by short hairs. The larvae use debris, sticks, pebbles and pieces of algae of the aquatic environments where they live, to build a protective case, a sort of "mobile home". Just before the larva turns into pupa, seal the front and back openings, leaving only a small hole for the water to flow through, with the oxygen necessary to breathe. Inside the case, the transformation into adult takes place. Once completed, it will swim towards the surface to get out and fly.

# Looking for the aquatic insects

The underwater world is one of the most fascinating shows of nature. If you start to look at it, your doors will open to an attractive microcosm.

## Just follow these simple tips:

- Always carefully explore any “collection” of water: streams, ponds, pools; even a tiny puddle can host interesting life forms
- Always bring with you a net and some containers: tubs, jars, pots, etc. Small wildlife boxes are good
- Dip the net and pass it very softly on the seabed, between the mud and vegetation
- Pull up the net and put everything into the different containers
- Now you just have to start the watching!



# Dragonflies: awesome predators

Dragonflies are among the most fascinating insects that you can observe (from spring to autumn) while flying quick and fast near puddles, ponds, lakes, streams, rivers or flooded meadows.

They belong to the order of the Odonata, these are the characteristics that make them unmistakable insects:

- A long and slender abdomen, divided into 11 segments
- 4 wings, usually transparent, characterized by thick and thin veins. These wings can move separately from each other, allowing the insect to fly backwards
- Very developed and compound eyes, which make the dragonfly sensitive to any movement
- Short antennae
- A showy and brilliant colouration, usually blue, purple, green, bronze, scarlet, pink, red, yellow, often combined with each other
- Developed and bent forward legs, used for perching and climbing on plants

## The dragonflies are divided into

### Zygoptera

The term means “similar wings”. Also known as damselflies, they keep their wings closed, backwards on the abdomen, when they are resting. The eyes are placed on both sides of the head, distant from each other.



**Binomial nomenclature** → *Enallagma cyathigerum*

### Anisoptera

The term means “different wings”. These dragonflies keep the wings spread even when resting, and the fore ones are bigger than the hind ones. They're better at flying than damselflies and have two big eyes joined together.



**Binomial nomenclature** → *Anax imperator*

## The number one predator

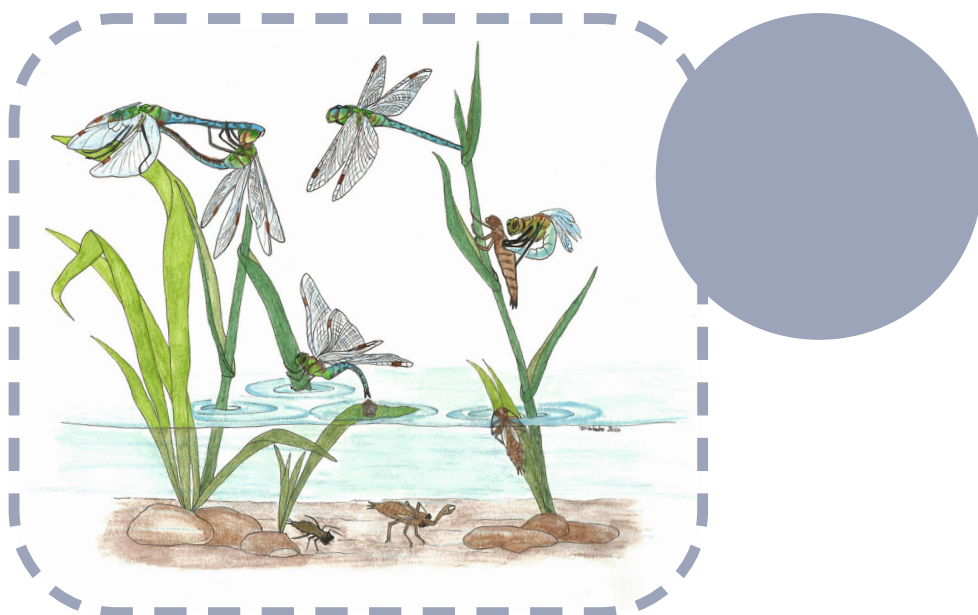
Dragonflies are skilful predators, both larval and adult.

The larva, which has an aquatic life (see information sheet on the vital cycle), usually lurks in the mud or in the middle of the lake vegetation, waiting for the right moment to catch a prey. In order to do it, it uses what is called "mask", that is the hinged labium, which at the moment of the attack is extruded to capture, with a fast movement, even fast animals. The larvae feed on mayflies and chironomids, molluscs, tadpoles, newt larvae in the early stages of development, fry (young fishes) and also other dragonflies. The adult dragonfly has instead an aerial life: captures and devours its prey in flight, launching a fast and particularly silent attack, that succeeds in 95% of cases. This makes this insect, one of the most formidable predators in nature. Its main preys are gnats, mosquitoes, butterflies, mayflies and caddisflies. It has a mouthpart suitable for chewing the preys, characterized by strong toothed mandibles.

## Dragonflies: awesome predators

### Life cycle

The peculiarity of the life cycle of dragonflies and many other insects, is to have an aerial phase (adult) and an aquatic phase (larva): let's see it more closely! To mate, the male grasps the female until it takes a strange position that looks like a heart. The female lays the eggs in water, leaving them in the vegetation or spreading them: in a time ranging from 2 weeks to a few months, depending on the species, originate aquatic larvae. These larvae moult several times, until they climb up a reed and get out of the water. Once done, the metamorphosis into adult begins: the exuvia covering the larva, dries and break at the level of the abdomen. The dragonfly comes out of this envelope, begins to spread the wings and extend the abdomen, reaching the final size; this process can last from a few minutes to about two hours.



### Bioindicator

Dragonflies are considered "bioindicators" of environmental health. They live in clean water, therefore the reduction or disappearance in a stream, lake or other aquatic environment, may suggest a decline of its quality.

# What to do in spring

## Calendar: what to do and when

**As you know, spring is time for awakening and preparation:**

If you want to place hedges, we suggest you to do now. In spring they take root well, while in the most advanced season they will have difficulties in doing so.

The same goes for pruning: take advantage now, before the plants start to blossom and the first leaflets start to sprout.

Spring is also the best time to prepare the soil to welcome new plants: it's time to dig and fertilize!

In spring you can safely rake the foliage from the ground. After the cold, the insects have all awakened and there is no danger of hurting them. The night frost is now behind, so it is no longer necessary to protect the roots of perennial plants.

We advise you to orient your creepers by fixing them on specific holders.

This is the right time to sow annual plants.

In some areas of the lawn, let the grass grow and cut it only at the end of the summer (after the withering of the plants) or in winter. Regularly water new plants and young plants just germinated from seed.

Build your pond at the beginning of spring, just past the winter cold. When the amphibians come out of their hibernation state, they will find it ready to welcome their eggs.

The beginning of spring, is also the best time to set up the nest boxes, the mangers and to build a bug hotel. If you don't waste time and choose the right time, you will enjoy the presence of your little friends for the length of spring and summer!



# What to do in summer

## Calendar: what to do and when

**Summer is a bit more settled and "quiet": your wild garden does not need the proceedings that characterize preliminary periods such as spring and autumn. However, some maintenance work is still needed even in this interval. Here are some tips:**

Direct your creepers and secure them on proper holders.

Cut dry flowers: you will give the plant new life-force and more opportunities to produce new flowers.

This is the right time to harvest the seeds of the plants after the decay: you will sow again the following year.

Do not trim plants and bushes in summer: you may kill and damage eggs and chrysalises.

Let the grass grow more than usual (5-9 cm).

Water the new plants, paying particular attention to those in pot which, living in a more restricted space and with a limited quantity of soil, seek to dry up more frequently.

Remove some of the excess aquatic plants in the pond. Remember: do not throw them away, but leave them wet on the ground near the water. In this way, you will give any animals the chance to come back to the pond.

Install a bowl full of water in the garden, so the birds can drink. If in this period is full of insects everywhere, it's not the same for water.

# What to do in autumn

## Calendar: what to do and when

**Autumn is a very fragile period: nature joins a global state of dormancy and many guests of your garden reduce to the minimum their activity, saving their energies. Temperatures drop, food resources are few and suitable protection is needed. Many plants turn off vegetative activity. Many animals hibernate, while others continue to be active even in the colder months. Whatever choice they make, they still need a lot of energy... It is therefore a very difficult time, but we are getting ready for the future: we will return in the spring, stronger and fuller of life than ever...**

**But what to do in this period to help your garden and your guests? Here are some simple tips for you:**

If you haven't already done so in early spring, autumn is the perfect time to place the nest boxes for your funny guests. By placing the shelters in this period, your friends will have enough time to locate them, inspect them and see if they are suitable for their needs, before occupying them in the spring. As you know, your guests are rather wary, careful and suspicious...

Don't throw away the withered flowers. Leave them on the plant, so they can spread their seeds.

This is the perfect time to plant spring bulbous.

If you did not do it in the early spring, now is the time to plant shrubs and trees.

If you didn't realize it at the beginning of spring, autumn is also the best time to get to work for the pond. We recommend you to proceed to the dig and let it naturally fill with rainwater.

If you already have ponds in the garden, remove the leaves that fall from the trees during this period.

In late autumn (November) it becomes essential to distribute food to birds. Be careful, however, not all foods are good! Check in the laboratory sheet which are the most suitable.

# What to do in winter

## Calendar: what to do and when

**In winter everything is at rest and the garden requires very little care. However, there are some small activities that we should do in view of the arrival of next spring. Here are some small suggestions:**

In protected places, you can already carry out preventive sowing of some plants.

At the end of winter, before spring blossoms, we advise you to do all the trimming. This is the best time, now that the sap is stopped. If instead you trim your plants in the late spring, when the lymph circulation will be reactivated, you will cause the "bleeding" in correspondence to the area of the cuts, from where the liquid will flow.

Remember: make sure that snow does not collect in excess on the branches of trees and shrubs, damaging them with its excessive weight. We recommend you to regularly shake off the snow from the branches of trees, shrubs and hedges.

Clean and grease your gardening tools and get your seeds ready for the next spring season.

Protect the most fragile and delicate plants from winter and secure the pond from frost, clearing it from the ice. In addition, we advise you to remove snow from ice places, to allow light to filter.

Properly supply your mangers and spread greedy food on the ground. We suggest you to combine the availability of seeds, with pieces of apple and other fruits.

Towards the end of winter, when the snow has melted, begin to spread compost on your flowerbeds and continue to provide food for the birds, both on the mangers and on the ground, they still need it!

We also advise you to minimize any trampling of the lawn: if the terrain is frozen, you could damage it.

In winter, do not touch the stumps and trunks of dead plants, leave them entire on the ground. They may contain many caterpillars, chrysalises and larvae of xylophagous insects.

Absolutely avoid digging the ground in winter, unless it is strictly necessary: many chrysalises spend the winter period underground.



# The webcam

You just saw a great tit flying to that nest box you built and placed in your wild garden, so you're thinking: who knows what it's doing inside? There will be eggs and it will be hatching them? Or maybe the youngs are already born so it went out to get food for them? Well, there is a way to find out! Thanks to the new technologies, we have the chance to install webcams inside the shelters in our wild garden. In this way we'll be able to film inside, and find out what their guests do, without any trouble.

Remember that installing a webcam in an already busy shelter could be a problem, because you might disturb the animal that chose it as "home" and risk that it will leave. The advice we give you is therefore to provide the shelter with a webcam right away. In this way, in addition to not disturb anyone, you will have the opportunity to observe all phases of nest occupation!

Think about what a unique opportunity it can be to observe the spawning and the hatching of the eggs in the nest occupied by the blue tit, or even the continuous going on to bring the food to the young.



Have you ever thought about what happens inside the bat box? Would you like to see up closely, what bats do during the day inside it or understand how it is used during the year?

All this will be possible thanks to the webcams that you can install in the shelters of your wild garden! Those currently on the market, give us the opportunity to make wireless connections, are much easier to install, and connect directly to the school PC!

For small shelters such as nest boxes and bat boxes, at the time of construction it may be necessary to consider building them higher than about 10 cm. It's necessary to avoid that the webcam inside is too close to the animals, creating clutter and providing a less sharp shot. This obviously depends on the webcam you decide to install, so we suggest you to choose models that are well suited to the measurements of the nests.

Once installed, we will just wish you... enjoy!

# The phototrap

Do you know what a photo trap is and how it works? The word "trap", already makes us realize that this device will serve to "capture" something, but what? As you may have guessed, it captures images exactly as any camera does. The difference, however, is that it does not need you to be behind the lens, with the risk of scaring the animals you want to photograph, the phototrap does everything by itself!

It's able to capture autonomously everything that walk past, thanks to a sensor, that is, a mechanism that feels the movements and therefore allows it to take photos, and in some cases even videos, as soon as it detects something (the function to record videos depends on the model). Phototraps today, are one of the main tools used by expert naturalists and biologists to study the fauna living in a specific place. So, what better tool to observe the movements of the animals that have chosen to visit your wild garden? You can see the hedgehog while at night it hunts insects and snails, or the toad that on wet days comes out of the shelter that you have specially created, or finally, if you are lucky, the woodpecker while tamping his beak on the bark of a tree! At night I said? Yes, I said at night! Because the phototrap can take photos and videos even in the dark, thanks to the equipment of infrared leds that are used to make "light" when the sun has set. This is a great advantage, especially for observing those animals that usually move at night and rest during the day. In addition, many trap models have flash, so you can take colour photos even at night.



The application of this valuable ally, is very important. The positioning is very simple, through the strap supplied or with the use of plastic clamps: in a short time, you can fix it on the trunk of a tree or on a pole specially placed in the ground.

You have to properly evaluate the area of your wild garden that you want to observe. For example, if you are interested in studying the behaviour of the hedgehog who lives in the shelter built for him, you will place the phototrap in a point that manages to capture well his "house". Or why not, point it towards the pond where the animals will surely approach to drink. The choice is yours!

# The binoculars

There are animals that will move in your wild garden, especially at night. This is in practice a feature common to many mammals that tend to move with darkness, both because for some it is the best time to look for food, and because it is the one in which man moves less. As we said, the phototrap is a precious ally to observe their behaviour.

What instrument can we use instead to observe who lives and hangs around the wild garden during the day, and that allows us at the same time not to get too close to not scare him?

Here comes into action a tool that surely you all already know, and maybe you have at home: the binoculars!

The binoculars are the optical observation instrument, whose peculiarity is to magnify what surrounds us and, in many cases, to lighten what is being observed, allowing us to capture details that otherwise we would not be able to see with the naked eye. Also, as the term itself suggests, binoculars means "two eyes", so we will have the enlarged vision of what we are looking for both our eyes.

There are many types and sizes for sale, from those that allow you to enlarge an image less than 5 mt from you, to those that make you see all the details of something that is more than 500 mt away. You will need to purchase the most suitable model depending on what you want to observe with binoculars. To observe the fauna in your wild garden, it will be good, for example, a 7x50 binoculars, where the first number indicates the magnifications, the second the diameter of the objective.



All the binoculars are equipped with the possibility of focusing: normally they have a sort of small wheel at the centre between the two eyepieces, which if moved makes the images sharper according to your optical parameters, that is, your eyesight.

But such technology is used to observe who? The binoculars are used to observe all the fauna, keeping at distance from it, and it is certainly the main tool of the birdwatcher. And who is this? It's simple: who watches the birds. To practise bird-watching, you don't have to be a bird expert, you also have to be a simple nature lover and curious! You could observe the blackbird as it moves among the shrubs of your wild garden looking for fruits, or the blue tit as it comes out of the nest box that you have built it, looking for food for its young. Also take a notebook where you can write down your observations, and a guide on birds, which will allow you to recognize the species less familiar to you.



# The microscope

Instead, to observe the details of those animals too small to be noticed by the naked eye? Here comes into play the microscope! Have you ever used one? Do you know how it works?

The microscope is an instrument that allows us to observe, enlarging them, the details that would otherwise be invisible to the naked eye. It consists of an optical part (a lens system and a light source) and a mechanical part. The lens closest to our eye is called eyepiece, the one closest to the object to be observed, is called objective. To have a clear and not faded or blurred image, the microscope too is equipped with a focusing system, which allows you to find the point of maximum resolution. How much is magnified the object you are observing? It depends on the value indicated on the eyepiece and the one reported on the objective. For example, if the first is 10x and the second is 40x, we will have a magnification of 400x, because the two numbers must be multiplied among them.

There are obviously several models of microscopes, depending on the function to which they must perform. You've collected some aquatic insects from the pond of your wild garden, both larval and adult, and you want to take a closer look at them? Well, you need a stereomicroscope, equipped with two eyepieces and two lenses, which can zoom 100 times the insect you collected, allowing a three-dimensional view. Today there are also digital microscopes, equipped with a camera instead of the eyepiece, which transmit the magnified image directly on a monitor, such as that of the computer; in this way, you will not observe your insect magnified in the microscope, but directly on the PC. Even the smallest residents of the wild garden will have no more secrets for you!

