PHOTOGRAPHING

BUTTERFLIES & DRAGONFLIES

MARK OVERMARS

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Preface

During 2023 I spent considerable time learning everything there was to know about photographing all sorts of insects in various ways. This led to the book *My Journey into Insect Photography* that you can download for free from my website www.insectphotography.org/book. So, in 2024 it was time for a new challenge, and I decided to focus further on photographing butterflies and dragonflies. These are of course also insects, but the techniques required to photograph them are rather different from photographing bees or bugs.

Butterflies and dragonflies are beautiful and often large, colorful insects, and you can find them everywhere. Most people will have taken a shot of a butterfly at some time, but to consistently create beautiful pictures of these insects is quite a challenge. Small insects you photograph most reliable using a macro lens to shoot them from a short distance. But butterflies and dragonflies tend to fly away when approached. So instead of a macro lens, a telephoto lens is normally the better choice, allowing you to photograph from a greater distance, but also presenting new challenges such as a reliance on natural light rather than a flash, and the necessity of paying more attention to composition and background elements.

You see Large White butterflies everywhere, but to create an interesting shot requires some skill. 350 mm telephoto lens, 1/350 s, f/8, ISO 800.

This book describes all I learned during the past year about photographing butterflies and dragonflies. I will discuss the best equipment to use, required photography techniques, composition, the use of light, processing your images, and a lot more. The book also contains ideas for several special projects, such as photographing caterpillars, flying insects, and moths. The book contains some 200 shots of butterflies and dragonflies I took during 2024. These images were taken in the

Netherlands, but you will find similar insects everywhere. For each shot, the focal length of the lens, shutter speed, apertures, and ISO value are given. When a flash was used this is also indicated.

The book is meant for amateur photographers like me, that are interested in shooting butterflies and dragonflies. When photography is a hobby, you work in a different way from professionals. For example, I hardly ever use a tripod, I don't spend much time researching or planning my outings, I go out during normal hours and simply shoot whatever I find.

Equipment and software

Unless indicated otherwise, for this book I used the following equipment:

- Camera: Canon R7 mirrorless APS-C camera.
- Lenses: Canon RF 100-400 mm telephoto lens and sometimes a Canon RF 100 mm macro lens.
- Flash: Godox V350 speedlight.

The images in this book have been processed using ON1 Photo RAW (www.on1.com). This is a photo editor with functionality similar to Adobe Lightroom plus the most important elements from Adobe Photoshop, like the use of layers.

Contents

The book consists of eight chapters that are largely independent. So, you can easily skip parts you are not interested in. I do, however, recommend you always read chapter two on photography techniques and equipment, as the topics discussed there are important background for the information and recommendations presented in the rest of the book. Each chapter consists of several sections, each discussing a particular topic. In the book you find many images of butterflies and dragonflies that hopefully give you some ideas on how to shoot them. I hope you will have as much fun as I had while capturing these beautiful creatures.

- Chapter one gives some background information about butterflies and dragonflies. If you want to photograph something it always helps to have some knowledge about the subject. For example, this information makes it easier to find certain butterflies or dragonflies.
- Chapter two discusses photography techniques and the best equipment to use. Aspects like magnification factor, depth of field, focusing, and exposure settings are explained in the context of photographing butterflies and dragonflies. I also discuss the best cameras and lenses to use.
- In chapter three we get started. Where do you go and what do you take with you? How do you approach the insects and take the best shots? Also, I discuss sorting your images and identifying what insects you photographed.
- Chapter four discusses the photographic process in more detail, including more specialized techniques. What is the best point of view for the shots? How to create beautiful blurry backgrounds that draw attention to the subject? How to take a close-up shot? I also describe how to apply focus stacking to increase the depth of field.
- Composition is important for all pictures, and butterflies and dragonflies are no exception. In chapter five I discuss basis composition principles. Where do you place the insect in the frame? How do you get a harmonious image, or a strong contrast? What is the role of the foreground and the background, and how do you use symmetry and repetition?
- Without light it is impossible to take pictures. With the correct lighting, butterflies and dragonflies become considerably more beautiful. In chapter six I discuss the use of ambient light, flashes, backlight, and under- and overexposing images.

- Images can be improved by processing them with photo editing software. Many people are reluctant to do this, but modern photo editors are rather easy to use, and it is possible to enhance your shot with just a small investment in post-processing. Chapter seven discusses the most important techniques and how to apply them.
- Finally, in chapter eight I discuss some special projects. How to find caterpillars and photograph them? How to shoot flying dragonflies? How to photograph in tropical butterfly gardens, and how to attract and photograph moths at night?

The Garden Tiger is a beautiful moth which most people have never seen. 100 mm macro lens, 1/320 s, f/13, ISO 400, flash.

Mark Overmars, May 2025

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1. Butterflies, moths and dragonflies

When you want to photograph certain subjects, it always helps to have a bit of knowledge about them. Hence, we start this book with some background information about butterflies, moths, and dragonflies. We discuss the similarities and differences between butterflies and moths, and between dragonflies and damselflies. We also look at the life cycle of these insects and you will find some tips on when and where you can best photograph them.

Butterflies

Everyone knows the Whites and the Peacock butterflies. But what different types of butterflies are there and when is the best time to photograph them?

Everyone has an idea of what butterflies are. The scientific name for the insect order of butterflies is **Lepidoptera**. There are more than 180,000 species of butterflies worldwide, but most of them live in the tropics. Moths also belong to this order. Some 165,000 species are moths while there are "just" 17,500 species of butterflies.

Almost all butterflies are **diurnal**, meaning that they are active during the day and sleep at night although there are a few species that are **nocturnal** and are active at night. With moths, it is the other way round. Some 80% of the species are nocturnal. But there are still 30,000 species of moths worldwide that are active during the day. So, there are more day-active moth species than butterfly species. Moths are discussed further in the next section on page 5.

Everybody knows the Whites. This is a Large White butterfly. 400 mm, 1/350 s, f/8, ISO 500.

A flying butterfly is the adult stage of a butterfly's life cycle. A butterfly starts as a tiny egg, from which a caterpillar emerges (larva). When the caterpillar is large enough, it forms a chrysalis (pupa) in which the caterpillar metamorphoses into a butterfly. The main goals of the adult butterfly stage are to avoid predators, find a mate, and reproduce. More information about the life cycle of butterflies can be found in the section on page 8.

Butterflies come in many different sizes. The smallest butterfly, the Western Pygmy Blue Butterfly, has a wingspan of just 13 millimeters, while the largest one, the Queen Alexandra's Birdwing, has a wingspan of 27 centimeters. Because of the big size differences, it helps to photograph with a zoom lens because it allows you adjust the focal length to accommodate a wide variety of distances from and sizes of the butterflies.

Butterflies have many different colors. Some, such as the Cinnabar moth, use bright colors to indicate that they are poisonous. Other butterflies, such as the Peacock butterfly, use the markings

on the wings to scare off enemies, yet other butterflies have camouflage colors that make them difficult for both predators and photographers to see.

Flying butterflies seem a bit clumsy because they flutter back and forth, but that is the same trait that makes them harder for predators to catch. Flying butterflies can be looking for food. Males might be patrolling, and females might be looking for a place to lay eggs. Fluttering makes it very difficult to shoot flying butterflies. Some butterflies can fly very fast. For example, the Southern Dart can reach a speed of close to 50 km per hour. Some can also fly large distances. Monarch butterflies migrate from Canada to Mexico and back every year – the journey takes four generations to complete.

In most temperate areas you won't see butterflies during the winter period. The first butterflies to appear at the end of the winter are species that hibernate as an adult butterfly. But most species only appear as adults in late spring. Their caterpillars must first grow by eating many new leaves before metamorphosing into an adult. You see most butterflies during summer, although some species only appear during particular months. If you want to photograph a particular species look up when and where they can be found. One of the most accessible and comprehensive sources for this information is the website https://www.inaturalist.org/. See chapter 3 on page 46 for more information.

The beautiful Orange Tip butterfly in the Netherlands only flies in the months of April and May. Only males have the orange wing tips. You can't photograph it during the rest of the year. 400 mm, 1/350 s, f/8, ISO 200.

Some species of butterflies can be found almost anywhere. You also often see them in gardens. Other species only live in very specific areas, such as heathlands, areas with sandy soils, or peatlands. You can find such information on the website https://www.inaturalist.org/ as well. There are also numerous guidebooks about butterflies. It's best to get one for your own country.

The best chance of seeing butterflies is during warm weather, when the sun is shining. It is also better if there is not too much wind. The butterflies are active then, so you often see them drinking nectar on flowers, or flying around looking for mates. Butterflies are cold-blooded, like all other insects, and can frequently be found with their wings spread out to warm up in the sun. The muscles

of their wings need to warm up to about 25 degrees Celsius before they can fly properly. They use the sun for this, but they can also vibrate their wings to warm them up. If you go out early in the morning, the butterflies are usually too cold to fly. This makes them easier to photograph, but they are more difficult to find.

By placing the correct plants in your garden, you can attract lots of butterflies, like these Red Admirals in my garden. 100 mm, 1/320 s, f/8, ISO 320, fill flash.

How to create a butterfly garden

It is easy to make your garden butterfly friendly. For that, two types of plants are needed. Butterflies feed on nectar which they usually get from flowers. So, it is important that there are nectar plants in your garden that bloom throughout the butterfly season. A popular nectar plant is the Buddleia. Butterflies are not very picky about the types of nectar plants. However, caterpillars are. Each species of caterpillar has its own host plant(s) on which it lives. These plants must therefore also be present in your garden. These plants are always native species. You also must make sure that the plants have not been specially bred to deter insects. Information about the host plants can be found in butterfly guidebooks or on the Internet.

Moths

There are more than 160,000 species of moths in the world. Some of these species can be seen during the day, but for most of them, you must look at night.

There are many more species of moths than of butterflies. In the Netherlands where I live there are only 50 species of butterflies but over 2,000 species of moths. You can easily distinguish moths from butterflies.

- Butterflies have thin antennae with a club at the end. For moths, the antennae are often saw-edged or feathery (males) or are only thin blades (females).
- Butterflies hold their wings vertically above their body while at rest, whereas moths fold them over their body or spread them out. (Butterflies also spread their wings to warm up, but don't tend to do so while at rest.)

Although most moth species are nocturnal, there are also many species that you can see flying during the day. These are called diurnal moths. Some species, such as the Ruby Tiger moth below, are active both during both day and night.

The Ruby Tiger is a beautiful reddish-brown moth that is active during both day and night. 100 mm, 1/320 s, f/13, ISO 200, flash.

To make things even more complicated, the moths are divided into macro moths and micro moths. The macro moths are usually a bit larger than the micros, but there are also micros, such as the well-known Box Tree Moth, that are large while some macros, such as the Cream-bordered Green Pea Moth, are very small. The actual difference between micro and macro moths is the time and environment they evolved in. Micro moths evolved earlier than flowering plants while macro moths evolved alongside flowering plants and depend greatly upon them. Pictures of many different macro and micro moths can be found on my website (www.insectphotography.org).

The Yellow-barred Longhorn Moth is a micro moth. The males have very long antennae. 100 mm, 1/320 s, f/13, ISO 200, flash.

Moths are usually easy to view and photograph. What you need is a white sheet and a strong lamp, preferably a UV lamp. Hang the sheet tightly outside and point the lamp at it when it gets dark. Now wait and see. During the evening and night, more and more moths will be attracted by the lamp and land on the sheet, together with mosquitoes and other insects. There will also be moths that land near the sheet, so it's best to look around with a flashlight from time to time. The moths usually stay for a long time, so it is easy to photograph them in many ways. However, a flash is required for good lighting. The moths are not bothered by the flash and just stay put.

Luring moths and photographing them is a lot of fun. You will be amazed by the variety of sizes, patterns and colors of the moths. And you will always find new species that you can view and photograph up close.

You can attract moths all year round, even in winter, but most moths are seen in the summer months. It works best if it is a balmy night with little wind and a lot of clouds. A little light rain (drizzle) is no problem if you put the sheet and lamp under a roof. In chapter 8 on page 175, I will discuss the luring and photographing of moths in detail.

The Green Silver-lines is a moth that can only be seen if you lure it at night with a lamp and a sheet. 100 mm, 1/320 s, f/13, ISO 200, flash.

Why are moths attracted by light?

Many moths, like several other species of insects, are attracted by light. For a long time, it was a mystery why that is the case and there were many theories. Recent research shows that moths expect light to come from above, from the sky and the moon. So they think that the light is above them and turn the top of their body in the direction of the light. Research with very fast cameras has shown this. The result is that they move towards the light. Then they become disoriented and no longer know where they are flying to. Eventually, they decide to sit still and go to sleep. They usually stay put as long as the light stays on.

Life cycle of butterflies and moths

The life cycle of a butterfly consists of four stages: egg, caterpillar, chrysalis and adult butterfly. Each stage provides interesting photo opportunities.

When we talk about butterflies, we usually mean the adult butterflies that fly around. An adult butterfly is called an **imago** (like any other adult insect). But this is only the last, and often shortest stage of a butterfly's life. The other stages are also important and can make for beautiful pictures.

Egg. A butterfly starts its life as a tiny egg. The adult female deposits these eggs on the **host plant** of the butterfly. Each species of butterfly has its own host plants on which the caterpillars live. Certain butterflies, such as the Orange Tip, lay only a single egg on each plant. This way the caterpillar has the whole plant to itself. They can even smell whether another Orange Tip has already placed an egg on a plant. Other species, such as the Peacock butterfly, lay a lot of eggs together to increase the chance of survival. Still other species of butterflies scatter their eggs around and let the caterpillars find the right host plants themselves. Butterflies can lay many hundreds of eggs.

It often only takes a few days for the eggs to hatch. Eggs of a White butterflies hatch after 4 to 7 days if it is warm enough. Other species of butterflies, overwinter as eggs and only hatch in the spring.

Caterpillar. When the egg hatches, a very small caterpillar appears. It looks nothing like the final butterfly. In the past, it was even thought that caterpillars and butterflies were different types of insects. Caterpillars aim to eat as much as possible and collect as much nutrition as they can so that they can transform into adult butterflies. During their lives, they molt several times, each time getting a lot bigger, until they finally pupate.

The caterpillar of a moth called Water Betony. 100 mm, 1/320 s, f/8, ISO 500, flash.

Caterpillars are very picky when it comes to food. Most caterpillar species only eat the leaves or flowers of only a single host plant species. For example, caterpillars of the Red Admiral and Peacock butterfly live on nettles. The Orange Tip butterfly especially likes the Cuckoo flower. A good butterfly guidebook will tell you the host plants of the different species.

Some butterflies only live as caterpillars for a few weeks, while other species are caterpillars for much longer. There are even species that hibernate as caterpillars.

Chrysalis. As soon as the caterpillar has reached its maximum size, it forms a chrysalis, also called a **pupa**. In this chrysalis, the caterpillar completely transforms into an adult butterfly, a process called metamorphosis. Certain caterpillars attach the chrysalis to a leaf or a stem. If you look closely at the image below of a chrysalis of a White butterfly, you can see a filament about one third of the width of the picture from the right side that attaches the chrysalis to the leaf. (It starts at the bottom of the chrysalis where it meets the leaf and then goes up and over.) Many other caterpillar species crawl into the top layer of the soil where they form a chrysalis.

The chrysalis of a Large White butterfly. 100 mm, 1/320 s, f/19, ISO 200, flash.

Depending on the species and the weather, a butterfly can live as a chrysalis for a short or long period of time. In the summer, for example, a White butterfly emerges within two weeks. However, a later generation of the same butterfly overwinters as a chrysalis, just like many other species of butterflies.

Adult. Eventually, an adult butterfly emerges from the chrysalis. The wings are initially still small and crumpled. The butterfly pumps up these wings and lets them harden, after which it can finally fly. The main goal now is to find a partner and reproduce. Because the butterflies can fly, they can spread their offspring over a large area. Some butterflies must first eat a lot of nectar to become strong enough to travel long distances, but there are also many butterfly species that don't eat at all. They use the energy they have stored as caterpillars, and don’t travel very far. After mating and laying the eggs, the work is done, and the butterflies die. Often, they live for only a week or two. But there are also butterflies, such as the Brimstone, that live much longer and hibernate as adults.

Many butterfly species have several generations per year. In the spring, the first generation emerges from the chrysalises and lays new eggs. These hatch after a few weeks, after which the caterpillars gorge themselves and form new chrysalises. In the summer, a second generation of adult butterflies will emerge. In some species, even a third generation follows in the fall.

For example, the Map butterfly usually has two generations per year. The first generation emerges in the spring and the second generation in the summer. When the weather is very nice, a third generation sometimes follows. The special thing about this butterfly is that the adult specimens of the first generation look completely different from those of the second generation.

A first-generation Map butterfly (left) and a second-generation Map (right).

There are also migratory butterflies. These butterflies, for example, migrate in autumn from Northern to Southern Europe or even to North Africa and fly thousands of kilometers to do so. There they lay eggs, and the next generation comes to life. This next generation of butterflies then migrates back north to reproduce there in the summer. The most famous migratory butterfly is the Monarch that migrates from Canada to Mexico and back.

Growing caterpillars yourself

If you find eggs or caterpillars of butterflies, you can try to raise them yourself. It is important to know which butterfly it is in order to care for it properly. You must provide leaves or flowers of the correct host plant. Place the caterpillars in a container with a layer of soil and the right leaves and seal the top with a piece of fine mesh so that no other insects can get in. Regularly provide fresh leaves from the host plant. Place the container in an unheated area. Observe how the caterpillar eats, molts, and grows, until it eventually becomes a chrysalis. Find out how and where the caterpillar pupates, for example in a layer of soil or on a piece of dead wood, and make sure that this is present in the container. Place a stick near the chrysalis. As soon as the butterfly emerges from the chrysalis, it can climb up the stick, pump up its wings and let them harden. Then release the butterfly. If you are lucky, you can photograph the process.

Dragonflies

Everyone has seen dragonflies or the smaller damselflies, especially near water. But what are dragonflies anyway? How do they live and where and when is the best time to photograph them?

I live in the Netherlands, which is a water-rich country. And because the larvae of dragonflies live in the water, you find many dragonflies here. The scientific name for the insect order of dragonflies is **Odonata**. This is a relatively small insect order of which only about 6,300 species are known worldwide. It consists of the larger dragonflies and the smaller damselflies. Nannophya pygmaea is the smallest known dragonfly, mostly found in Southeast Asia, with a wingspan of just 20 millimeters. The largest dragonfly is the helicopter damselfly Megaloprepus caerulatus, with a wingspan of 19 centimeters.

A Migrant Hawker dragonfly resting on a twig. 100 mm, 1/350 s, f/8, ISO 800.

Dragonflies and damselflies are easy to distinguish from each other. Dragonflies spread their wings at rest, as in the photo above of a Migrant Hawker dragonfly. Damselflies hold their wings along their body or point them upwards when at rest. Dragonflies have large eyes that almost touch each other on the top of the head. Damselflies have smaller eyes in the shape of a half sphere on either side of the head. Dragonflies are usually larger and more robustly built than damselflies.

A Red-eyed Damselfly. The wings lie along the body and the eyes are hemispherical and on the sides of the head. 400 mm, 1/350 s, f/8, ISO 800.

Dragonflies eat other flying insects - you often see them flying in strange patterns hunting for these insects. Dragonflies have very good eyes to locate and capture flying insects. They are excellent flyers that can reach speeds of up to 50 km per hour. They can fly in all directions, even backwards and sideways. In doing so, they can change direction at lightning speed to follow the insects. This way of flying makes it very difficult to photograph flying dragonflies. But sometimes dragonflies hover in the same place for a while. This is the best moment for a photo, provided you can focus quickly enough.

A flying Blue Emperor dragonfly. 400 mm, 1/1000 s, f/11, ISO 3200.

Many dragonflies are territorial. They are constantly trying to chase other dragonflies out of their area. To this end, they often fly around in fixed patterns and attack potential intruders. Other

species of dragonflies sit on a high vantage point in search of food and intruders. These dragonflies are a lot easier to photograph. Still other dragonflies sit mainly amongst reeds and tall grasses. While these are easy to approach, it's difficult to get a good shot because there are always plants in the way. Photographing dragonflies certainly has its challenges and you sometimes need a lot of patience to be able to take a nice shot.

Water is of great importance to dragonflies as they live most of their lives as larvae (also known as nymphs) in the water. Many species of dragonflies are very particular about the type of water environment they choose to live in. For example, the Beautiful Demoiselle damselfly only lives in clear flowing streams. There are only a few of these left in my country, so this damselfly is rare here. Other species of dragonflies are very sensitive to pollution in the water and their presence or absence is therefore a good indicator of water quality. You can sometimes find dragonflies far from water. Many species first fly a long distance away from the water after emerging from the larval exuviae, to hunt insects and gain further strength. Only when they are ready to mate do they return to the water.

In most countries you have the best chance of photographing dragonflies during summer. However, some species can be found all year round because they hibernate as adults. Whether you see a lot of dragonflies also depends very much on the weather. As with butterflies, sunny and warm weather is best, but dragonflies, unlike butterflies, can often also be seen in more cloudy weather. You won't find them warming up in the sun though, so you must look a little harder. When there is a lot of wind, dragonflies hide in the trees and the chance of a good photo is very small.

Constructing a dragonfly pond

You can attract dragonflies to your garden by creating a dragonfly pond. It is best to make a large pond with variation in water depth. Make sure that the deepest point is at least 80 centimeters deep so that the pond never freezes completely. Create a bank that slopes gradually so that the larvae can crawl out of the water. Choose a spot that is in the sun for only part of the day. Make sure there are enough floating water plants which help to keep the water clear. Also, many dragonflies lay their eggs on them. Plant shore plants with upright stems, so that the larvae can climb up along them when they leave the water. Some dragonflies lay their eggs inside the stems of plants above the water and in rotting wood, so place a few small logs around the edge. And certainly, do not place fish in the pond as they may eat the larvae as well as other small pond life which dragonfly larvae feed on.

Life cycle of dragonflies

The life cycle of dragonflies consists of only three stages: as an egg (laid very near or under water), then as a larva (nymph) living in water, which it then crawls out of and emerges from its exuvia ('skin') as an adult. The adults live on land.

Many insects have four stages in their development, but dragonflies have only three. They skip the chrysalis stage and transform directly from larvae into adult dragonflies, a process called incomplete metamorphosis.

Eggs. Most dragonflies lay their eggs in the water, often on aquatic plants just below the surface. If you look closely, you sometimes see dragonflies sitting on aquatic plants with their abdomen in the water, like in the picture below. Other species lay eggs in the mud or in rotting logs near the bank. Females lay hundreds to thousands of eggs. In some species, the female does this alone. In other species, the male stays nearby to chase away enemies and other males. And in still other species, the male remains connected to the female. In this way, the male is sure that the female does not mate with another male and that his sperm is therefore used for the fertilization of the eggs.

Sometimes the eggs hatch after a few weeks, but in other species this can take months. There are also dragonfly species that hibernate as eggs.

A large Blue Emperor dragonfly lays eggs between the aquatic plants. 400 mm, 1/320 s, f/8, ISO 200.

Larva. When the egg hatches, a small worm-like animal first appears. This moves to the place where the larva can live and then molts into an actual larva or nymph. Dragonfly larvae eat small aquatic animals. The larva continues to grow and must molt regularly, sometimes more than ten times. This larval stage lasts a long time for dragonflies, usually one or two years, but there are species that live underwater for four or five years.

Adult dragonfly. When the larva has reached its maximum size, it crawls out of the water and climbs onto a stem or branch which it grabs onto tightly. The last molt then begins, and the adult dragonfly emerges from the exuvia (that is the name of the larval skin left behind). This process can take up to an hour or more. Slowly the insect emerges, but it still has very small wings. These, together with the

abdomen, are slowly pumped up with body fluid until they reach their final size. After this, the wings must harden for a while before the dragonfly can fly.

If you are lucky, you can photograph the emerging process, which usually happens in the early morning. To be prepared it can be helpful to go out after dark with a flashlight and see if any nymphs are at the water surface or maybe have already climbed up a stem or leaf. Depending on the species, this transformation usually happens in the second half of spring or early summer, often after a couple of warm days. Dragonflies that have just emerged are also easy to photograph because they cannot fly yet. But the dragonfly is still almost colorless at this stage so your shots might not be the nicest.

A Downy Emerald dragonfly. On the left it crawls out of the exuvia, and on the right it is busy pumping up the wings. 100 mm, 1/320 s, f/16, ISO 320, flash.

After emerging, the dragonfly usually flies away from the water to gain further strength, get its final colors, and become mature. It then returns to the water to mate with other dragonflies, after which the whole process starts again.

When dragonflies mate, they form a so-called **mating wheel** that sometimes has the shape of a heart. The mating can take a very long time, sometimes hours, so you have plenty of time to photograph it. Damselflies can often be approached very closely when they are mating. It is difficult to get both damselflies completely sharp in the photo. After mating, the wheel is broken, but for several species the male continues to clasp the female just behind her head while she lays the eggs.

Two mating Azure Bluet damselflies. 400 mm, 1/350 s, f/8, ISO 400.

2. Techniques and equipment

To consistently to take nice shots of butterflies and dragonflies you need to know something about photography technique. It is also important to understand what the best cameras and lenses are. Photographing these insects is part of the discipline of close-up photography. Important aspects here are the magnification factor, depth of field, and focus distance. We will discuss these in this chapter, as well as exposure settings and different ways of focusing. That leads to recommendations for the best cameras and lenses.

Magnification factor

The smaller the subject you want to photograph, the larger the required magnification factor. What magnification factor is required for photographing butterflies and dragonflies?

Photographing butterflies and dragonflies is part of the discipline of close-up and macro photography. The **magnification factor** plays an important role there. It indicates the relative size of the subject versus the size of the subject projected onto the camera's sensor. When you use a large magnification factor you can photograph small details, while using a small magnification factor shows more of the surroundings of the insect. The magnification is determined by the lens, the distance to the subject, and the sensor size. Each lens has a **maximum magnification factor**. Understanding magnification factors helps to choose the correct lens for the pictures you want to take.

A magnification factor of 1, also denoted as 1x1, means that the projection of an object onto the sensor has the same size as the object itself. When the factor is 0.5, or 1x2, the projection is half the original size. And with a factor of 0.2 the projection becomes one fifth of the subject's size. In macro photography people use magnification factors of 1 or more, but for butterflies and dragonflies that is not necessary.

A full-frame camera has a sensor of 36x24 millimeters in size. This means that with a magnification factor of 1 the visible part is also 36x24 millimeters. Most butterflies and dragonflies are larger than that, so less magnification is needed to fit the whole subject on the sensor. Only when you want to photograph small details, like eyes, will you need such a strong magnification. When the magnification factor is 0.5, the visible area has a width of 72 millimeters and with a factor of 0.2 this becomes around 17.5 centimeters.

The maximal magnification of a lens is measured for a full-frame sensor. An APS-C camera has a smaller sensor. Hence, the visible area is smaller, leading to a larger effective magnification. This means that you need a smaller magnification factor for the lens to get the same result. See the text box at the end of this section for more details.

How much magnification do you need? The wingspan of a butterfly or a dragonfly is the distance between the tips of the wings when the insect spreads its wings. Most butterflies have a wingspan between 30 and 80 millimeters and most dragonflies are even larger.

As an example, consider the Peacock butterfly in the image below. The wingspan of this butterfly is around 55 millimeters. Even if you want to take a picture from close range, it is important for a balanced image to leave enough room around the insect. The total width of the visible area becomes, for example, 12 centimeters. This corresponds to a magnification factor of 0.3 on a full-frame camera.

For this shot of a Peacock butterfly a magnification factor of 0.3 was required on a full-frame camera. 400 mm, 1/350 s, f/9.5, ISO 250.

As a second example, consider the Banded Demoiselle damselfly in the image below. Damselflies are often shot from the side. The length of this damselfly is 45 millimeters. As above, it is best to leave some space around the insect, leading to a visible area with a width of 9 centimeters. That corresponds to a magnification factor of 0.4.

For this shot of a Banded Demoiselle damselfly a magnification of 0.4 was required on a full-frame camera. 100 mm, 1/320 s, f/13, ISO 400, flash.

There are also butterflies that are considerably smaller than the Peacock, and especially many moths are tiny. In the image below you see a Nettle-tap moth which has a wingspan of just 10 millimeters. Even if you leave a considerable amount of space around it, a magnification factor of 1 or more is required for such a shot on a full-frame camera.

For this image of a Nettle-tap moth a magnification of 1 is required on a full-frame camera. When using an APS-C camera and some digital cropping, a magnification factor of 0.3 of the lens is enough. 100 mm, 1/320 s, f/13, ISO 200, flash.

The effective magnification may be increased by cropping the image when processing it afterwards. Modern cameras produce images with a very high resolution. The **resolution** is the number of pixels in the image and is expressed in megapixels or MP. Nowadays most cameras have a resolution of at least 20 MP and some cameras reach 40 MP or more. For most purposes a resolution of 8 MP is more than enough. This means that you can considerably crop the image and still have enough resolution to maintain clear and detailed images. Cropping makes a smaller area visible in the image and, hence, effectively increases the magnification. If, for example, you crop from 20 MP to 8 MP, you get an extra magnification factor of 1.6.

When using an APS-C camera you need a smaller magnification of the lens to maintain a consistent effective magnification. So, when using an APS-C camera or when cropping your image during processing, you can achieve sufficient magnification for almost all shots of butterflies and dragonflies with a lens with a maximum magnification of just 0.3.

APS-C cameras

Cameras come with different size sensors. Full-frame cameras have a sensor of 36x24 mm. For APS-C cameras, the sensor size is roughly half of that, for example 24x16 mm, depending on the camera brand. APS-C stands for Advance Photo System type C. Such sensors are sometimes called crop sensors as they crop the image produced by the lens down from its usual full-frame size. Micro four-thirds sensors, which are, for example, used by Olympus, are 17x13 mm with a 4x3 aspect ratio. And compact cameras and mobile phones use even smaller sensors.

On an APS-C camera with a lens with magnification factor 1, the visible area becomes 24x16 mm which is considerably smaller than that of a full-frame camera with the same lens. The effective magnification becomes 1.5 times as large. Hence, you can see more detail. A magnification of 1 becomes 1.5, 0.5 becomes 0.75, and 0.2 becomes 0.3. A micro four-thirds sensor gives an extra magnification factor of 2, compared to a full-frame camera.

Focus distance

When photographing butterflies and dragonflies it is preferable to stay at some distance from the insects. Hence, the preferred focus distance is large.

The **focus distance** is the distance between the sensor of the camera and the subject. When using a small focus distance the subject will be enlarged. When using a large focus distance, you see more of the surroundings of the insect. In other words, the larger the required magnification, the smaller the focus distance. The maximum magnification is achieved at the minimum focus distance of the lens.

The focus distance is measure from the sensor of the camera to the subject. The sensor position is indicated with a small line on the camera body. The distance between the front of the lens and the subject is more relevant. This distance is called the **working distance**. To calculate the working distance, you must subtract the length of the lens and part of the thickness of the body from the focus distance. That can make a considerable difference, especially with long macro or telephoto lenses.

This Arched Marble moth was shot with a focus distance of 35 centimeters from the sensor. That meant that the moth was 15 cm from the front of the lens. 100 mm, 1/320 s, f/13, ISO 400, flash.

A small working distance can make photographing butterflies and dragonflies more difficult because getting close to the insect can easily scare it away. So, the goal is to have a reasonable magnification while still maintaining a large focus distance. This can be achieved using a telephoto lens with a large focal length.

Each lens has a **focal length**, indicated in millimeters. A standard lens often has a focal length of 50 mm. A telephoto lens has a focal length of 100 mm or more, while wide-angle lenses have a focal length of less than 35 mm. A zoom lens has a variable focal length, for example between 100 mm and 400 mm.

The **focal point** of a lens is a point in the lens through which the subject is projected onto the sensor. The focal length is the distance between the sensor and the focal point. This explains why telephoto lenses are so long. Wide-angle lenses on the other hand can be very short.

Increasing the focal length zooms into the subject and increases the magnification factor. If you want to keep the magnification the same, you can move further away from the subject. Assume, for example, that we want to photograph a butterfly with a magnification of 0.25. When using a 50 mm lens the focus distance is 25 centimeters. Using a 200 mm lens this becomes 1 meter. For a magnification of 0.25, the focus distance is around five times the focal length of the lens. For a magnification of 0.5 the focus distance is three times the focal length. See the end of this section for details.

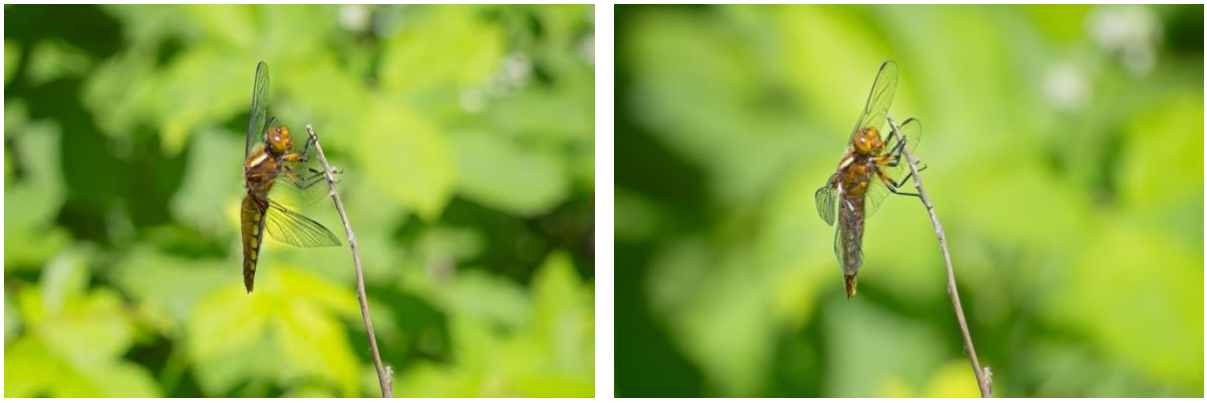
When using an APS-C camera you must multiply the focus distance by 1.5 (the crop factor of the sensor), meaning you can stay further away from the subject than when using a full-frame camera. Using a crop-sensor camera can therefore be quite helpful when shooting active butterflies or dragonflies.

By using a 400 mm telephoto lens I could shoot this Map butterfly using a focus distance of two meters. 400 mm, 1/350 s, f/8, ISO 800.

Generally, a large focal length is the best choice, because you can stay further away from the insects. However, lenses with a large focal length are larger and heavier. When photographing handheld, this makes it more difficult to keep the camera stable and focus on the correct position.

Compression

A large focal length has another effect on the image, called **compression**. When the focal length increases the viewing angle decreases. This means that a smaller part of the background becomes visible. The background is compressed and seems to be closer. With a larger compression the background becomes less busy which puts more emphasis on the insect in the front.



A Broad-bodied Chaser dragonfly. At the left shot with a 100 mm lens and at the right with a 400 mm lens. 1/350 s, f/8, ISO 200.

The image above shows the effect of compression. The picture at the left was shot with a focal length of 100 mm. The picture at the right was shot with 400 mm from a larger distance. In both shots the magnification is the same, as can be seen from the size of the dragonfly. But in the right picture you see a considerably smaller part of the background making the image more pleasing.

Magnification – focal length – focus distance

For those interested in the details, here is the formal relationship between the magnification, focal length, and focus distance. When using a lens with focal length L and a magnification factor M, the focus distance becomes L + L/M. For example, when using a 100 mm lens a magnification factor 0.4 corresponds to a focus distance of 100 + 100/0.4 = 350 millimeters. The following table shows the focus distance in centimeters for different combinations of magnification factor (left) and focal length (top).

	50 mm	85 mm	100 mm	150 mm	200 mm	400 mm
0.2	30	51	60	90	120	240
0.3	22	37	43	65	87	173
0.4	18	30	35	53	70	140
0.5	15	26	30	45	60	120
0.75	12	20	23	35	47	93
1	10	17	20	30	40	80

When using an APS-C camera you must multiply these distances by 1.5 (the crop factor of the sensor). The actual distances can be slightly different because each lens is constructed in a different way. Realize that not all lenses can achieve all these combinations of focal length and magnification.

Depth of field

When photographing a butterfly or dragonfly you normally want most of the insect to be in focus. How much of it is sharp depends on the depth of field.

There is always just one distance from the camera where the image is perfectly sharp. That is the position on which you focus. But an area in front and behind that point is still experienced as sharp. The length of this area is called the **depth of field**. The part in front of the focus point is smaller than the part behind it. Hence, it is best to focus on a position near the front of the insect. This is often the position of the eyes. The depth of field is determined by several parameters that we discuss below.

By using a different depth of field, you get a completely different result. When using a small depth of field, only a small part of the butterfly or dragonfly will be sharp, for example only the head. This draws all the viewer's attention to that area. When using a larger depth of field, all details of the insect become sharp. But a larger depth of field also results in background elements to become sharper and more distracting.

This caterpillar of a Ruby Tiger moth is shot with a small depth of field. Only the head is sharp. It creates a dreamy atmosphere in the picture. 100 mm, 1/320 s, f/2.8, ISO 100, flash.

The depth of field is determined by several factors. First, the magnification factor plays an important role. The larger the magnification, the smaller the depth of field. When the magnification factor doubles the depth of field is reduced by a factor four. (The depth of field behaves like the inverse square of the magnification.) When the magnification factor becomes 1 or more, the depth of field is often less than a millimeter.

There are two aspects that determine the magnification factor: the distance to the subject and the focal length of the lens. For a stronger magnification, you can either move closer or zoom in. The effect on the depth of field is the same, but as indicated above, a larger focal length leads to compression, resulting in a blurrier background. So, when possible, don't move closer but zoom in.

The second important factor for the depth of field is the aperture. The smaller the aperture (larger f-value), the larger the depth of field. The relation is simple. When the f-value is doubled the depth of field is also doubled. For example, assume at f/4 the depth of field is 2 centimeters. Using f/8 instead gives 4 centimeters depth of field, and f/16 gives 8 centimeters. This is the difference between just a sharp head and the complete insect being sharp.

When the depth of field increases not only does the insect get sharper, but other parts of the image also get less blurred. Details in the background become clearer which can distract the viewer. When the background is far away from the subject, the effect of a change of depth of field is minimal. But when the distance between the insect and the background is small, try to use a smaller depth of field.

The image below shows an example. To make this Moustached Darter dragonfly fill the entire frame a large magnification was used, resulting in a small depth of field. By using a small aperture of f/16, most of the insect became sharp. The background was far away so it remains blurred, putting all the focus on the dragonfly. But even with the smallest aperture available it is impossible to get the complete insect sharp. If this is required, you must resort to focus stacking, which we discuss in chapter 4 on page 85.

A Moustached Darter dragonfly shot with a small aperture. 400 mm, 1/350 s, f/16, ISO 1000.

Cropping images

As mentioned before, the effective magnification can be increased by cropping the image during processing. But cropping has a different effect from changing the magnification while shooting. When you move closer or zoom in, the depth of field is reduced. But when you crop an image the depth of field stays the same. So, the magnification becomes larger but without a decrease in depth of field. However, the resolution becomes lower, which can affect the image quality. In the same way, using a crop sensor (APS-C or micro four-thirds) increases the magnification without reducing the depth of field.

The camera

What is the best camera for photographing butterflies and dragonflies?

You can shoot butterflies and dragonflies with any camera. A modern mobile phone can also be used. But to create the best pictures it is important to have control over the exposure settings, be able to switch between lenses, and be able to use a flash. Also, it helps to process the images afterwards; this works best when the pictures are stored in RAW format at high resolution.

The image below shows the difference between a smartphone (iPhone 13) and a mirrorless camera (the Canon R7). As you can see the background of the smartphone picture has a lot more detail, distracting the viewer. This is the result of the very small sensors in smartphones. A small sensor results in a larger depth of field and reduced compression. The smartphone picture also has a lower resolution and less color depth. As a result, the details are less crisp. But the smartphone still produces a reasonable image, and there are smartphones with considerably better cameras.

Two pictures of the same Common Blue Damselfly. The left picture was shot with an iPhone 13, while the right picture was shot with a Canon R7. Both images were processed to obtain the best result.

For a long time DSLR cameras were the prime choice for serious photographers, but in recent years this has changed. All brands now focus on **mirrorless cameras**. As the name indicates, these cameras have no mirror and, hence, no optical viewfinder. Instead, they use an electronic viewfinder that displays the image as seen by the sensor. This is a small screen with a very high resolution. The quality of electronic viewfinders has improved considerably over the years and, hence, there is no advantage in using an optical viewfinder anymore. Mirrorless cameras have many advantages. They show exactly what the sensor registers, they make less noise, they can focus on many more points, they have a faster burst rate, and so on. When considering a new camera purchase, I strongly recommend a mirrorless camera, but there is no need to replace a modern DSLR.

There are cameras with different sensor sizes. A full-frame camera has a sensor size of 36x24 mm. **APS-C** cameras have a sensor of approximately 24x16 mm, while **micro four-thirds sensors** measure 17x13 mm. A large sensor produces better quality images. They also perform better in low-light conditions where high ISO values are required. But sensor technology is improving rapidly and modern cameras with a smaller sensor still produce very high-quality images. Noise reduction has also improved considerably.

An advantage of smaller sensors is that they give an extra effective magnification factor, and lenses effectively get a larger focal length. Both are useful when shooting butterflies and dragonflies. You can stay further away from the insect, or you can use a lighter lens with a smaller focal length,

increasing the photo opportunities available. Hence, an APS-C or micro four-thirds camera has some advantages when shooting these insects. Disadvantages include greater depth-of-field and less compression, resulting in more busy backgrounds.

The **resolution** of the sensor indicates the number of pixels it contains. Most modern cameras have a resolution of at least 20 MP, that is, 20 million pixels in total. This is more than enough for almost all types of photography. But some cameras have a considerably larger resolution. The main advantage of this is that you can crop the images without losing details. This is useful when you cannot get close enough to the insects or when a lens with a large magnification is unavailable. However, a sensor with a large resolution has a negative effect on the image quality and the low-light performance of the camera.

The same picture of a Small Heath butterfly as it looked on a full-frame camera, on an APS-C camera with the same lens, and, at the bottom, after cropping to 8 MP. 400 mm, 1/350 s, f/8, ISO 250.

Fast and precise autofocus is essential when photographing butterflies and dragonflies, unless you want to use manual focus, which I strongly advise against. Autofocus on modern mirrorless cameras is considerably better than on older cameras. Modern cameras have many more positions they can focus on, can make the required computations much faster, and use AI to select the best position to focus on. But you also need a lens that can focus fast and precisely.

Modern cameras often have **image stabilization**, called **IBIS**, which stands for In-Body Image Stabilization. Some lenses also have built-in image stabilization. These two types of stabilization work well together, especially when camera and lens are from the same brand. Image stabilization considerably reduces the risk of motion blur due to camera motion, which is crucial when using a telephoto lens or a large magnification. An additional advantage is that it keeps the image in the viewfinder more stable when shooting handheld, making it easier to choose the desired composition and focus on the correct position.

Another property of cameras is how fast they can shoot images in burst mode. This is important when you try to photograph flying insects. By using a fast burst rate, there is a better chance of obtaining a good shot. Some cameras can shoot 120 frames per second, but for photographing butterflies and dragonflies, 15-30 frames per second is more than enough.

Focus stacking is a technique to increase the depth of field, especially when shooting close to the subject. You take multiple images from the same position, each with a slightly different focus distance. The sharp parts from these images are then combined to create a single image where everything is in focus. Focus stacking is useful when photographing butterflies and dragonflies. In the past, it was a complicated technique. But modern cameras have functionality to create such series of images automatically (called focus bracketing) and some cameras can even combine the images in the camera. When you want to use focus stacking, such functionality makes life considerably easier. We discuss focus stacking in more detail in chapter 4 on page 85.

So, the "ideal" camera for shooting butterflies and dragonflies has the following features:

- Modern mirrorless camera with a high-quality electronic viewfinder.
- APS-C sensor.
- At least 20 MP resolution and preferably more.
- Fast and precise autofocus.
- Image stabilization.
- 15-30 frames per second burst rate.
- Focus bracketing (and stacking) functionality.

While writing this book I used a Canon R7 camera which has all these features. Similar cameras from other brands are the Sony A6700 and the Fujifilm X-T50 or X-T5. Good cameras with a micro four-thirds sensor are at this moment the Olympus OM-5 and the Panasonic G9.

The Canon R7 mirrorless APS-C camera with the Canon RF 100-400 mm telephoto zoom lens that I used for most pictures in this book.

But none of these features is essential. With a full-frame camera or a camera with more modest specifications, you can still create great shots of butterflies and dragonflies. Remember, it is the photographer who takes the nice shots, not the camera.

A bridge camera

A **bridge camera** (also called a **superzoom camera**) is a camera with a fixed lens with a large zoom reach, for example from 24 mm to 600 mm. Most of these cameras have an electronic viewfinder, can use an external flash, have image stabilization, and offer many of the same settings and features of mirrorless cameras. They are considerably more expensive than compact cameras (in the range of 1000-1500 euro where I live) but they also offer many more features. Bridge cameras can take images at close range and at a large distance due to their strong zoom lenses. Hence, they are very suitable for photographing butterflies and dragonflies. Their only disadvantage is the small sensor size (1-inch or less). This reduces the image quality, leads to a bit more noise at high ISO values, and makes the backgrounds less blurry.

Lenses

A good camera is nothing without a good lens. What are the best lenses for shooting butterflies and dragonflies?

There are many different types of lenses available. Each of these lenses has its advantages and disadvantages. It is certainly not the case that the most expensive lens is always the best. Many people think that a macro lens is most suited to photograph butterflies and dragonflies, but in my experience that is not true. In many situations, a telephoto lens works better.

As indicated in the section about the focus distance on page 20, the focal length of the lens is of great importance. At a larger focal length, you can stay further away from the subject. For many butterflies and dragonflies, that is the only way to photograph them properly. A zoom lens helps to determine the right framing and makes it possible to also photograph insects that are a bit closer. Also pay attention to the maximum magnification of the lens. This should preferably be at least 0.3 (0.2 for an APS-C camera). You can find this value in the specifications of the lens.

The **maximum aperture** is another important property of lenses. The larger the aperture (small f-value), the more light can reach the sensor. The depth of field also becomes smaller. Having a larger aperture range, gives more flexibility in the type of shots. But lenses with a large maximum aperture are bigger, heavier, and more expensive. For most photos of butterflies and dragonflies, a large aperture is not necessary. Often a value of f/5.6 or f/8 works just fine. In a further section on page 37 we will discuss the role of the aperture in more detail.

It is important that the lens can focus quickly and precisely. There is a big difference between lenses in terms of the speed of the focusing motors, so pay close attention to these factors when considering which lens to use. For this information, search the Internet for reviews of the lens, or borrow/rent the lens and try it out. If focusing is too slow, it will be very difficult to get sharp pictures. And finally, as already discussed in the camera section above, image stabilization is important, especially when using telephoto lenses.

A good lens for photographing butterflies and dragonflies therefore has the following properties.

1. A telephoto zoom lens with a reasonable range. A maximum focal length of at least 200 mm for a full-frame camera (150 mm for an APS-C camera) and preferably more.
2. A maximum magnification factor of at least 0.3 (0.2 for an APS-C camera).
3. Fast autofocus.
4. Image stabilization.

A cheaper kit lens is available for most cameras. These are usually zoom lenses with a decent range and a reasonable magnification factor. For my Canon R7, this is the RF-S 18-150 mm lens. For an APS-C camera, this is a great lens to start with. The image below of the caterpillar of a Swallowtail was taken with this lens. Sony has a 55-210 mm kit lens and Olympus a 14-150 mm lens. These lenses normally have a relatively large minimum aperture value, but that is less important with butterflies and dragonflies. These lenses are small and light, which makes them easy to use.

A young caterpillar of a Swallowtail butterfly, shot with a kit lens. 150 mm, 1/320 s, f/13, ISO 400, flash.

To stay at a greater distance from the insects, a telephoto zoom lens is needed. I use a 100-400 mm lens. When choosing a telephoto zoom lens, ensure that you can get close enough to the subject. Telephoto lenses are designed to bring subjects that are far away closer. But for butterflies and insects, it is helpful to bring subjects that are already close even closer. Some telephoto lenses have a minimum focus distance of more than two meters, and then you miss out on many photo opportunities. Also pay attention to the weight. Shooting handheld, with a heavy lens, can be difficult and tiring.

Comparing the size of the Canon RF 100-400 mm lens (bottom) and the Tamron 150-600 mm lens (top).

As an example, the image above shows the difference between the Canon RF 100-400 mm lens (at the bottom) and the Tamron SP 150-600 mm lens (at the top). The Tamron lens has a somewhat larger range and a larger maximum aperture (f/6.3 versus f/8). But this lens is three times as heavy (2 kg versus 650 grams) and has a much larger minimum focus distance (2.2 meters versus 90 cm). It is an excellent lens for photographing birds, for example, but it is less suitable for butterflies and dragonflies. So, take a good look at all the specifications before buying a lens and borrow or rent one to try it out.

Teleconverters, also known as **extenders**, amplify the magnification factor of a lens. They are small and light and placed between the lens and the camera. They spread the image that comes out of the lens, so that only a smaller part of it falls on the sensor. There are teleconverters with a factor of 1.4 and 2. A 400 mm telephoto lens effectively becomes 560 mm with the first and even 800 mm with the second. This allows you to stay even further away from the insects or zoom in even more. Teleconverters have a few drawbacks though. The image quality deteriorates somewhat and the light output decreases. At a factor of 1.4 you lose one stop of light and at a factor of 2, you lose two stops. For example, if you have an f/8 lens, then this becomes f/16 with the 2x teleconverter. Also, teleconverters are quite pricey.

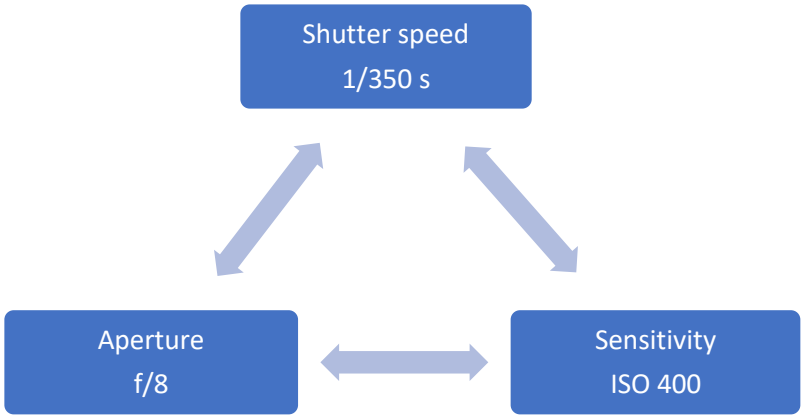
A **prime lens** is a lens with a fixed focal length. A prime lens cannot zoom in or out, so you will have to move forward or backward yourself to obtain the correct composition. This can be tricky when photographing butterflies and dragonflies. In natural areas it is not always possible to get closer or walk backwards because there are bushes or branches in the way. Most of the time, you should stay on the trails to avoid unnecessary damage to the environment. Several insects are easy to approach up close, while others fly away quickly. To maximize your photo opportunities, using a zoom lens is preferable. However, prime lenses also have important advantages. They deliver excellent image quality, and they have a wider maximum aperture. They are also often lighter than zoom lenses. For convenience, a zoom lens is recommended, but overall quality is generally greater for prime lenses.

When shooting small butterflies or damselflies or when taking pictures of details of the insects, a macro lens can be used. **Macro lenses** have a large magnification factor of 1 or more. For most butterflies and dragonflies, that strong magnification is not necessary, but if you only want to show part of the insect, such as the eye or a wing or antennae, a macro lens is needed. Macro lenses are always prime lenses. There are macro lenses with different focal lengths. A macro lens with a small focal length is smaller and lighter, but you must get very close to the insect, and with living insects, that's virtually impossible. Therefore, for butterflies and dragonflies, it is best to use a macro lens with a focal length between 90 mm and 120 mm. In chapter 4 on page 81 we will discuss the use of macro lenses to take close-up photos.

The exposure triangle

To properly expose a photo, the correct shutter speed, aperture and ISO are required. How do you do this when photographing butterflies and dragonflies?

It is essential to expose your photos correctly. Current photo editing software can correct a good deal of under- or over-exposure, but the results will always be better when starting with a correctly exposed image. Three settings are important for the correct exposure: the shutter speed, the aperture and the sensitivity of the sensor, indicated by the ISO value. These form the **exposure triangle**. Together they determine the exposure of the photo. When changing one of the settings, to maintain a consistent exposure, this must be compensated by adjusting one or both of the other settings as well.



The exposure triangle with typical values for shooting large insects with a telephoto lens.

Cameras have a mode where the exposure is determined completely automatically. This is almost always the case with smartphones. I strongly advise against using this mode when photographing butterflies and dragonflies. The chosen values are usually not the correct ones. Moreover, in the fully automatic mode, it is no longer possible to adjust other things, such as the autofocus mode. It is therefore important to understand the settings and their impacts on creating successful images. This is not difficult at all, and we will briefly discuss it here. For more information about shutter speed, aperture and ISO value, see the following sections.

The **shutter speed** determines how long the shutter stays open. This is expressed in fractions of a second, for example 1/250 of a second. The longer the shutter remains open, the more light falls on the sensor. When using a shutter speed of 1/500 sec instead of 1/250 sec, half the amount of light falls on the sensor. The term **stop** is often used for this. Changing the exposure one stop means the halving or doubling of the amount of light.

The **aperture** determines the size of the opening in the lens. The larger the opening, the more light falls on the sensor. The aperture is expressed with the f-value. The smaller the f-value, the larger the aperture. The f-value is in fact a fraction. So, a value of 8 actually means an eighth. That is why we write f/8 instead of f8. If the f-value is twice as large, four times less light falls on the sensor. So, the exposure decreases by two stops. For example, f/8 gives a quarter of the amount of light of f/4. In between those values is f/5.6, which gives half the amount of light of f/4.

The **ISO value** indicates the sensitivity of the sensor. When increasing the value, the sensitivity is amplified, so less light is needed for a good exposure. The base value is ISO 100. When doubling the

value, half the amount of light is needed. The ISO value is often used to make the exposure correct at a desired shutter speed and aperture.

Each of these three settings also has important effects beyond simply increasing or decreasing the light reaching the sensor. If you reduce the shutter speed, the chance of motion blur increases. When photographing butterflies and dragonflies, a fast shutter speed of 1/350 sec, for example, is desired to freeze movement and maintain sharp focus. When increasing the aperture value, the depth of field decreases. For example, to get a dragonfly completely sharp, you will have to use a small aperture of, for example, f/16. And a higher ISO value has a negative effect on image quality and can introduce noise into the image. We will discuss this in more detail in the following sections.

Cameras have different modes for determining the exposure. They usually have a dial on the top that allows you to set this mode.

1. **Automatic exposure**. In automatic mode, the camera determines the exposure all by itself, along with several other settings. This is strongly discouraged because the settings are usually not the right ones for photographing butterflies and dragonflies.
2. **Shutter priority (S or Tv).** You choose the shutter speed yourself and the camera determines the best aperture and ISO value. This can work if the shutter speed is very important, for example when shooting flying insects. But usually, the camera chooses an aperture with an f-value that is too small to get enough of the insect in focus.
3. **Aperture priority (A or Av).** You determine the aperture yourself and the camera chooses the best shutter speed and ISO value. Since the aperture is often important, this mode can work well for shooting butterflies and dragonflies. However, my experience is that the camera often chooses a shutter speed that is faster than necessary and therefore uses too high an ISO value.
4. **Manual (M).** In this mode, you can adjust all the settings independently. Usually, you choose the shutter speed with one dial and the aperture with the other dial. The ISO value is selected with a button or with a third dial. Setting all three values manually is quite difficult and there is often not enough time for it. However, setting the ISO value to automatic can help decrease the time needed to complete the adjustment. You determine the shutter speed and aperture yourself, and the camera chooses the correct corresponding ISO value. This is usually the best way to work.

It is therefore recommended to learn to work in M mode, but to set the ISO value to automatic. This way, you have control over the two important settings, shutter speed and aperture, and the camera ensures that the exposure is always correct. Keep an eye on the ISO value the camera selects automatically and make sure it doesn't get too high. At some values for shutter speed and aperture, the camera can no longer find a good ISO value. The ISO value will then flash on the screen. In that case, it is preferable to adjust the shutter speed and not the aperture.

The more settings the camera determines, the less control you have over the final exposure. For example, it is recommended to overexpose a dark butterfly on a white flower because otherwise the butterfly will become too dark. It is similarly desirable to underexpose a dragonfly or a White butterfly against a dark background, otherwise the insect will be too light. This can be achieved using the **exposure compensation**. This setting allows you to under- or overexpose the image up to 3 stops in small steps. Some cameras have a separate dial for the exposure compensation, while other cameras use a dedicated button. This is usually indicated by the +/- symbol. It is important that you know how this works on your camera. With a mirrorless camera, the effect of exposure compensation is directly visible in the viewfinder, making it easy to choose the desired value.

When shooting a White butterfly, such as this Green-veined White, you must underexpose a bit, otherwise it will become too white and the details in the wings will disappear. 200 mm, 1/350 s, f/8, ISO 125.

On most modern cameras you can define multiple **custom shooting modes**. These are usually indicated on the mode dial with C1, C2, et cetera. These modes are useful for pre-setting common butterfly and dragonfly shooting scenarios, making them accessible at a moment's notice. Set both the exposure settings and the autofocus settings. This way you always have the right settings at your disposal. I use two custom modes, C1 for shooting insects without a flash and C2 for shooting with a flash. Check your camera's manual to determine how this works for your camera.

The Canon flexible value mode

Canon has an additional way to choose the exposure settings on modern cameras. This modus is called **flexible value**, denoted by Fv. All four settings are accessible in this mode: the shutter speed, aperture, ISO value and exposure compensation. One dial is used to choose the setting you want to change and with the other dial the setting is adjusted. The great thing is that each of the shutter speed, aperture, and ISO can be set to automatic. Thus, this mode combines all the others. If you only want to set the aperture yourself, set the shutter speed and ISO to automatic. If you only want to control the shutter speed, set the aperture and ISO to automatic. I recommend to only set the ISO value to automatic to keep control over both the shutter speed and the aperture. The exposure compensation can also easily be changed in this mode.

Shutter speed

The shutter speed determines how long light falls on the sensor. The correct value depends very much on the circumstances. Is the butterfly or dragonfly sitting still or flying around?

The shutter speed indicates how long the shutter remains open. The slower the shutter speed, the more light falls on the sensor, but there is also a larger chance of motion blur. Motion blur can have three different causes. Camera motion, insect motion, or motion of the perch due to wind may all introduce motion blur. Image stabilization of the camera or lens prevents the first cause. But to prevent motion blur due to insect or flower movement, a fast shutter speed is required.

If you zoom in and the magnification becomes stronger, motion blur becomes more likely. A rule of thumb says that for telephoto lenses the shutter speed should be about one divided by the focal length. So, at 400 mm focal length, a shutter speed of about 1/400 s is often appropriate. With the quality of the current image stabilization, this value is usually enough to freeze motion. Most of the time I photograph butterflies and dragonflies with 1/350 s shutter speed, regardless of the focal length.

When insects are flying, a much faster shutter speed is required of, for example, 1/1000 s. A lot depends on whether you want the wings to stand still or whether you find motion blur in the wings acceptable or even desirable. For completely stationary wings 1/4000 s shutter speed is often required, but stationary wings certainly don't always give the most beautiful pictures. Moreover, such a fast shutter speed makes it necessary to use a very high ISO value.

To get the wings of this flying Orange Tip butterfly sharp, a fast shutter speed was needed. 100 mm, 1/1250 s, f/10, ISO 1600.

Types of shutters

Cameras support different types of shutters. **Mechanical shutters** use two curtains. The first curtain opens the path of the light to the sensor while the second curtain closes it again. The faster the curtains move one after the other, the faster the shutter speed. Mechanical shutters make noise and can also cause camera movement. **Electronic shutters** set the values in the sensor to 0, wait a short time, and then read the new values. They are silent and can achieve very fast shutter speeds. But

they are usually incompatible with a flash, and they can distort fast-moving subjects. The **electronic first curtain shutter** combines these techniques by starting the exposure electronically and ending it mechanically. They have the advantages of both types of shutters and are usually the best way to work.

Recently more and more cameras use stacked sensors. These can read the sensor data much faster and, hence, electronic shutters for such cameras can be combined with a flash and the occurrence of distorted subjects is considerably reduced. The readout speed increases all the time. If this development continues, the mechanical shutter will probably become a thing of the past. This is a good development, because the mechanical shutter is often the weakest part of the camera. Mobile phones, for example, have no mechanical shutters.

The aperture

The aperture is the most important exposure setting when photographing butterflies and dragonflies because it has a large impact on the depth of field.

The aperture determines the size of the opening in the lens. The larger the opening, the more light falls on the sensor. In that respect, the aperture controls the exposure. But the aperture has a much more important role: it largely determines the depth of field. And depending on the depth of field, you get a completely different kind of photo.

You speak of a large aperture when the opening is large. This corresponds to a small f-value, for example f/2.8. The depth of field is then small. As a result, only part of the insect is sharp and the rest of the insect and especially the background (and foreground) is out of focus. The further away the background is, the blurrier it becomes. You can also use a lower ISO value or a faster shutter speed.

A Four-Spotted Chaser dragonfly shot with aperture f/2.8. Only the head is sharp, and the body and background are blurred. 100 mm, 1/320 s, f/2.8, ISO 100.

Unfortunately, long telephoto zoom lenses don't allow for a very large aperture (unless you spend a huge amount of money). My 100-400 mm lens has a maximum aperture of f/8 at 400 mm. Expensive telephoto zoom lenses sometimes allow for a value of f/4, but for lower values a prime lens with a fixed focal length may be required

A small aperture corresponds to a small opening. This is indicated by a large f-value, for example f/11. This significantly increases the depth of field. You can get the whole insect in focus, and it becomes easier to focus. But the background also becomes less blurry, and this can give a busier image. In addition, you will have to compensate for a smaller aperture with a slower shutter speed or a higher ISO value.

The same Four-Spotted Chaser dragonfly shot with aperture f/11. A much larger part of the dragonfly is in focus, but the background is also much more visible and busier. 100 mm, 1/320 s, f/11, ISO 1600.

A small aperture of f/16 or even smaller reduces image quality. Many lenses give the best image quality near f/8. This is due to **diffraction** where the light is scattered by the edges of the lens opening. So, try to avoid these large f-values as much as possible. Sometimes, however, you must be prepared to compromise on image quality if it produces a sharper image.

Because smaller apertures mean greater diffraction, the balance between the sharpness of the subject and blurriness of background must be kept in mind. My experience is that when photographing butterflies and dragonflies with a telephoto lens, f/8 is enough to get the insect sufficiently sharp and keep a blurred background. But if your lens allows it, also try to shoot with a larger aperture of, for example, f/4.

It is important to experiment with different values. Take the same shot several times with different f-values to see the difference. Do this with both large and small insects and both in situations where the background is close to the insect and in situations where the distance is much larger. And always look back at your images in the camera to make sure that the depth of field is correct.

Most mirrorless cameras show the image in the electronic viewfinder and on the screen at the largest aperture and not at the chosen aperture. Only when the photo is taken is the aperture in the lens set to the chosen value. This helps to focus properly because more light reaches the sensor. But it's not what the final image looks like. Cameras usually have a button to check the depth of field, called the **depth of field preview**. Whenever this button is pressed, the aperture opening in the lens is set to the correct position, so you can see exactly what the depth of field is. This is a very useful tool to determine the correct f-value where enough of the insect is in focus and the background remains sufficiently blurred.

This shot of a Common Winter Damselfly has a good balance between sharp and blurred parts. 280 mm, 1/350 s, f/8, ISO 200.

What is the f-value?

We indicate the aperture with the f-value. This number is a bit strange. A small value corresponds to a large aperture and vice versa. The aperture number is the diameter of the opening in the lens, divided by the focal length of the lens. An opening with a diameter of 50 mm with a 400 mm lens corresponds to an aperture of 50/400 = 1/8, or f/8. Hence the / sign in the value indication. For this lens, a value of f/4 corresponds to a diameter of 100 mm. That's why fast telephoto lenses are so big and heavy. If the diameter becomes twice as large, the surface area of the opening becomes four times larger, and the surface area determines the amount of light. That is why halving the aperture number, for example from f/8 to f/4, leads to four times as much light.

ISO value

The ISO value indicates the sensitivity of the sensor. By increasing this value, less light is needed, but the image quality deteriorates, and more noise can occur in the image.

In the analogue era, a roll of film was used to record the photos. There were rolls of film for sale with different sensitivities. This sensitivity was indicated by the ISO value of the film with rolls of high sensitivity offering the possibility of photographing in low light at the cost of increasing the graininess of the image.

Today, the ISO value is a setting that indicates the sensitivity of the sensor. But unlike film rolls, you can set this value for each shot separately. At a high ISO value, the sensor amplifies the intensity values such that less light is needed.

Most sensors have a base value of ISO 100. Each time the ISO value is doubled, the amount of light the sensor requires halves. Each time a stop of light is gained. This results in values like ISO 200, ISO 400, ISO 800, et cetera.

If the ISO value increases, the image quality decreases. There is more noise in the image and the dynamic range decreases. In the past, the quality of photos with an ISO value above 400 was rather poor. But sensors have improved considerably and values such as ISO 6400 can be used with good modern cameras without introducing too much noise. Much depends on the size and resolution of the sensor. In addition, the software used to remove the noise has become better and better. The camera uses this software when it creates JPG images, but when shooting in RAW format, you will have to remove the noise yourself afterwards (see chapter 7 on page 132).

The sensor in a camera consists of a very large number of light-sensitive elements, called pixels. A camera with 20 MP **resolution** has 20 million such pixels. The larger a pixel is, the more light it can capture and the more precisely it can determine the intensity of the light. As a result, the image quality is better, and the sensor is less sensitive to noise. At the same resolution, full-frame sensors therefore produce less noise than APS-C sensors. Sensors with a high resolution of, for example, 40 MP give more noise than sensors with a lower resolution of 20 MP because the pixels are half the size (assuming both sensors have the same surface area). This is the reason that the most expensive professional cameras often have a relatively low resolution. The image quality is therefore the very best. But sensor technology is improving rapidly. Modern sensors deliver significantly better image quality and much less noise than sensors that are a few years old.

It works best to let the camera determine the ISO value itself. Then you can be sure that the photos are well exposed. You can set the range of allowed ISO values. For example, for my camera, I set the maximum allowed value to ISO 6400.

Autofocus

The butterfly or dragonfly in your shot should be in focus, but how to make sure the camera focuses on the correct position?

When photographing butterflies or dragonflies, it is important that the insect is in focus. Only in special creative shots might you want a blurry insect. Fortunately, modern cameras have excellent autofocus, and most modern lenses also support this. Cameras have many settings related to focusing, and that makes it quite difficult to make the right choice. We must distinguish between two different situations: photographing insects sitting still and photographing insects flying.

Insects that sit still

The best approach is to intentionally choose which area of the shot is in focus. Usually, the eyes are chosen, but sometimes it is more interesting to have the colorful wings or other features in focus. The following settings are important here:

- Make sure the lens is set to AF (**autofocus**). Many lenses have a switch for this. In other cases, you must set this on the camera.
- On the camera, choose **continuous focus**. With Canon cameras this is called “servo”. With this setting the camera is focusing continuously. This may seem strange, because the insect is not moving, but you are moving yourself and every movement of the camera changes the distance to the insect so the focus must be adjusted.
- Choose a small **focus area** to precisely decide what to focus on. When selecting a large focus area, the camera determines that point, which is often not the desired place.
- Turn off **subject tracking**. Cameras can track subjects automatically these days. This usually does not work well with butterflies and dragonflies, and there is a risk that the camera will focus on a moving leaf, for example.
- Turn off **automatic object recognition** (see the text box at the end of the section).

Before focusing, first think about the composition. Which part of the insect, such as the head, should be the main point of interest and therefore in focus? Often it is not possible (nor desirable) to get the entire insect in focus. So, choose the most important point carefully. Then put the focus point on that spot. You can usually use a mini joystick on the back of the camera to move the focus point. Now aim this point at the insect's head and press the shutter button halfway to focus. Wait until the camera has focused properly and fully press the button. Always take several shots because focusing is not perfect.

Focus should lie on the head of this Large White butterfly, but it is not in the middle of the image, so you must move the focus point before taking the shot. 100 mm, 1/320 s, f/13, ISO 200, flash.

If a butterfly is sitting on the edge of a flower or if a dragonfly is sitting on a twig, the camera sometimes wants to focus on the background. Always aim well at the desired position before pressing the shutter button halfway. If the camera is still focusing on the background, point the camera at another object that is about the same distance, such as the ground. Press the shutter button halfway to make the camera focus on it. Release the shutter button, point the camera back at the insect and press the button halfway again. This normally puts the focus on the correct position. With some lenses or focusing options, you can still focus manually even on automatic mode. In that case, rotate the focus ring until the insect is roughly in focus. Now press the shutter button halfway and the autofocus takes over and ensures the precise focus.

As discussed earlier, the chosen aperture has a large effect on the depth of field. The smaller the aperture (larger f-value), the easier it becomes to focus properly. But increasing the f-value also makes the background sharper and that is often not the effect you want to achieve. A smaller aperture means an increase of the ISO value, which leads to more noise in the picture.

Focusing properly is one of the trickiest parts of photographing butterflies and dragonflies. It may not always work out in the beginning, but after a while you will become more and more skilled at it.

Flying insects

Photographing flying butterflies and dragonflies is a big challenge. It is better not to try shooting insects in flight until you have more experience with your camera's autofocus, but it is also very satisfying when it works. We will discuss this in more detail in chapter 8 on page 164, but here I will briefly discuss how to deal with automatic focusing. In this situation use the following suggested settings:

- Set the lens to AF (autofocus).
- In the camera, choose continuous autofocus.
- Choose a large focus area. It is impossible to point a small area at the moving insect. You will have to trust the camera to choose the correct point, and it might regularly fail.

- If the camera has the capability, turn on subject tracking. In this way, the camera tries to keep following the insect.

If you see a flying butterfly or dragonfly, try to get it into the focus area. Don't zoom in too far. It's better to crop the image afterwards. Press the shutter button halfway and see if the camera can indeed find the butterfly or dragonfly. Then take a series of shots, hoping that at least one is sharp. The continuous shooting mode is usually better for this than single shot.

There is a better chance of obtaining sharp focus if the background is as empty as possible. So, try photographing the butterfly against the sky or try to capture the dragonfly against a backdrop of water. Most of the time, the camera will not be successful. Butterflies and dragonflies fly in more irregular patterns and that makes it difficult. Eventually persistence wins.

A flying Green-eyed Hawker dragonfly. You must rely on the camera to focus on the correct point. 400 mm, 1/350 s, f/8, ISO 1250.

Recognizing animals

More and more modern cameras have AI-based software to automatically recognize and focus on certain objects. For example, most cameras can recognize faces and focus on the eyes. Cameras can also recognize animals and focus on their eyes as well. But this does not usually work well for butterflies and dragonflies. They look very different from other animals and their eyes especially are different. So, it's better to turn this off. It is expected that this recognition will continue to improve in the coming years, so maybe in the future it will also work well for insects.

Manual focus

In certain situations, autofocus does not work properly and you must focus manually. How does this work?

Some lenses are completely manual. These lenses do not contain motors and cannot be controlled by the camera. This means that you must manually choose the right aperture and focus distance. These lenses also don't have image stabilization. Many macro lenses are completely manual. If you are not an experienced photographer, I do not recommend using a manual lens. It will lead to a lot of frustration and a lot of failed shots.

If your lens does not support autofocus, you must focus manually. But even with an automatic lens, manual focusing sometimes works better, especially when the insect is sitting on the edge of a flower or on a twig and the camera sometimes wants to focus on the background. This can often be overcome, but sometimes manual focus is the only solution.

This Orange Tip butterfly was sitting on the edge of a Cuckoo flower. The automatic focus always picked the background so manual focus was required. 300 mm, 1/350 s, f/9.5, ISO 400.

If you want to focus manually, the lens must be set to **MF** (**manual focus**). Often there is a switch on the lens for this, but sometimes it must be set in the camera. (A manual lens doesn't have such a setting, of course). The focus distance can now be set with a ring on the lens.

There are two different ways to work with manual focus. You can focus with the focus ring on the lens or choose a fixed focus distance and then move the camera forward or backward to focus on the correct location. The second approach usually works best, unless you're shooting from a tripod. Use the focus ring to choose approximately the right distance and then move the camera for precise focusing.

Focus support

Cameras have tools to assist with manual focusing. With SLR cameras, these tools only work on the screen on the back of the camera, but with mirrorless cameras they also work in the viewfinder.

The camera can magnify the image to show the area you want to focus on very precisely. How strong the **magnification** is, depends on the camera. Often a factor of 5 or even 10 is used. You can specify which part of the image is enlarged. Enlarging the image is difficult when shooting handheld because every little movement is amplified. But when using a tripod, this technique works well.

With **focus peaking** (also known as MF peaking), the camera indicates the positions that are sharp with a color. For this the camera looks at edges and contrast differences in the image. Usually, red is used as the color, but this can be adjusted when photographing a red butterfly or dragonfly. While moving the camera forward or backward, the colored positions shift and you can determine the correct distance.

Modern Canon cameras have a special tool for manual focusing, which is called **focus guidance**. The camera shows a square just like with automatic focus. As long as the square remains red, the subject in the square is not in focus. As soon as it turns green, you have the right focus distance. Three arrows indicate whether you should move forward or backward. This is very convenient, but a downside is that it doesn't work with fully manual lenses.

Manual focus is considerably easier when using a tripod, but this is only possible when the insect sits still for a long period of time and there is little wind. This is the case early in the morning when many insects are still too cold to fly, or when photographing sleeping moths during the day. Some species of dragonflies always return to the same twig after flying for a short time. And flying dragonflies often follow the same route. In doing so, they hover in the air for a while at several positions before flying on. In all these situations you might consider using a tripod and focus manually on the insect or on the position where the insect is expected to appear. This technique works best when using a remote-control shutter release.

This Common Darter dragonfly kept returning to this vantage point. 300 mm, 1/350 s, f/8, ISO 250.

3. Getting started

It's time to get started. But where do you go to photograph butterflies and dragonflies? What to take with you? And how to find and approach the insects without scaring them away? Once you have found a beautiful butterfly or dragonfly, what is the best way to photograph it? And what do you do afterwards with all those shots you have taken? We will address all these questions in this chapter.

Where are you going?

Butterflies and dragonflies are not found everywhere. How do you determine where you have the best chance to photograph them?

Of course, you can photograph butterflies and dragonflies if you happen to come across them, for example during a walk or in your garden. But if you want to intentionally photograph butterflies and/or dragonflies, you must go to those places where the most interesting species can be found at that time. A little preparation and knowledge are useful for this.

Finding butterflies

To photograph certain butterflies, it is good to first see when these butterflies are flying. For this information, consult a good guidebook on butterflies or search the web for information about the butterflies that occur in your region. Most butterflies can be found in the summer, but certain species occur earlier or later in the year.

In addition, it is good to pay attention to the weather. Butterflies are sensitive to the weather. On dark and rainy days, they remain well hidden. Also, if there is a lot of wind, few butterflies can be found. So, it is best to go out on a sunny day with little wind.

Different species of butterflies occur in different places. For example, the Silver-studded Blue butterfly shown at the beginning of this chapter is mainly found on heathland. Other butterflies, such as the Red Admiral and the Peacock butterfly, can be found everywhere. Butterflies are most common in areas with many flowers, but there should also be some shelter, for example along the edge of a forest. There also is a good chance of finding butterflies in gardens. Again, consult a butterfly guide or search the Internet for this information.

The Marbled Fritillary butterfly is very rare in the Netherlands and is almost exclusively found in the far south of the country. 400 mm, 1/350 s, f/8, ISO 400.

Finding dragonflies

Dragonflies are often easier to find than butterflies. In most places where water occurs, dragonflies can be found. However, as with butterflies, different species of dragonflies fly during different periods. In summer almost all species of dragonflies can be found. There are excellent dragonfly guides for all countries, and this information is also available on the web.

Because the larvae of dragonflies live in water, most dragonflies are found in wetlands. Different species of dragonflies prefer different types of water. For some dragonflies, such as the Keeled Skimmer below, the water must be shallow and warm. Other species prefer clear flowing streams. Certain species like nutrient-rich water while other species seek nutrient-poor water.

Dragonflies also love the sun, but when it is cloudy they are still easy to find. However, with rain or a lot of wind, they hide in the trees. When it is still cold, the dragonflies often warm up in a sunny place and can easily be photographed.

The Keeled Skimmer likes warm, shallow water. 400 mm, 1/350 s, f/8, ISO 500.

Checking recent observations

Whether the butterflies or dragonflies are present depends on many factors. If the spring has been warm, the butterflies often appear earlier. But the amount of rain also has an influence.

If you want more precise information about where certain butterflies have recently been observed, you can visit the website of https://www.inaturalist.org/. Select Explore at the top. You are shown a map or list of all observations. In the Species field, type in the name of the species. You can also indicate a location. Now the view is restricted to the observations of that species. You can switch between a map view, a grid view, or a list view. Press the Filters button to set all sorts of filters on your search. In particular, you can indicate a date range. In this way you can find out whether there were recent observations of the insect in your vicinity. You can also search for observations of butterflies or dragonflies in general.

When you are in Europe you can also use the site https://observation.org/. This has many more observations than iNaturalist and has more possibilities for exploring these observations. But it is largely limited to observations in Europe. Hundreds of thousands of volunteers report sightings of

insects and other organisms here. The species, time and location of each of these observations are stored. Often there is also a photo available. For example, in 2024, more than 13,000,000 observations of butterflies and more than 5,000,000 observations of dragonflies could be found on the site. The data is mainly used by scientists, but the site is available for free to anyone who is interested. You don't even need to create an account.

The https://observation.org/ website can be used in different ways. If you want to know where a particular species of butterfly or dragonfly can currently be found, choose from the menu **Explore->Species**. Type in (part of) the name of the species and choose on the right what kind of organism you are looking for, so for example **Butterflies** or **Dragonflies**. A list of species with that name will now appear. Click on the name of the species you are looking for. This shows a large amount of data about the species. There are several tabs. The most important are:

- **Details**. Here information about the species and some general data are given.
- **Observations**. Here all the observations of this species are shown, with the most recent ones at the top. You can set all kinds of filters. For example, you can change the period, limit the observations to a certain country, or search for the name of a location. Click the **Filter** button to apply the filter. This way you can easily find the recent sightings in your area. Click on the date of an observation to get more information, including the exact location. (The location of several rare species is not shown.)
- **Maps**. Here distribution maps of the species can be found. You can set a date range and, for example, restrict the observations to the last two weeks. You can zoom in on the map and if you click on a block, the exact location of the observations in that area are shown.
- **Photos**. Here photos of the species are shown. With butterflies also photos of the corresponding caterpillars are available.

Another way to use the website is to search for recently observed species in your area. Choose **Explore-> Surroundings**. Select **Distance from point** and specify the desired distance. Now click on the map at your location. A list of the species that have been observed in this area in the last 10 days will appear. You can choose the type of organism in a menu. All observations appear on the map. Click on any of these observations to get more data.

All of this helps to greatly increase the chances of finding certain butterflies or dragonflies. The website offers many more options, and I recommend that you search around in it for a while to learn how to use it.

Butterfly gardens

In many places, special gardens have been created that attract butterflies. In these gardens there are flowering plants that produce nectar that butterflies love. In addition, they often contain host plants on which the caterpillars can grow. These are great locations to photograph the insects. Many countries also have indoor tropical butterfly gardens. Here you will find completely different species of butterflies that do not occur in the wild in your country. We discuss tropical butterfly gardens in chapter 8 on page 167.

What should you take with you?

What equipment is required when you go out to photograph butterflies and dragonflies? Preferably as little as possible.

It helps to think carefully in advance about what equipment you need when photographing butterflies and dragonflies. Otherwise, you will be faced with unpleasant surprises in the field. Since you must often walk a lot to get to the interesting locations, it's advantageous to take as little as possible with you. By thinking in advance what kind of photos you want to take, much less equipment is required than if you only think about it at the location.

The camera. Of course, you need your camera. Check if the battery is charged. I always take a spare battery with me. You will take a lot of pictures, especially if you want to photograph flying insects, so the battery drains quickly. Also make sure that there is enough space on the memory card. Ideally, format the card in the camera before setting off (but make sure you've saved the images in two different places). Always take a second memory card with you just to be sure.

Lenses. Which lens is required depends on the type of photos you want to take. I put my telephoto zoom lens on the camera by default. If I expect to take close-up shots as well, I take my macro lens with me, but I prefer not to. If I don't bring my macro lens, I take a close-up lens with me that fits on the front of the other lens, so that I can still take close-up shots (see chapter 4 on page 81 about the use of close-up lenses).

Flash. I usually put a small speedlight flash on the camera. If there is too little light somewhere, I can easily fire the flash. See chapter 6 on page 113 for more information about the use of flash units. The flash unit also gives some extra stability while shooting, because I can press my head against it.

I don't take any other equipment with me. I don't use a backpack but a shoulder bag. It is more manageable and large enough for everything I need. And it can easily be put on the ground for a while. And of course, I always take a small bottle of water with me.

Using a tripod

Some photographers prefer to use a tripod when photographing butterflies or dragonflies. However, keep in mind that a tripod is a good amount of extra weight that must be carried around. A tripod can only be used if the insect is stationary for a long time and there is little wind. That allows for enough time to set up the tripod and focus properly. This is the case, for example, when photographing early in the morning. Butterflies and dragonflies are still cold and must warm up before they can fly. That gives ample time to photograph them.

The advantages of using a tripod are that you can determine the composition much more carefully, you can focus very precisely, often manually, and a slower shutter speed can be used because motion blur won't be a problem. A tripod also works well when using focus stacking (see chapter 4 on page 85). When using a heavy telephoto lens, a tripod makes it easier to point the camera at the desired point. But for this, a monopod with a ball head often works better. See page 59 in the section on holding the camera on how to work with a monopod.

The disadvantages of a tripod are that it adds weight, takes time to set up, and only works well when the insect is not moving and there is little wind. None of the pictures in this book were taken using a tripod.

A Peacock butterfly that is warming up in the sun can be photographed with a tripod. 200 mm, 1/350 s, f/8, ISO 250.

Protection

Photographing butterflies and dragonflies seems to be a very safe hobby. But in nature there are always some dangers lurking. It is easy to do something about that.

Butterflies are completely harmless. There are caterpillars that can cause skin, eye and respiratory irritation, especially some species with hairs. So always keep some distance from caterpillars and (of course) do not touch them. Despite persistent rumors, dragonflies cannot sting or bite either. Again, don't touch them, not so much for your own protection, but because it is not good for the insect.

Where there are butterflies and dragonflies, there are usually many other insects, and some insects can bite or sting. Think of mosquitoes, wasps and horseflies. Horseflies can be very persistent if they want to bite you. When photographing, you often sit concentrated in a fixed position for a longer period of time. Then you are an ideal target for mosquitoes and horseflies. Preferably use an insect spray to avoid being stung or bitten.

The greatest danger is ticks. They can cause Lyme disease (Borreliosis) which is a dangerous condition. When sitting on the ground or walking amongst tall grass or bushes, there is a risk of catching a tick. Preferably wear long pants, closed shoes and socks and apply an anti-insect product based on DEET to your arms, legs and neck. And after each trip, check that you have not picked up any ticks. Also be aware of other dangerous animals, like certain spiders or snakes.

In addition to insects, there are also various thorny plants or nettles that can damage your skin and cause irritation. When looking through the viewfinder of your camera whilst trying to determine the best position for a shot, you will easily bump into these plants. Only protective clothing, such as long sleeves, will help against this. There is also the risk of bumping into branches or tripping while looking through the viewfinder. So always move carefully.

Caterpillars of several butterflies, including these Map butterflies, live on stinging nettles. Be careful when shooting them. 100 mm, 1/320 s, f/13, ISO 400, flash.

Another danger is the sun. You are often distracted for long periods when photographing butterflies and dragonflies, and you can quickly forget the time. As a result, your body is exposed to a lot of sunshine, and you can burn easily without realizing it. So always use sunscreen lotion and a baseball cap. Put it on backwards otherwise it will hit the flash. Also take enough water with you to prevent dehydration.

It may sound strange, but knee pads are an important part of my equipment. For beautiful shots, often a low point of view is required and for that, it is best to get down on your knees. Knee pads help to avoid injury on your knees and getting dirty or wet pants. Put on the knee pads before starting to photograph, because when taking a shot there is no time for that anymore. Knee pads can be bought cheaply at a hardware store. In any case, always bring a plastic garbage bag to sit on, or wear rain pants. Even in very sunny weather, plants and the soil can still be wet.

Also protect your equipment. Make sure you don't knock the camera against branches. Always use a lens hood to protect the lens and preferably also a UV filter (for protection only). Make sure to keep the camera and lens dry and clean the lens from time to time.

Default camera settings

It's helpful to have some fixed camera settings and set them up before heading out. For example, I use a shutter speed of 1/350 s, aperture f/8 and automatic ISO. In addition, I use the smallest focus point and continuous autofocus. Check the settings beforehand, otherwise you run the risk that your first shots on location will fail due to incorrect settings. Take a few shots at home to make sure everything is in order. If you want to experiment with something new, for example focus stacking or macro photography, try testing them out at home in a controlled environment. In the field, there is no time to figure things out.

Finding butterflies and dragonflies

Even if you know that there are many butterflies or dragonflies in an area, they are not always easy to find. What is the best way to go about this?

Butterflies and dragonflies can hide well. Despite their colors, they are often difficult to spot when they are sitting somewhere. And if they are actively flying around they are visible, but you can't photograph them without some luck. So, what is the best way to proceed? In general, this works differently with butterflies than with dragonflies, so we treat them separately.

Butterflies

Some butterflies, such as the well-known Peacock butterfly and Red Admiral butterfly, are large and striking and can easily be seen when they fly around or sit somewhere. But there are also many smaller species of butterflies. To find them, you must look around and follow everything that flutters, no matter how small. Other butterflies have good camouflage colors and are often hidden, such as the Small Heath butterfly in the image below that is usually found amongst grasses.

A Small Heath butterfly, hidden between the grass. 100 mm, 1/320 s, f/8, ISO 500, fill flash.

When looking for butterflies, it helps to know where they usually can be found. When butterflies are still cold, they look for a place in the sun to warm up, for example on a leaf or on a trunk, and spread their wings. They don't visit flowers yet. So, look carefully in places in the sun to find them.

When butterflies are feeding, they can be found on flowers that give a lot of nectar. Some butterflies can stay on the same flower for a long time, but other butterflies, such as White butterflies, fly frequently from flower to flower, which gives very little time to photograph them. Butterflies often crawl over the flower to collect nectar. Keep the camera pointed at the butterfly and wait for it to get into a nice position. If you are lucky, it is possible to also capture the rolling tongue, with which it drinks nectar.

A Small Tortoiseshell butterfly on a flower, drinking nectar. 300 mm, 1/350 s, f/8, ISO 125.

When butterflies lay eggs, they can be found at their host plants. Each butterfly has its own host plant. For example, Orange Tip butterflies are often found on Cuckoo flowers.

Usually, you often only see a butterfly when it flies around. In that case, it is best to proceed as follows. Above all, stand still. When chasing butterflies, they will continue flying. Only follow the butterfly with your eyes. If it flies very far away, move a little closer but keep your distance. After a while, the butterfly often settles somewhere. Look very carefully where it lands, otherwise you will lose sight of it. Wait a moment to let it calm down. Then slowly move closer and keep looking at the butterfly. First, take a shot from a distance and take shots again and again while getting closer. If you've gotten close enough and the butterfly is still there, try to find an interesting angle for the shot and a nice composition. Never make quick or unexpected movements and prevent your shadow from falling on the butterfly.

Unfortunately, there is a good chance that the butterfly will fly away before you can get close. Then the process repeats itself. The butterfly is also often in places where you can't photograph it nicely, for example at the back of a flower or half in the shade. There is little you can do but wait and hope that the butterfly moves to a better position.

Dragonflies

To photograph dragonflies, it helps to know something about the behavior of the different species. There are species that usually sit motionless on a twig or stem and can be easily approached. Other species also settle but fly off whenever you get close. Yet other species fly around almost continuously and hardly ever land. This information can be found in a good dragonfly guide or on the Internet. Dragonflies do not feed on nectar, so they are not found on flowers.

The smaller damselflies often rest on a stem or leaf. It is difficult to find them if they are not moving. If you get too close, they will fly away, but they generally fly slowly and land again within a short distance. Keep a close eye on them, and approach them carefully. Choose a nice angle and take a lot of shots.

Broad Scarlet dragonflies sit on tall grasses or on reed stalks. Their bright red or yellow color makes them easy to find. You can get close to them, but the complex background of tall grasses often makes for distracting photos.

Darter dragonflies are usually found on a branch or stem. This way, they have a good vantage point to see insects and intruders. If you get close, they sometimes fly away, but usually they come back to the same place. By taking a slightly lower point of view, you can photograph them against a distant background or against the sky.

Migrant Hawker dragonflies often sit on thick branches or against small tree trunks. You can approach these dragonflies easily. Sometimes it is possible to take close-up shots, even in the middle of the day. The shot below of the head of a Migrant Hawker was taken from only 20 centimeters distance.

A close-up of the head of a Migrant Hawker dragonfly. 100 mm, 1/320 s, f/13, ISO 400, flash.

Many other dragonflies, such as the Blue Emperor dragonfly, rarely stop flying. You must have a lot of patience or go out early in the morning when they still need to warm up. But sometimes you are lucky and find one sitting quietly, for example when it eats a caught insect. Approach it very carefully and photograph it at first from a large distance, then progressively take closer shots as you approach.

As with butterflies, Dragonflies are often only seen when they take off. Then proceed in the same way. Follow them with your eyes until they settle again, then approach them cautiously. With dragonflies this can take a very long time, sometimes more than 10 minutes, so you must be patient.

Rare species

To photograph rare species of butterflies or dragonflies, you will have to do your homework and find out when and where they can be found, using guidebooks or the Internet. You will then have to search extensively and return to the same place regularly. Seeing them is only the first step to photographing them. It's very frustrating when you see a rare butterfly flying that refuses to settle and disappears into the distance. But sometimes you are just lucky. I found the rare Black Darter in the image below in the forest near my house. I didn't know they were there and there were no previous sightings in that area.

A rare Black Darter dragonfly. 400 mm, 1/350 s, f/8, ISO 800.

Taking photos

If you have found a butterfly or dragonfly, you can photograph it. But how do you take the most beautiful shots of these insects?

The goal of taking a picture of a butterfly or dragonfly can be to register that you have seen it or to identify it later. A shot straight from above or from the side works best for this. It's about the insect; the rest doesn't matter much. If the image clearly shows the insect, it is successful.

But photography is much more than simple registration. Ideally, photos should capture and hold the viewer's attention. A photo work best when it surprises, captivates, or even moves the viewer. You want to create a wow moment for the viewer. To achieve this, many aspects play a role, such as the type of shot, the composition, and the lighting. We will discuss all these aspects in detail in the following chapters. Here I discuss only some main aspects.

There is often little time to take the shot. Sometimes a butterfly or dragonfly stays in the same spot for a long time, but usually it flies away in no time, so you must act quickly. Make sure that the default settings on your camera are suitable for most shots. First take a picture with these settings and then vary if necessary. Make sure the camera is always on, and the lens cap is removed. Most cameras go into sleep mode after a certain amount of time. Turn this off (or set the time to very long). This can be done with a setting in the menu. When using a flash, make sure it is also on and ready to fire.

Because there is little time, it is also difficult to determine the exact composition you want. It is best to leave a little more space around the insect to be able to crop the photo later to the desired composition.

Two different shots of the same Painted Lady butterfly. Both shots 400 mm, 1/350 s, f/8, ISO 125.

Try to take photos from many different angles. From above, from the side, from the front and even from below. The above shots of the same Painted Lady show two examples. On the left, you see a standard photo from the side. On the right you find a photo from straight in front. In this shot it is no longer possible to recognize that this is a Painted Lady, but the image is much stronger.

Also, try to take shots from different distances. In a shot from a larger distance, much more of the insect's surroundings is visible. But if you try to get very close, you get a close-up in which beautiful details of the insect can be seen. Remember though, not every telephoto lens allows you to get very close. But as mentioned earlier, the image can always be cropped quite a bit when editing. When shooting butterflies, there is also a big difference between pictures with open wings and with closed

wings. Try to get shots of both situations. Also pay attention to the details, such as the tongue in the above shots, or how the antennae are situated.

The background is at least as important as the insect itself. Even with a beautiful insect, a messy background makes the image ugly. The background becomes less busy if it is far behind the insect. A small move of the camera can result in a completely different background. Pay attention to this while shooting. You can also try shooting upwards and using the sky as a background.

A shot of a Willow Emerald Damselfly, taken against the blue sky. 400 mm, 1/350 s, f/8, ISO 125.

The lighting for your photo is of course always important. Most of the time, you'll be shooting in sunlight. Be careful that no shadows fall over the insect. Also be careful that enough detail remains visible in the highlights. This is a big issue when photographing White butterflies. It is better to underexpose the shot a bit. An insect in the shade is often easier to photograph. However, the image can then become a bit flat, which means that the colors are dull and there is little contrast in the image.

Always review your shots in the field to verify the results. Check that the correct parts are in focus and that there are no disturbing elements. But avoid looking at the screen for long. Before you know it, the insect has flown away.

Hidden insects

Butterflies and dragonflies are often on the "wrong" side of a flower or stem, making them partially invisible. And usually it is impossible to walk around it to the other side. With butterflies, this is a matter of patience. When they are drinking nectar, they crawl over the flower. Keep looking through the viewfinder until the butterfly is in the correct position, then take the shot. Above all, make sure that the head is visible. Dragonflies usually stay motionless for a long time, so it makes little sense to wait for them to reposition themselves. It’s usually up to you to move instead. But sometimes it is possible to take an interesting shot regardless of the insect’s position. If the stem is thin, you can try to run it exactly between the eyes, as is shown in the following image.

A Small Emerald Damselfly behind a stem, shot from the front. 300 mm, 1/350 s, f/8, ISO 1250.

A butterfly or dragonfly is best photographed when it is in an open space on a flower or stem. This avoids obstacles in the foreground or a cluttered background. But unfortunately, in practice, the insects are often between grass or stems. Sometimes these obstacles can be used to frame the insect (see chapter 5 on composition on page 103), but most of the time they get in the way, especially if they run in front of the insect. Try to find a position that allows you to shoot through a gap in the vegetation. A telephoto lens makes this easier. The closer you get to the insect, the bigger the gap becomes. Also check the shots you have taken. Sometimes a thin stem in front of the insect is not visible in the viewfinder while taking the shot, but it is ruining the image. Also realize that the lens of the camera is lower than your eye. If, without a camera, you think you have found the best position and you place the camera in front of your eye, that position is not correct, and you must move up slightly. It is just a small difference, but it can result in stems or leaves lying in front of the insect rather than below it.

Holding the Camera

It may seem trivial, but when holding the camera correctly, much better shots of butterflies and dragonflies are taken. Especially when using a heavy telephoto lens, it is difficult to point the camera properly at the insect and hold it stable. Image stabilization in the camera and/or lens helps, but it is always important to adopt the right posture. Here are a few tips:

- Hold the camera with your right hand and place your left hand under the lens.
- Use the viewfinder as much as possible. Press the camera against your face. When using a speedlight flash, press it against your forehead. In this way, the camera and your head become one.
- Stand steady with your feet slightly apart and one foot slightly in front of the other. Lean on the front foot. Press your arms against your body.
- Don't hold your breath. Exhale before taking the shot.
- If possible, try to lean against something. If necessary, get down on your knees to photograph an insect close to the ground or at an angle upwards. Don't squat down - that is a very unstable position.

If you get used to always photographing this way, it becomes easier to focus well and take sharp shots.

It helps to learn to shoot while holding the camera with one hand. Holding the camera with your right hand only, your left hand can be used for other things, for example to hold a lamp or flash, or to push away a branch. This technique can also be used to photograph in places where you can't reach with both hands, for example if it is necessary to lean above the water to take the shot. The heavier the lens, the more difficult it becomes to shoot with one hand.

Using a monopod

To get extra stability, a monopod can be used, which is a tripod with only a single leg. The monopod carries the weight of the camera and lens and ensures that it moves much less. The monopod usually has a ball head to which the camera is attached. Keep the ball head slightly loose so that you can still rotate the camera. That allows you to easily point the camera at the insect. Place the monopod at an angle backwards, grab the camera with both hands and push it towards the ground. This results in a very stable situation. It is best to leave the monopod (retracted) on the camera when walking around, to be ready to take the next shot very quickly.

Organizing your pictures

After taking shots of butterflies and dragonflies, there is still more work to do: Save the images, organize them, assess them and, above all, throw away a lot of shots.

Photography is fun, but it's a shame to do nothing with your beautiful pictures. You want to keep your best work, edit images to improve them if necessary, and it's very satisfying to share your photos with others or print them and hang them on the wall.

Saving images

The first thing that must be done after a photo shoot is to save the images from the camera's memory card to a different place. While the images are only in the camera, there is a real risk that you will lose them.

There are several ways to store your images. Storing your images only on your computer is strongly discouraged. If the computer breaks down, all your work might be lost. Also, photos use a lot of memory. Saving an image costs about 40 MB (RAW+JPG) depending on the resolution of the camera, so the computer disk fills up quickly.

The safest way is to store the images in the cloud by using services such as Microsoft OneDrive, Google Drive, or Apple iCloud. The photos will not be lost if your computer breaks down and the images can be viewed and edited from any device. These services cost money though, and you will soon need 1 TB of cloud storage or more, which is costly. Photo editing software such as Lightroom and ON1 Photo RAW also offer subscriptions including cloud storage, but that is often even more expensive. In addition, a fast internet connection is required to use these services.

SSDs are secure, small, fast, and can hold lots of pictures.

Another option is to use an external SSD. These have fallen sharply in price in recent years. A 2 TB SSD costs less than 200 dollars today and can hold about 50,000 photos. I use two such SSDs. One

SSD I use to edit the images and the other as a backup. I store only the best edited images on my computer and in the cloud.

Format the memory card in your camera only after the images are stored in two different locations, then you can be sure that no shots will be lost. There are even photographers who use memory cards only once and use a new card as soon as they are full. A 256 GB card nowadays costs less than 50 dollar and can contain more than 5,000 photos. That's only 1 cent per image and it gives extra security.

Organizing photos

When photographing butterflies and dragonflies, you usually take a lot of shots. If you don't organize these properly, it will be impossible to find them again. Photo editing software such as Lightroom and ON1 Photo RAW have extensive options for this, but the software that comes with your computer for free also has such functionality.

To start with, it is recommended to throw away a lot of images. If you have taken ten shots of the same butterfly, there is no point in keeping them all. My rule of thumb is to throw away any image that I don't want to share with others or print, unless the shot contains something very special, like a rare insect. Usually I delete 80%-90% of the images that way which cleans up considerably.

Next, it is useful to indicate in some way what the best shots are. When using photo organization software colors or stars can be used for this. I use stars and give three stars to a great shot, two stars means that there may still be something beautiful to be made of it when editing, or that the photo shows something special. I give one star to bad shots that I still want to keep for some reason. You can also put images in folders, depending on the quality.

I recommend providing the images with keywords, such as the name of the butterfly or dragonfly. This makes it easier to find them later. For special images, such as backlit shots, I also indicate this with keywords.

Make sure the time and date in your camera are set correctly such that it is possible to find shot taken at specific moments. Most cameras also have an option to store the GPS location where shots were taken. Sometimes the camera can do this by itself, but often an app on your mobile phone is required. The camera contacts this app and retrieves the GPS location from the phone. This is stored in the EXIF data of the image. This is very convenient. You can then easily find the shots that were taken in a certain place later.

I don't edit the images at this moment because that takes quite a bit of time and I prefer to take more pictures. I only do that editing at a later stage when I have enough time, and the weather is bad.

Photo sharing

If you have taken beautiful shots of butterflies or dragonflies, it is nice to share them with other people who are also interested in these insects. Due to the many social media, this is very easy nowadays. Of course, you can post the images on your own Facebook or Instagram pages for all your friends to view. But to reach a wider audience with your photos, you can post them on Facebook groups about butterflies and dragonflies. Just search for groups about these topics and many such groups can be found with tens of thousands of members. Post your shots there and they will be seen by a lot of people. There are also more general groups about insects.

The members of these groups are usually friendly and appreciate beautiful photos. Inspecting the images taken by others in these groups will give you valuable information. Remember that most of

these groups are about the insects and not about photography. For questions about photographic techniques, there are groups on macro and close-up photography and groups on different camera models.

When posting a photo, like this Map butterfly, in a Facebook group, you often get very nice reactions. 350 mm, 1/350 s, f/8, ISO 200.

Images on social media quickly disappear from the radar. To make your photos available continuously, you can consider creating your own website. That's not at all difficult these days. You can create an account on sites like Flickr (www.flickr.com) or 500px (www.500px.com) that are specifically meant for photo sharing. It is also possible to build a complete website with, for example, Squarespace (www.squarespace.com) or one of the many other website-building services. By using different templates, putting together your own website is fast and easy.

It is very nice to make a photo book of your best shots of butterflies and dragonflies. Be sure to put large images in the book, so that the viewer can admire all the details. There are many services for this. Search the Internet for a service in your region. The software to design the books is free and easy to use. It is also possible to make a calendar with your photos, for example. This makes for a nice, personal gift.

Identifying your subjects

It is extra satisfying when you know what kind of butterflies or dragonflies you have photographed. Maybe you even found a rare species.

In the past, identifying insects was a difficult task for which you had to be an expert. You had to carefully study all aspects of the insect and there were extensive manuals to determine what kind of insect it was. Often this was only possible with a dead specimen of the insect at your disposal. What made the process extra difficult is that caterpillars and dragonflies change throughout their lives. Male and female dragonflies also often look different.

Nowadays, with the help of AI, identification has become a lot easier. The software is surprisingly good at recognizing the different insects. In the image below you can see a shot of the Essex Skipper on the left. On the right is a shot of the Small Skipper, which is rare in the Netherlands. Do you see the differences? The software has no problem distinguishing between them.

The Essex Skipper (left) and the Small Skipper (right) butterflies. Both shots 300 mm, 1/350 s, f/8, ISO 250.

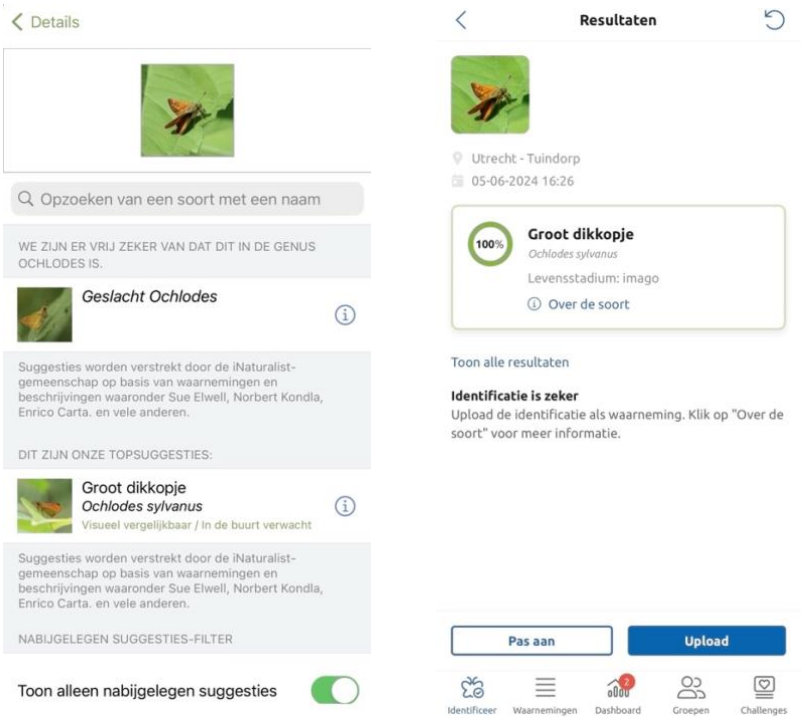
There are websites and free apps where you can send one or more photos of the insect, and you will immediately see which insect it is. These websites and apps were built by scientists who want to gather information about the distribution of insects and other organisms. Adding your observations, helps these scientists. The apps use modern AI techniques and collections of millions of images to perform the identification.

Be aware that the answers are not always perfect. Sometimes they give strange suggestions. So, to be sure, it is best to look up some more information about the species on the Internet. Strangely enough, high-quality photos taken with a good camera sometimes give worse results than photos taken with a mobile phone. This is because most photos are taken with a mobile phone, and the AI is trained on those images.

To determine what kind of butterfly or dragonfly you saw while photographing, it is best to use one of the apps iNaturalist or ObsIdentify on your mobile phone.

iNaturalist (www.inaturalist.org) is the world's most popular app for identifying insects and other organisms. The app is available on mobile phones for free. You will be asked to create an account. After that, you can upload images. The app provides the genus of the insect (a genus is a group of species) and gives suggestions for the species. By selecting the right species (usually the first one) the observation will be saved. The app is very extensive. You can view your own observations and those of others, and request more information about the insect.

I personally prefer **ObsIdentify** (www.observation.org/apps/obsidentify). This app focuses mainly on Europe. The app has the same functionality as iNaturalist but is a bit easier to use. The app contains considerably more observations in Europe than iNaturalist, which makes the identification more reliable. It also allows you to get much more information about the distribution of the different insects. ObsIdentify immediately indicates the species of the insect in the image, along with a confidence percentage. If this percentage is 90% or higher, the app assumes that the identification is correct (but it's always better to check it again.)



The apps iNaturalist (left) and ObsIdentify (right) both identify a photo of a Large Skipper (in Dutch).

To identify the images you took with the camera on the computer afterwards, the corresponding websites www.inaturalist.org and www.observation.org can be used. Another possibility is to show the image on the computer screen and take a picture with your mobile phone for identification.

When you start using ObsIdentify or its website, your observations are initially validated by experts. This way they can be sure that you are sending in correct information. This is of great importance because the data is used for scientific research. The observations are visible to you, but as long as they have not yet been validated, they are not included in overviews and distribution maps. After a month, if your observations are correct, you become a normal user and your observations will be recorded, unless you indicate that an observation is uncertain.

Identification while photographing

With an app like ObsIdentify, you can take pictures with your mobile phone and instantly see what kind of insect it is. But this can be difficult if the butterfly or dragonfly is far away. You don't have a strong telephoto lens for your mobile phone. And there is also a good chance that the insect has already flown away after you took the shot with your camera. A simple trick is to show the photo on the screen on the back of the camera and zoom in a bit. Now take a picture of the insect on the screen with your phone and let the app identify it. This generally works very well.

4. Photographing

There are many ways to photograph butterflies and dragonflies. You can photograph them from above, from the side, from the front or even from below. You can have the insect fill the entire image to show all the details, or you can leave a lot of space around the insect to show a larger part of the environment. You can leave the image largely out of focus to put all emphasis on a part of the insect, or you can opt for a large depth of field, for example by using focus stacking. You can also take close-up shots and show details of butterflies and dragonflies, such as the eyes, antennae or wings. In this chapter, we discuss all these possibilities.

The standard photo

Standard photos of butterflies and dragonflies are taken from above, to show the full wings, or from the side if the insects keep their wings closed.

If a butterfly has its wings spread out, for example to warm up in the sun, most people photograph it from above, so that the pattern on the wings is fully visible. Often the shot is also taken from behind because it is impossible to hold the camera directly above the butterfly. Such photos show the butterfly in all its splendor and are excellent if you want to identify the insect. They can offer a nice symmetry, especially if the background is not too busy. But such shots are often a bit boring. The viewer only observes the butterfly and there is no action.

For such a standard photo, you carefully approach the butterfly from behind. First, take a shot from a somewhat greater distance. Hold the camera in front of your eye and slowly move closer to take more shots. Be careful not to cast your own shadow or that of the camera on the butterfly. If the butterfly moves its wings up, it is alert. Then wait a while or move a little further away until it spreads its wings again.

A standard photo of a Speckled Wood butterfly, shot straight from above. 400 mm, 1/350 s, f/8, ISO 250.

Dragonflies are also often photographed in this way. They typically sit vertically against a stem and by taking the photo straight from behind the full insect can be seen and the stem is not in the way. If the wings are almost in the same plane, it is easy to get a sharp picture of them by focusing on the eyes.

Make sure to leave enough space around the insect. Initially, you often tend to try to get as close to the insect as possible, but the image usually becomes more beautiful if a bit more of the environment remains visible. That area should not be busy, otherwise it distracts the viewers' attention. Try to have the insect fill no more than half the width of the image. You can always crop the image later if the butterfly is too small.

Also experiment with diagonal compositions, as in the image above of a Speckled Wood butterfly. If the butterfly is exactly vertical, this does increase the feeling of symmetry, but if it is at an angle, the image becomes more playful.

Butterflies usually rest with their wings closed (unless they are warming up in the sun) and some species of butterflies almost never spread their wings. Most people photograph a butterfly with its wings closed from the side. That way you can see the head, wings, antennae and, if you're lucky, the tongue with which it drinks nectar from a flower.

For such a shot it is best to approach the butterfly from behind and only move a little more to the side at the last moment. Make sure there is no shadow over the butterfly and be careful with your own shadow. A low position is often required to photograph the butterfly in this way. To do this, get on your knees as this provides extra stability.

A standard photo of a Brimstone butterfly, shot straight from the side. 100 mm, 1/500 s, f/8, ISO 250.

Damselflies almost always sit with their wings closed along their body. Hence, a photo from the side also works well with damselflies. With such a shot the complete insect can be seen. If you photograph slightly from above, the photo becomes more interesting because also a part of the second eye can be seen. By ensuring that the entire damselfly is at the same distance from the camera, it is possible to get it completely in focus. However, when reviewing the picture, it often turns out that the back of the body is not sharp after all. Having the whole insect in sharp focus is not always necessary for a good shot but always check whether the shot has produced the desired result.

A Large Red Damselfly shot from the side. To put a lot of emphasis on the beautiful head, the back of the body is kept a bit out of focus and the frame is tight for extra magnification. 400 mm, 1/350 s, f/8, ISO 320.

Standard photos of butterflies and dragonflies can be beautiful, and I take them regularly. But it's also fun to try something different, as we'll see in the next section.

Different orientations

More interesting photos of butterflies and dragonflies can be obtained by shooting from different angles. For example, you can take a shot straight from the front or diagonally from below.

In addition to the standard photos straight from above or straight from the side, butterflies and dragonflies can be shot in many other ways. This is often a bit more difficult, and the insect does not always cooperate, but the satisfaction is greater. There are several options here, but above all, let your imagination run wild.

At an angle

If you photograph a butterfly or dragonfly at an angle, it provides more depth in the image. More depth of field is needed for this, requiring a narrow aperture (larger f-value). Depending on how the insect is positioned and where you want to draw the most attention, you can photograph diagonally from the front or diagonally from behind.

With a shot diagonally from behind, as in the image below, there still is a nice view of the beautiful wings of the butterfly. There is more depth than with a photo straight from above, and a better use of shadow, although some of the symmetry is lost. Such a shot works best if the insect has spread its wings. Otherwise, the photo gives too much of the impression that the insect is fleeing from you.

A Comma Butterfly, shot diagonally from behind. 400 mm, 1/250 s, f/11, ISO 500.

Personally, I like photos of butterflies where they have their wings only partially open, and the shot is taken diagonally from the front, like in the image below of a Map butterfly. The head and antennae can clearly be seen, together with part of the wings. A connection is created between the viewer and the butterfly. Even with dragonflies, photos from the front can work well. The insects must cooperate though. They often fly away when you try to approach them from the front.

A Map butterfly with the wings slightly open, shot diagonally from the front. 400 mm, 1/350 s, f/8, ISO 250.

When taking pictures diagonally from the front, you must think carefully about how you want to deal with the depth of field. Most of the time, it is best to focus on the insect's eyes. A small depth of field can be used to emphasize those eyes as much as possible, or a large depth of field to get as much of the insect in focus as possible. Optionally, focus stacking can be applied for extra depth of field. But if the back of the body or wings are out of focus, it usually gives a stronger sense of depth, so you do not always need a large depth of field.

A Large Red Damselfly shot almost straight from the front. 400 mm, 1/350 s, f/9.5, ISO 320.

Straight from the front

Photos straight from the front have a lot of impact on the viewer. The insect looks at you and it seems very large in the picture. When shooting exactly from the front, the photo is sometimes even

a bit alienating or frightening. You also get a very strong symmetry in the image. By keeping a small angle, it is a bit clearer what the viewer is looking at. The photo above of a Large Red Damselfly is an example of this. By keeping a small angle, the shape of the body and wings are still visible. But all attention is focused on the beautiful head.

It is difficult to photograph insects straight from the front. It works best to stay at a considerable distance, use a telephoto lens, and crop the image a bit. With the image above, I was able to stay one and a half meters away. Also, use a low stance and get on your knees if necessary. The image has the most impact if the camera is at the same height as the insect. And don't forget to pay attention to the background. This should support the image and not distract from the insect.

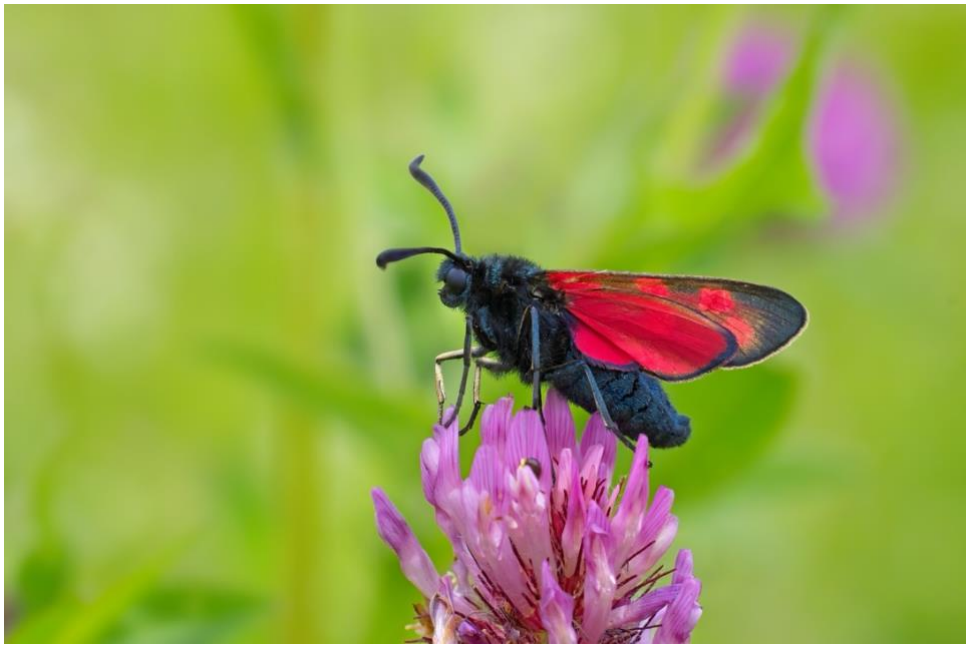
Again, depth of field plays an important role. The head must be sharp, and the head is often larger than you think, with protruding eyes or antennae. So, make sure to have enough depth of field. But the body, when visible, may be out of focus, especially towards the back.

Photographing from below

If you see a dragonfly or damselfly sitting on a stem, it is common to photograph it in such a way that the stem does not pass in front of the dragonfly, by shooting from the top of the insect or from the side. This way you get the full insect in the picture. But it is also possible to shoot from the other side. By positioning the camera very precisely, you can ensure that the two eyes are on different sides of the stem. This results in a special shot. By taking a low position and shooting upwards, the image becomes even stronger. Make sure focus lies on the eyes and not on the stem.

A Small Emerald Damselfly behind a stem, shot from below. 260 mm, 1/350 s, f/8, ISO 320.

You can do something similar with a butterfly on a flower. Try get into as low a position as possible and shoot upwards from the front or side of the butterfly. Make sure the wing(s) are seen from below. This works a bit more easily if the flower is tilted or the butterfly is more on the side. A larger part of the body of the butterfly is visible, and you will see the underside of the wings instead of the top. The two surfaces of butterfly wings often have very different colors and patterns. Because you photograph upwards, you can easily provide a quiet background.



A Six-spot Burnet moth, shot from below. 100 mm, 1/350 s, f/8, ISO 2000.

When photographing insects at special angles, it can help to keep the camera a bit away from you. Don't look through the viewfinder but use the screen on the back to determine the desired composition. That screen can usually be turned in any direction you want. For example, you can shoot from below without having to lie down on the ground. In this way you can also stay further away from the insect and only move the camera closer. This increases the chance that the insect will stay put.

Moths

When attracting and photographing moths at night (see chapter 8 on page 171) you often have many more opportunities to photograph them at interesting angles. They are usually inactive when attracted by light. It is possible to let them crawl onto a piece of paper or on a stick and choose any angle you like. By holding the stick with your left hand and operating the camera with your right hand, the insect can be photographed from any direction. You must learn to photograph with one hand, or you must use a tripod. Often also close-up shots can be taken. The same goes for butterflies and dragonflies early in the morning on a cold day. However, always treat the insects with respect.

Framing

How do you fill the image? Do you let the butterfly or dragonfly fill the entire frame or do you leave a lot of space around it to show more of the surroundings?

By framing, we mean the way the elements are placed within the space of the image. When photographing butterflies and dragonflies, people often frame very narrowly, with the insect filling almost the entire image (assuming they can get close enough). The big advantage of such a picture is that all the small details of the insect can be seen. The more space you leave around the insect, the smaller it will be in the image and the less detail can be distinguished. If the background is uninteresting or busy or messy, a narrow frame has the added advantage that you see little of that background and the viewer is not distracted by it.

A narrowly framed Large Skipper butterfly. 400 mm, 1/350 s, f/8, ISO 200.

If you step back a bit or zoom out, you can, for example, show the entire flower on which the butterfly is sitting, as in the image below. This creates more space around the subject and adds tranquility to the photo. In such shots more attention must be paid to the background, and an interesting composition should be picked. The insect should be positioned in the correct place in the image and distracting elements must be prevented from appearing. See the next chapter on page 90 for more information on composition.

The same Large Skipper butterfly shot from a greater distance. 400 mm, 1/350 s, f/8, ISO 200.

If you zoom out even further or keep an even greater distance from the subject, you can show the environment in which the insect is located. The insect is no longer the main topic. It's about the whole composition, for example a shrub with many flowers. The butterfly or dragonfly adds a focal point to this. The interest in the image must be derived from the whole scene, not just the insect. The viewer may not even notice the insect consciously.

Chamomile flowers with a Speckled Wood butterfly. 100 mm, 1/350 s, f/8, ISO 125.

Most of the time, people hold the camera horizontally or vertically. But when photographing butterflies and dragonflies, this is not always necessary. You can often hold the camera at a slight angle without any problems. There is usually no horizon in the image and stems don't need to run vertically. That way, framing can sometimes be improved and distracting elements can be kept out of the picture. You can also rotate the image afterwards when editing it. Make sure that any

shadows still run in a natural-looking direction. When there are shadows in the image, these should remain diagonally below the objects.

When seeing a butterfly or dragonfly, always think carefully about how to frame the insect. By using a zoom lens, that framing can easily be changed. This gives you a better chance to take the desired shot before the insect flies away. Always review your photo after taking it to verify the image has the desired effect. Consider taking multiple shots with different focal lengths. It is always better to frame a little wider and determine the final framing by cropping the image afterwards.

Aspect ratio

The aspect ratio is part of the framing and has an important effect on the experience of an image. Given the position of our eyes, horizontal photos are the most natural. That is why cameras produce that standard. They also work best on social media. But a vertical or square image can have a stronger impact on the viewer.

If a butterfly has spread its wings, a horizontal photo is often the best. But with closed wings, a square photo can also work well. And for dragonflies that are sitting along a stem, a vertical image gives an interesting frame because it shows more of the stem. Try out the different options. You can also easily adjust the aspect ratio of images afterwards, provided you leave enough space around the subject when photographing.

This shot of a Four-Spotted Chaser (below) and a Broad-bodied Chaser (above) dragonfly together on a stem works best with vertical framing. 240 mm, 1/350 s, f/8, ISO 160.

Using a wide-angle lens

A wide-angle lens has a small focal length (often between 10 and 24 millimeters), so the field of view becomes wide. The smaller the focal length, the wider the field of view. This allows you to see a much larger part of the background while the subject in the foreground is still large in the frame. The background is of course vaguer, but the content is still clearly distinguishable. For example, you can show a pond behind a dragonfly or a heathland or forest edge behind a butterfly.

When using a wide-angle lens with a small focal length, you must get very close to the insect. In the photo below, the butterfly was only 10 centimeters away from the front of the lens. This only works with certain insects, and you must be a bit lucky. The exposure requires extra attention. Since the background is important, it must be correctly exposed. At the same time, you want the subject in the foreground to stand out clearly.

A White Satin Moth, shot with a wide-angle lens. 16 mm, 1/350 s, f/6.7, ISO 100.

A blurred background

It is often nice if the background of a photo is blurred. The insects will stand out better. But how do you achieve that?

The background of a photo plays an important role. The background can help to draw attention to the butterfly or dragonfly, for example via leading lines or by using empty (negative) space (see the next chapter on composition for details). But a backgrounds can also distract from the subject. Hence, a largely empty or blurry background is usually preferred. There are several ways to achieve this. Somewhat muted colors are preferred that flow smoothly into each other, and there should be as little detail as possible with few elements and details.

Two shots of a Large Skipper butterfly. In the right photo the background is much blurrier, so there is more emphasis on the butterfly. Both shots 400 mm, 1/350 s, f/8, ISO 200.

There are four factors that determine the blurriness of the background:

- The distance between the subject and the background. The further away the background is, the more blurred it becomes. Pay attention to this when composing the shot.
- The distance between the camera and the subject. When getting closer to the subject, the background becomes blurrier (when using the same focal length). The magnification factor increases, reducing the depth of field and thus blurring the background.
- The aperture. The larger the aperture (small f-value), the blurrier the background. This is again because the depth of field becomes smaller.
- The focal length of the lens. The larger the focal length, the more blurred the background appears. This is due to compression (see page 21). The background is magnified more and therefore appears blurrier.

To obtain a nice blurry background, work with the widest possible aperture that keeps the subject sharp enough, use a large focal length, and try to choose the composition that offers the greatest background distance possible, as in the image below. The latter is often difficult to achieve. If a dragonfly is among grass or reeds, there are many other objects close to the subject. Or if a butterfly is in the middle of a large leaf, the background is close to the subject as well. In these situations, you will have to put the emphasis on the insect in a different way by using the different composition techniques that we discuss in chapter 5 on page 90.

A Small White butterfly. The purple color of the flowers is repeated in the blurred background. 400 mm, 1/350 s, f/8, ISO 250.

You usually get the best effect when the butterfly sits on the edge of a flower, or the dragonfly sits on a twig. By choosing a low point of view, the background usually becomes further away. You can also try shooting against the sky, especially if there are some nice clouds, which can result in a beautiful image. Make sure that the insect is sufficiently exposed because sky backgrounds tend to be very bright. Overexpose the shot a bit if necessary. Another possibility is to use a fill-in flash. See chapter 6 on page 108 for more information on lighting.

A Red Admiral butterfly against a cloudy sky. 100 mm, 1/350 s, f/8, ISO 100.

Be careful with objects that are between the camera and the subject, for example when photographing amongst twigs or leaves. These objects will become blurred as well, but often not to

a sufficient extent. As a result, they become distracting elements in the image. Try to avoid such objects or use them to frame the subject as described on page 103.

Sometimes, despite our best efforts in the field, it is not possible to get the desired blurred backgrounds. Most of the background might be fine, but a few objects can get in the way and stay sharp. In those situations, editing software techniques can be applied to remove or blur those distracting elements. These techniques are discussed in chapter 7 on page 138.

Bokeh

Bokeh is a word from Japanese that means “blur”. Although bokeh is about the quality of the blur in general, most photographers associate it with the round bright spots that are created in the photo because light sources become blurred. This effect can be seen, for example, when there are raindrops in the background reflecting the light or when the light falls through leaves. It can make a shot special, but when photographing butterflies and dragonflies it easily distracts from the subject, especially if there are only a small number of such spots present.

The background of this Common Darter dragonfly is made up of bokeh spots, caused by light falling through leaves. 325 mm, 1/320 s, f/8, ISO 800, fill flash.

Close-up photography

Shots of just a part of a butterfly or dragonfly give a new look at these insects with unimaginable detail.

In addition to photos of complete insects, you can also photograph only part of a butterfly or dragonfly, for example just the head. This shows details that would otherwise remain hidden. In the image below of a Hairy Dragonfly you can see the beautiful eyes and the color patterns (and the hairs).

A close-up of a Hairy Dragonfly. 400 mm, 1/350 s, f/8, ISO 800.

To photograph only part of an insect, a higher magnification is required than when photographing the entire insect. There are two options here. With a telephoto lens with a high magnification, you can stay at a reasonable distance and zoom in. The telephoto lens must have a small minimum focus distance. The above photo of a Hairy Dragonfly was taken with a focal length of 400 mm from about one meter. Not all telephoto lenses can get this close.

The alternative is to use a macro lens and shoot from much closer. Many butterflies and dragonflies can be photographed very closely, if you move very slowly. Especially when they are still cold in the morning or when they are eating, they can easily be approached.

A **macro lens** is a lens with a fixed focal length that is constructed in such a way that you can focus very close to the subject. This results in a large maximum magnification factor, often 1:1 and sometimes even more. This is ideal when photographing insect details, but macro lenses are expensive and often not easy to use. There are cheaper alternatives if you only want to take macro shots from time to time (see below).

There are macro lenses with different focal lengths. The smaller the focal length, the closer you need to get to the insect. This is undesirable for butterflies and dragonflies, which is why I recommend a macro lens with a focal length of at least 65 mm for these kinds of shots. I use a 100 mm macro lens. The image below of the head of a Large White butterfly was taken with that lens.

A close-up of the head of a Large White butterfly. 100 mm, 1/320 s, f/13, ISO 200, flash.

Many macro lenses are manual, so they cannot focus automatically. Working with them requires practice and is very difficult when dealing with moving insects or when there is wind. Fortunately, more and more macro lenses are coming onto the market with fast autofocus. Always test whether the lens works well with your camera before you decide to buy the lens.

Keep in mind that the depth of field decreases as the magnification increases. That means that you must use a small aperture, like f/13 in the photo above, or that you must think carefully about which part of the insect should be in focus and which parts can stay out of focus.

Close-up shots often look nicest when the insect is in the shade. The sun creates harsh shadows and therefore too strong a contrast between different parts of the insect. In the shade, the image can become a bit flat, but due to the many visible details, this is usually not a problem. If necessary, you can enhance the contrast and increase the vibrancy of the colors when editing the image. In addition, the image can be cropped to zoom in even more.

When photographing in the shade, a high ISO value is required, and noise reduction is therefore essential. The photo below of a Small Emerald Damselfly required ISO 1600 when using aperture f/8 for sufficient depth of field. But fortunately, the noise removal works very well these days. Of course, you can also use a flash with a diffuser, as in the photo above.

A close-up of a Small Emerald Damselfly. 100 mm, 1/180 s, f/8, ISO 1600.

Cheap alternatives

If the magnification of your lens is not sufficient for close-up shots, **extension tubes** are ideal for turning a standard lens into a macro lens. These tubes are placed between the camera and the lens. They ensure that the minimum focus distance is significantly reduced, which increases the magnification. There are extension tubes of different lengths. The longer the tubes, the stronger the magnification. It is also possible to combine the tubes.

The smaller the focal length of the lens, the stronger the effect of the extension tubes. A lens with a focal length between 50 mm and 100 mm works best. Extension tubes are very cheap. You need to buy the right tubes that go with your camera's lens mount. Get extension tubes that relay communication between camera and lens, so that autofocus and aperture selection continue to work. These tubes often have AF or auto in the name.

A disadvantage of using extension tubes is that you can no longer focus to infinity because the maximum focus distance is significantly reduced. Removing the tubes is necessary to take shots from a greater distance. Also, the use of extension tubes costs a stop of light. The tubes do not contain glass, so the image quality is not affected.

Instead of extension tubes, a **macro converter** lens can be used for a stronger magnification. A converter lens is placed on the front of the camera lens in the filter thread. Some converters are threaded while others, such as the commonly used Raynox converters, click onto the lens like a lens cap. The latter is very handy because you can then quickly place the converter when needed and remove it afterwards. Make sure that the filter size of the converter lens matches that of the camera lens you are using.

Converter lenses come in different strengths. For example, there is the strong Raynox DRC-250 and the weaker DCR-150. The larger the focal length of the camera lens, the stronger the effect of the converter. When using a telephoto lens of 100 mm or more, it is best to use the less powerful DCR-150, while shorter lenses pair best with the DRC-250. With a zoom lens, don’t use the large focal lengths as the magnification becomes too strong.

As with extension tubes, the focus range is very much limited to often just a few centimeters. So macro converters can only be used if you want to shoot up close. Converters can also be used with a fixed-lens camera, provided it has a filter thread. Good converters are a bit more expensive than extension tubes, but they are easier to work with for occasional use.

Meike extension tubes (left) and a Raynox DCR-250 converter lens (right) can both be used to turn a regular lens into a macro lens.

Focus stacking

To get the entire butterfly or dragonfly in focus from front to back, focus stacking can be used to increase the depth of field.

When photographing a butterfly or dragonfly at close range, it is usually impossible to get the entire insect in focus, even when using a small aperture such as f/16. To show the small details in both wings, for example, more depth of field is needed.

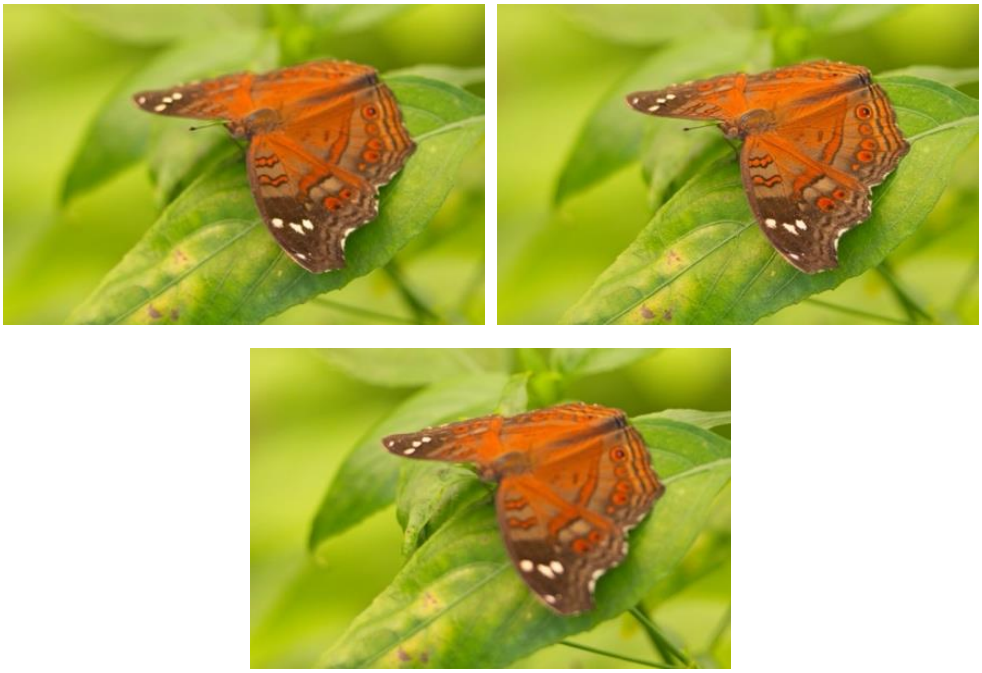
Focus stacking is a technique to get a larger part of a photo in focus. To this end, several shots are compiled into one. This used to be a complicated process, but modern cameras and software make focus stacking a lot easier.

The technique consists of two steps. First, a **focus bracket** is created. This consists of a series of photos of the same subject from the same position, each using a slightly different focus distance. By doing so, for each part of the insect there is a photo in the series where that part is sharp. In the second step, the actual **focus stacking**, these images are assembled into one using the sharp parts from each of the images in the series. Below we discuss both steps in more detail.

The following photo of a tropical butterfly (a Natal Pansy) was shot handheld in a butterfly garden. Because the shot is taken diagonally from the front, you need a very large depth of field to get both wings fully sharp. With the help of focus stacking, this is easy. The result is composed of only 5 images. More images would only make the background sharper, which is undesirable. In this case, Luminar Neo software (www.skylum.com/luminar) was used to compose the images.

A Natal Pansy butterfly composed of five images using focus stacking. 235 mm, 1/180 s, f/8, ISO 800.

Below you can see the first, third and fifth image from the series. In the first image only the front of the front wing is sharp, in the middle image the head is in focus and in the last image the back of the hind wing is sharp.



The first, third and fifth image of the focus bracket.

Create a focus bracket

There are several ways to create a focus bracket, depending on the equipment you use.

Automatically. More and more modern cameras can automatically make a focus bracket. This works as follows. You set how many shots should be taken and how large the step size of the focus distance should be between the shots. Then you focus on the nearest point in the insect and press the shutter button. The camera takes the indicated number of shots in quick succession and each time shifts the focus with the indicated step size. (There are also cameras where you must focus on the furthest point. Check your camera's manual.) The lens must be on autofocus. Automatic focus bracketing does not work with a manual lens.

The focus step size is a bit of an arbitrary value. With a smaller value, there is a larger overlap between the sharp areas in the images and this leads to the best result. But many more shots are needed to get the whole insect in focus. When photographing from a tripod, the insect is sitting still, and there is no wind, this is possible, but usually it is better to go for a larger value and take fewer shots. Experiment with different values to determine what works best for your camera and lens. (Do this at home, to make sure that things will go well in the field.)

The smaller the aperture, the fewer shots are needed. It's best to use an aperture between f/5.6 and f/8. Pay close attention to the exposure. This should be the same for all shots. You usually can't use a flash because it takes too long to charge between the shots.

Manually. If the camera cannot automatically make a focus bracket and you photograph handheld, proceed as follows. Set the lens to manual focus. Let the camera shoot continuously (burst mode) at the highest possible speed. Now focus on the nearest point of the insect. Press and hold the shutter button while slowly moving the camera forward. As soon as the furthest point is in focus, release the shutter button.

It requires the necessary practice to do this fluently at the right speed. It is important that the subject remains in almost the same place in the image. The focus stacking software can correct the position somewhat, but if the deviation is too big, it fails. Practice this at home first.

With a tripod. When using a tripod, the same technique can be used, but you will need a so-called macro focusing rail. Without such a rail, proceed as follows. Set the lens to manual focus again. Focus on the closest point on the insect and take a picture. Now turn the focus ring slightly and take another picture. Continue like this until you reach the furthest point on the insect.

This way of working is much slower. It therefore only works if the insect sits still for a longer period. An advantage is that a flash can be used with this approach. When using a flash, you can narrow the aperture so that fewer shots are needed. Often three to five images suffice.

A Common Darter dragonfly, combined by the camera from ten shots. 100 mm, 1/125 s, f/8, ISO 160.

Combining images

Again, there are several ways to combine the images in the focus bracket.

Automatically. Most modern cameras can not only automatically make a focus bracket, but they can also combine the images. This is very convenient. You immediately see the result. Due to unwanted movements, making a focus bracket often goes wrong and it is a shame if you only find out when at home.

The software in the camera is though somewhat inferior to the apps you can use on your computer. Also, realize that the combined image that the camera produces is usually saved in JPG format. Such images have a somewhat lower quality than the RAW images that the camera normally produces and give fewer possibilities to edit the images afterwards. But the camera also saves the individual shots of the bracket in RAW format, and these can be combined with better software afterwards.

On the computer. You can also combine the images from the focus bracket on the computer afterwards. Photo editing software such as ON1 Photo RAW and Luminar Neo have built-in focus stacking functionality. You can also apply focus stacking in Photoshop, although it is a bit more work (see the textbox below). In addition, there is software that is specially made for focus stacking, such as Helicon Focus (www.heliconsoft.com) and Zerene Stacker (www.zerenesystems.com). This software is considerably more extensive than the functionality offered by most photo editing software, but also a bit more difficult to use. And the special software is not cheap.

Preventing movement

The software that combines the images from the focus bracket tries to align them as well as possible. Small movements of the camera are usually not a problem, but it is still important to prevent movement as much as possible. There are three types of movement that must be avoided:

- Movement of the insect. You can't really do anything about this. The software cannot correct these types of movements. The result can be an image in which certain parts, such as the antennae, are duplicated. Yet such movement is not always a problem. For example, if the insect moves its head during the shots, there is a reasonable chance that the shots in which that head is in focus have already been taken. The new position will therefore not appear in the result because it is not sharp.
- Movement of the stem or flower on which the insect is sitting, for example due to wind. If this is a movement to the side, the software can usually correct it. But if the movement is in the direction of the camera or away from it, it doesn't work because such a movement leads to a change in focus distance. Parts of the final image are often not sharp.
- Camera movement. The best way to avoid this is to use a tripod or monopod, if you have the time to set it up. When shooting handheld, try to find some support for the camera or for your arms. Again, movements in the direction of the insect are a bigger problem than sideways movements. The fewer shots you need, the more likely it goes well.

Using a small aperture

The depth of field in an image can also be increased by using a smaller aperture. But the effect is completely different from using focus stacking. The pictures below show this. The left image of this Black-tailed Skimmer (female) was taken with f/22. Because the dragonfly was in the shade, 1/125 s shutter speed and ISO 5000 were needed. This was not a problem thanks to image stabilization and noise reduction. The right image was combined from ten shots using focus stacking. Here f/5.6, 1/350 s and ISO 1250 could be used. In both images, the dragonfly is almost completely in focus. But in the left image, the background has also become much sharper due to the small aperture. This is not the case in the right image because no sharp shots of the background were taken. The image on the right is therefore cleaner with more attention to the dragonfly.

A Black-tailed Skimmer dragonfly. The left image was taken at 1/125 s, f/22, ISO 5000 and the right image was combined from 10 shots at 1/350 s, f/5.6, ISO 1250.

Artifacts

When combining images with focus stacking, certain artifacts can occur. The software must determine which parts of the images are in focus and does not always do so correctly. Problems often arise in places where two parts of the insect at different distances overlap, both of which need

to be sharp. At the position where the parts touch each other in the image, there is no shot that contains both parts sharply. The software will generally use the shot where the closest part is in focus and the other part is out of focus. You can see that, for example, in the image of a Common Darter earlier in this section. The abdomen is behind the wings. The software has used the shot with the sharp wings here, so the wings are sharp, but the abdomen is not.

Focus stacking in Photoshop

When using Lightroom and Photoshop to edit your images, here's how to apply focus stacking:

- Select the images of the focus bracket in Lightroom and choose **Edit in -> Open in layers in Photoshop**.
- Select all layers in Photoshop. Go to the menu and choose **Edit -> Auto-Align Layers** and choose **Auto**. Photoshop will now overlay the images in the layers exactly.
- Now go to the **Edit -> Auto-Blend Layers**. Check both options and choose **Stack Images**.
- After some calculations, the layers are now assembled into a single layer. You can now delete the original layers.

Detailed instructions and videos can be found on the Internet (for example www.youtube.com/watch?v=bxxD-mS_Meo).

5. Composition

Composition deals with the way in which the parts of an image come together to form a whole. Where is the insect in the photo and where is the flower or stem it is sitting on? Composition is an important part of photography. If a shot has a good composition, it will keep the viewer's attention longer. Composition includes the structure of the image, the positioning of the elements, the use of lines, patterns and colors, and the role of the foreground and background.

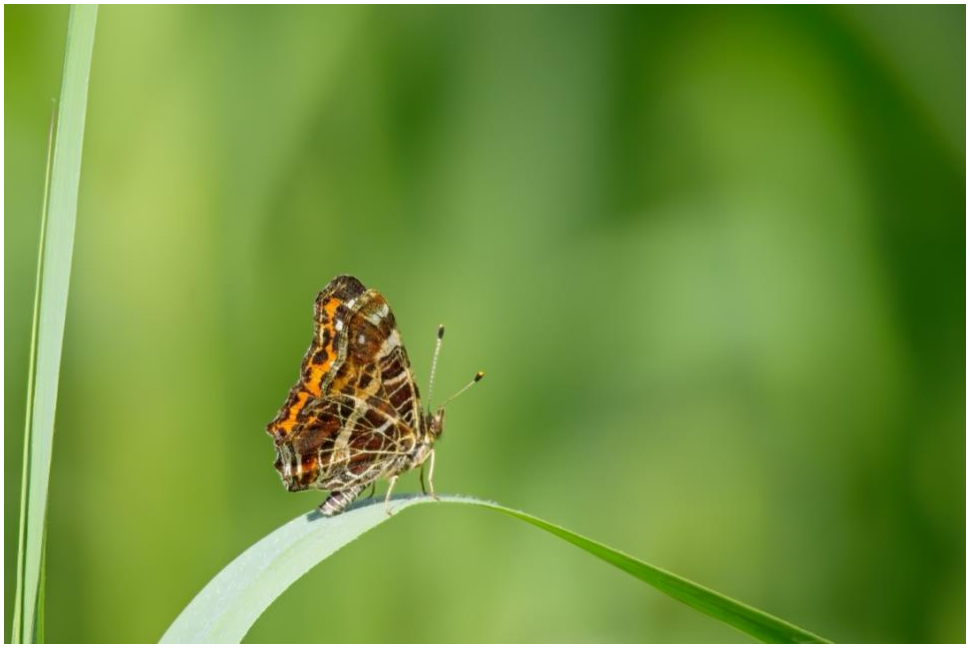
Structure of an image

What is the best way to structure an image of a butterfly or dragonfly? Where do you place the insect and all other elements in the image?

If you look at the photo of a Small White butterfly at the beginning of this chapter, you will see that the butterfly is not placed in the middle, but more towards a corner. The flower is placed exactly in the middle and a lot of empty space has been left on the right side. Several composition rules have been applied in this image, which we will discuss below.

When people look at a picture, their gaze usually starts in the bottom left corner or top left corner. From there, their gaze moves over the images, after which it comes to rest on the most important element. It helps to guide this path of the gaze through the positioning of certain elements in the image. If you look at the photo below of a Map butterfly, the leaf on the left leads the viewer's gaze downwards, after which the second leaf leads the viewer to the butterfly.

In this example, the butterfly is placed according to the **rule of thirds**. This is an important composition rule. When dividing the image horizontally and vertically into three equal parts, the lines intersect in four positions that are always at 1/3 or 2/3 of the length and width. These are the best positions to place the main element of the photo. In the image of the White at the start of this chapter, the butterfly is placed in a similar position.



This Map butterfly is placed according to the rule of thirds. A lot of negative space has been left in the direction in which the butterfly is looking. 400 mm, 1/350 s, f/8, ISO 400.

When using the rule of thirds, there is much more space on one of the two sides of the insect. It is important that the insect is oriented in that direction, otherwise it will look out of the picture. (There are situations where this causes tension, but this is usually not the case with insects.) It is slightly preferable that the insect looks to the right because our gaze moves from left to right over the image, but this is certainly not always important, and you usually have no choice when taking the shot. But the image can of course easily be flipped with processing software.

Although the rule of thirds is an important composition rule, you don't always have to stick to it. If a butterfly or dragonfly has spread its wings, there is a lot of symmetry in the shot. In that case, that symmetry can be strengthened by placing the insect exactly in the middle. And in close-up shots, you usually don't have the space to apply the rule of thirds.

It helps to place as few other elements as possible in the image. There is usually the flower or stem which the insect is on, but otherwise best leave the photo empty. This empty part of the photo is called the **negative space**. It creates tranquility and directs the viewer's attention to the insect. Having many other elements in the image can be distracting. Of course, you don't have to adhere to this rule either. Many different elements can also hold the viewer's attention for an extended period because there is a lot to see.

For example, the image below of the female of a Black-tailed Skimmer dragonfly does not adhere to the rule of thirds, nor does the photo contain much negative space. This emphasizes the shape of the dragonfly and clearly indicates that it can be found amongst grasses and reeds.

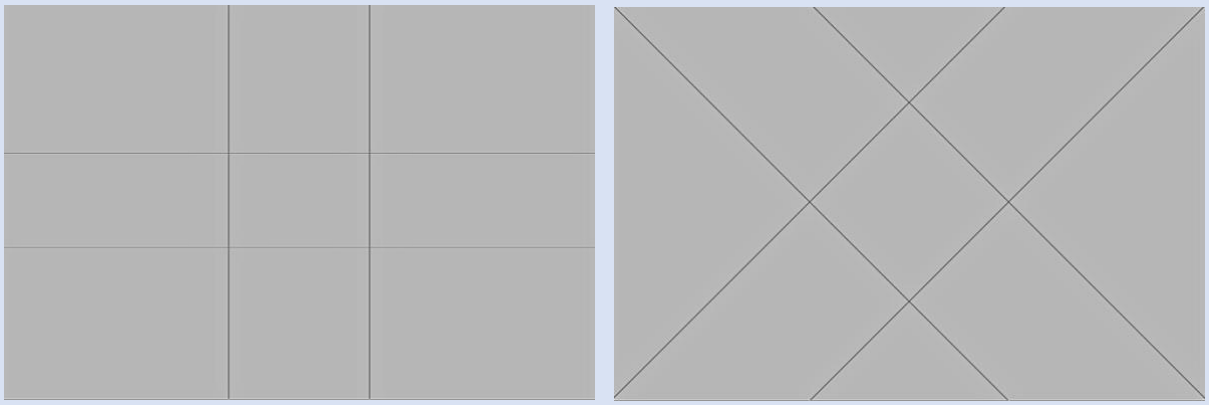
A Black-tailed Skimmer dragonfly amongst grasses. 280 mm, 1/320 s, f/8, ISO 320, flash.

When photographing, be aware of these simple rules of composition. This helps to create more interesting photos. You can always adjust the composition afterwards by cropping the photo a bit and possibly rotating it.

Other divisions

In addition to the rule of thirds, in which the photo is divided horizontally and vertically into three equal parts, another division is based on the **golden ratio**. The golden ratio is a number that is approximately equal to 1:1.62. When dividing the image horizontally or vertically into two parts, it is attractive to use the golden ratio for this. You use one of the lines in the left image below. This ratio is often used in architecture. Cameras and photo editing software can place such a line pattern on top of the image which helps to use this ratio.

With the **diagonal method**, the four corners of the image are divided into two equal angles. This way you get the four lines in the image on the right. Important elements can now be placed at the four intersections and other elements can be used to guide the viewer's gaze along the lines. On the next page you can see an example of a photo that uses the diagonal method.



The division of an image based on the golden ratio (left) and diagonals (right).

Leading lines and framing

Lines in the image can be used to guide the viewer's gaze, and you can frame the main subject to draw more attention to it.

Lines in an image are a powerful tool to direct the viewer's attention. As mentioned earlier, a viewer usually starts in a corner of the photo. A line from such a corner draws the eye to another place in the image, for example the location of the insect. Lines can be prominent, such as stems or branches, but they can also be formed by faint objects in the background.

The image below of a Broad-bodied Chaser dragonfly uses a prominent line from the upper left corner towards the dragonfly. The line follows the diagonal method described in the previous section and divides the angle into two equal parts. If you look closely, you can see a faint second line in the background that follows the other diagonal. The lines lead the viewer's gaze to the dragonfly.

The line formed by the stem follows the diagonal method and leads the viewer to this Broad-bodied Chaser dragonfly. 400 mm, 1/350 s, f/8, ISO 500.

If the shot contains multiple intersecting lines, then the intersection points of these lines are important positions. In the image below of a Small Emerald Damselfly, the two stems form intersecting lines. The four wings direct the attention even more to the head in the middle of the image. Lines do not have to be straight, as can be seen in this photo.

The lines formed by the stems and the wings guide the viewer to the center of this photo of a Small Emerald Damselfly. 260 mm, 1/350 s, f/8, ISO 400.

When surrounding the main subject with some kind of frame, more emphasis is put on it. That frame can be anything. For example, you can use a gap in the vegetation, branches, flowers and even open space. The image below uses two flowers to frame the butterfly.

The blurred flower at the top provides a frame for the Red Admiral butterfly. 100 mm, 1/350 s, f/8, ISO 100.

Completely framing a butterfly or dragonfly with objects gives a strange image. The viewer should keep the feeling that the insect can fly away. When the butterfly is fully surrounded, that feeling disappears. That is why it often works better to leave the top open, or even just fill the bottom and one of the sides. If the frame is blurry, as in the image above, then this problem does not occur

because the butterfly is clearly not trapped. Of course, the insect must look in the direction of the open space. Otherwise, the image is illogical.

Adding borders

You can easily add borders when editing an image. And when printing a photo and placing it in a frame, a passe-partout is usually used that surrounds the photo. These also give a frame to the image. The border or passe-partout pulls the viewer into the image. It separates the outside world from the world in the image. The color of the border is important here. A black border often works well with an image with bright colors. White is more neutral.

There are a lot of options for using borders in photo editing software. But be careful that it doesn't distract from the content of the picture. Often a simple border works best. And if a photo is shown against a white (or black) background, such as in a book, a border is usually not necessary at all. The background already forms a frame.

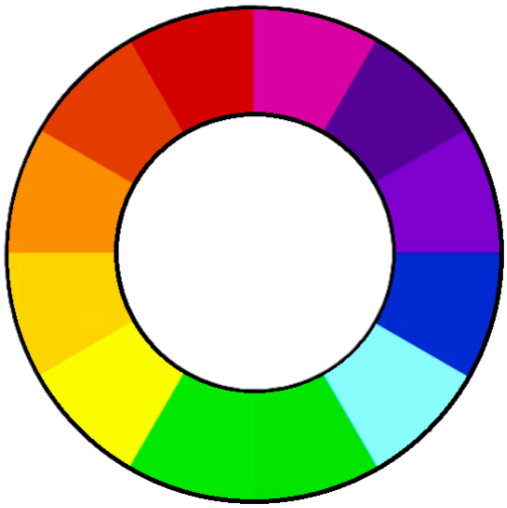
Color

Use of color plays an important role in the composition of an image. How do you combine the colors of the insect and the environment?

Many butterflies have bright colors and the same goes for various dragonflies. In addition, in your photo there are colored flowers, green or yellow flowers and stems, and a background that can also contain many different colors. Those colors can reinforce each other or lead to a mess.

Color has an important influence on the appreciation of an image. Some colors attract more attention than others. This is called the **visual weight** of a color. For example, red and orange have a much greater visual weight than green or blue.

Colors can be placed on a **color wheel**, as shown in the image below. They follow the colors in the rainbow, with purple and magenta connecting the ends of blue and red. Harmonious colors that resemble each other lie next to each other on the color wheel while contrasting colors lie opposite each other.



A color wheel. Harmonious colors lie next to each other and contrasting colors lie opposite each other.

The image below shows both color effects. The purple colors of the bands on the wings of this Purple-barred Yellow moth and the purple of the heath and the background are harmonious, while the yellow-orange parts of the moth contrast with these colors. This draws the viewers' attention to the yellow-orange parts of the moth.

This photo of a Purple-barred Yellow moth has many harmonious colors. The purple in the moth is repeated in the heath and in the background. The contrasting yellow-orange parts of the moth thus attracts extra attention. 400 mm, 1/350 s, f/8, ISO 400.

Harmonious colors give tranquility in an image. Contrasting colors, on the other hand, result in a stronger visual appearance that draws the viewer's attention to the colors with the greatest visual weight. So, it's important that those colors accentuate the desired part of the photo. The image below shows how this can go wrong. The purple color of the flower has the largest visual weight. Hence, the viewers' attention is not on the butterfly but on the flower. The Brimstone butterfly harmonizes with the green background. This was not the intended effect of the shot. Pay close attention to the effect of the colors in your images. If required, you can adjust colors a bit when editing the image to enhance the desired effect.

This purple flower draws attention away from the Brimstone butterfly. 300 mm, 1/350 s, f/8, ISO 200.

White balance

The **white balance** determines the extent to which the color temperature in the shot is shifted. You often want white in a photo to be really white, but depending on the type of light, it can look more orange (for example with a setting sun) or blue (for example with artificial light). The white balance can be used to correct this. But the white balance can also be used to change the mood in your photo. You can make the image warmer (more orange) or cooler (more blue). The example below shows what a change in white balance does to a photo (the effect is deliberately exaggerated here). The left shot seems to have been taken in the shade and the right shot in the sun. When using the JPG images from the camera, the white balance must be set in the camera. But when using the RAW images, you can easily adjust this afterwards when editing the image.

The same image of a Brimstone butterfly with a cool white balance on the left and a warm white balance on the right. 335 mm, 1/350 s, f/8, ISO 320.

Telling a story

A picture becomes more interesting if it tells a story, suggests action, or raises questions in the viewers' mind.

If there is a story behind a picture, that picture becomes more meaningful. The viewer can make associations with certain events, locations, or emotions. This is not easy to achieve with shots of butterflies and dragonflies, unless there are also other subjects in the shot. Think, for example, of a child looking at a butterfly or two people with butterflies flying around them.

There are images that tell the story themselves. With other shots you will have to tell the story because otherwise it is not clear to the viewer. Of course, this also depends on the viewer's level of knowledge. The image below of two mating Six-spot Burnet moths, for example, tells an interesting story for the connoisseur. At the bottom right of the stem you can see the yellow pupa out of which the female has just crawled. She has not even been able to fly before the male has already found her and started mating. Mating and laying eggs are the main purpose of adult female butterflies and moths.

Two mating Six-spot Burnets moths. The female has just crawled out of the pupa at the bottom right. 100 mm, 1/320 s, f/6.7, ISO 125, fill flash.

An image has a strong effect on the viewer if it expresses a certain emotion. This is also not easy to achieve with butterflies and dragonflies. We generally don't feel an emotional connection to these insects, although butterflies are associated with love. Yet a photo can certainly evoke certain feelings, regardless of the subject. For example, a shot of a small butterfly in a large empty field can give a feeling of loneliness. And the image below expresses a certain degree of sadness through the gray background and pale colors.

A Small Skipper butterfly, shot on a cloudy evening. 400 mm, 1/350 s, f/8, ISO 1000.

By positioning a butterfly or dragonfly in the right way and photographing it from the right angle, you can suggest action. For example, the insect may be about to fly away. Or you can suggest that the insect is flying towards you. Unfortunately, the insect often does not cooperate with this. But with patience, you sometimes manage to achieve that effect. It is also possible to photograph butterflies and dragonflies that are eating, mating or flying. We will discuss this in more detail in chapter 8 on page 154.

An image can also raise various types of questions. Although the viewer of course knows what butterflies are, there are species that many people will wonder if this is a butterfly, such as in the image below of a Morning-glory Plume Moth (a moth that also flies during the day). This effect is enhanced when the shot is taken from an unusual angle, such as straight from the front.

A Morning-glory Plume Moth, shot straight from the front. 100 mm, 1/320 s, f/13, ISO 400, flash.

A laughing dragonfly

Many dragonflies seem to be smiling. You can see this when shooting them straight from the front or from a slight angle. This gives the photo a cheerful look, especially if you reinforce that feeling with bright colors and a shot taken in the sun. In reality, this has nothing to do with the mood of the dragonfly, but that does not matter. It's all about the viewer's experience.

This cheerful Black-tailed Skimmer dragonfly came to sit on my finger. 100 mm, 1/320 s, f/13, ISO 400, flash.

Foreground and background

In every shot you must deal with the background and sometimes also with a foreground, in addition to the subject. The background and foreground should enhance the subject.

The butterfly or dragonfly you photograph is usually the most important element in the photo. But the image will also contain other elements, especially the background and sometimes also elements in the foreground.

When shooting insects, you have limited control over the background. But with every photo, that background is different and by changing your position in relation to the butterfly or dragonfly the background can be changed. It is important to realize what the effect of that background is on the way viewers experience your photo.

Normally the goal is to draw the viewer's eye to the insect. The background should be as calm as possible so that it does not demand attention. A background with little detail or that is blurry works best. If the color of the background contrasts with the color of the insect, the insect will stand out more clearly, but the photo will be busier. Harmonious colors often create a calm image.

The pictures below show the effect of the choice of background. In both images a Comma Butterfly is shown. In the left image there is a strong contrast between the orange butterfly and the green leaves. But the background also makes this image busy. In the right image, the background has similar colors to the butterfly. This makes for a calm image.

A Comma Butterfly on a leaf and on a twig. Left shot 400 mm, 1/350 s, f/8, ISO 1000. Right shot 400 mm, 1/350 s, f/9.5, ISO 200.

By changing your point of view just a little bit, the shot can sometimes be changed considerably. Another part of the background becomes visible in the image while the view of the insect remains almost the same. The shots below of a Large Skipper butterfly show this. In the right image, a slightly lower point of view was chosen, and the shot was taken for closer range, using a smaller focal length. As a result, the background has become less busy, and the antennae are more visible. The stem in the background is now running lower. Together with the two flowers, it provides a partial frame for the butterfly. The image has become stronger because of this small change. Always be alert about this and take several shots with different points of view.

The same Large Skipper butterfly shot from two slightly different points of view. Left shot 300 mm, 1/350 s, f/8, ISO 400. Right shot 165 mm, 1/350 s, f/6.7, ISO 320.

If a butterfly or dragonfly is among plants and you take a low point of view, you can try to shoot through a gap between the plants. Using foreground elements to frame the insect, this can produce a strikingly beautiful image. It is important that this foreground does not distract from the subject. By choosing a small depth of field, the foreground elements become blurrier and therefore less prominent. This effect can also be enhanced when editing the image. The picture below is an example of this. This Green-veined White butterfly has been shot through a gap in the leaves. This results in a hazy green frame around the butterfly.

A Green-veined White butterfly, shot through leaves. 400 mm, 1/350 s, f/8, ISO 250.

In most situations, parts of the foreground should not run in front of the insect, but in some cases, this can produce a nice image. In the picture below of a Small Pearl-bordered Fritillary butterfly, a leaf partially runs in front of the wings. However, the most important elements of the butterfly are still clearly visible, and the leaf creates more depth in the image.

A Small Pearl-bordered Fritillary butterfly, partially hidden behind a leaf. 400 mm, 1/350 s, f/9.5, ISO 400.

If there are plants in the way, it is tempting to remove them. This is undesirable. Bending a blade of grass to the side is of course possible, but there are also photographers who intentionally break off entire branches to achieve small improvements in composition. This is bad for nature and usually not effective because it quickly scares the insect away. By moving your camera closer to the subject and using a smaller focal length, many of the distracting elements can often be avoided. And sometimes it is possible to delete these elements when editing the image.

Using a Flash

When using a flash, the background becomes darker putting a lot of emphasis on the insect. The farther away the background is, the less light falls on it. The contrast between the insect and the background becomes greater, which can result in an unnatural image. A fill-in flash with a limited power often works better. We will discuss this in more detail in chapter 6 on page 113.

Using a flash does not work well when there are foreground elements. Since these elements are closer to the camera than the insect, they will be more brightly illuminated. That makes them ugly and puts the focus on the wrong parts. This is virtually impossible to correct when editing the photo. When using a flash, always make sure that the main subject is the closest element in the shot.

Symmetry and repetition

Most people find symmetry attractive. And butterflies and dragonflies have a strong symmetry that can be used. Repetition can also make a photo more powerful.

When photographing a butterfly or dragonfly with open wings straight from above, an almost perfectly symmetrical image is created that has a certain beauty. But a shot from straight on also contains a strong symmetry. In this case it often has an alienating effect, as in the image below of a Ghost Moth.

A Ghost Moth, shot straight from the front against a white background. 100 mm, 1/320 s, f/13, ISO 400, flash.

A butterfly or dragonfly has a plane of symmetry that runs from front to back through the middle of the body. When the insect is viewed straight on, the two halves are almost mirrored copies of each other, although legs and antennae are often not quite the same.

By placing your camera exactly on this plane of symmetry and photographing along the plane, you get this symmetry in your shot. This can be straight from above, diagonally from the front, from the back or straight from the front. You can even shoot at an angle from below. Shooting straight from above usually only works if the insect is against the side of a flower or stem.

It's best to place the plane of symmetry exactly vertically in the middle of the image. This strengthens the feeling of symmetry. The image can be rotated during editing to achieve this, provided that the orientation of the other elements in the photo and the shadows do not become unnatural. The background will not be symmetrical, but if there is little emphasis on it, it is not distracting.

A strongly symmetrical image of a Silver-studded Blue butterfly, shot straight from above. 400 mm, 1/350 s, f/8, ISO 800.

Repetition is another composition technique to enhance your shots. By including repeating elements in your photo in some pattern, the viewer's gaze is directed. It will be hard to use multiple butterflies or dragonflies as repeating elements due to their movement, but many flowers, twigs or stems can be used for this purpose. For example, the flower on which a butterfly is sitting can be repeated in the background. In many cases, these elements don't even have to be in focus to be effective as repeating elements and it is often sufficient to leave them as blurry colored spots in the background.

In the image below, the three thistles form a repeating pattern. They guide the viewer from the upper left corner, where one usually starts looking, to the butterfly. The first thistle is the most out of focus, the next a little sharper, and the last thistle with the butterfly is completely sharp.

In this image of a Meadow Brown butterfly, the three repeating thistles form a path towards the butterfly. 400 mm, 1/350 s, f/8, ISO 400.

6. Lighting

You cannot photograph without light. Different kinds of light lead to completely different pictures and also need different techniques and settings. When using ambient light, there is a huge difference between shooting in the sun or in the shade. A flash or continuous light source can be used to enhance the ambient light or even replace it. Special shots can be made using backlight or by underexposing or overexposing photos. In this chapter we will discuss all these options.

Ambient light

During the day there is normally enough light for photography. But depending on the time of the day and the weather the light can be rather different, leading to different images.

Photographing butterflies or dragonflies most of the time involves using the available ambient light. You need to consider the different lighting conditions that occur depending on the weather and the time of the day.

Butterflies and dragonflies are most active when the sun shines, unless you go out early while the air is cool, and they still need to warm up. When the sunlight falls on the insect, the colors are vivid. The harsh light in the middle of the day works well for these colors. However, the background can also be very brightly lit, which is less beautiful. Therefore, try to find a position where the background is in shadow. You can also underexpose the shot a bit by choosing a negative exposure compensation. This is especially important with lightly colored insects, like the White butterflies, otherwise the white parts will lose all detail. If necessary, lighten the insect a bit when editing the images. This makes the butterfly stand out from the darker background, as in the image below.

A Green-veined White butterfly in the sun. The background is in the shadows. The shot is slightly underexposed. 400 mm, 1/350 s, f/8, ISO 400.

A problem with photographing in the sun is that hard shadows are created. It is easier to take a good shot if the insect is in the shade or if it is cloudy. Light clouds give more beautiful light than heavy clouds, as there is sufficient color and contrast in the image while no hard shadows are created. If the image is too flat, you can make the colors a bit more vivid when editing and the clarity and contrast of the image can be increased slightly.

A Downy Emerald dragonfly in the shade of light clouds. 400 mm, 1/350 s, f/8, ISO 250.

The golden hour is the period immediately after sunrise and again before sunset. This is popular with photographers because the light is nice and warm and falls on the subjects at a low angle. However, this hour is less suitable for photographing butterflies and dragonflies. Few insects can be seen at those times. And if you have found a butterfly or dragonfly, the long shadows caused by the low sun often partially fall over the insect, as in the image below. Warmer light can also be obtained at other times of the day by adjusting the white balance in the camera to a warmer value.

A Speckled Wood butterfly with a shadow of a blade of grass. 400 mm, 1/350 s, f/8, ISO 1600.

Always pay close attention to the intensity and direction of the light and to any shadows that may be present. Your eyes adapt very quickly as the light changes. As a result, you often don't see that certain parts of the image are too light or too dark. Always look back at your shots immediately after taking them, to see if the exposure and the ratio between light and dark is correct.

Backlight

By photographing against the sun, you can achieve special effects in your shots of butterflies and dragonflies.

With a backlit shot, the light comes from the direction in which you are shooting. You can shoot towards the sun or towards a light background. Depending on the subject, this can produce very different effects. In some butterflies, the wings are translucent and when lit from behind, this gives a beautiful effect. With most dragonflies, a strong silhouette of the insect is obtained when backlit, because the body and veins in the wings do not let any light through.

The wings of butterflies consist of scales. In some species of butterflies, these are thin and the light shines through them. In other butterflies, the wings are thicker, resulting in a silhouette when the light comes from behind. Both situations can lead to beautiful images.

Below you see an example of a shot of a Meadow Brown butterfly. By taking the shot from below the underside of the wings is visible. These have a brown, inconspicuous color. However, when the sunlight falls on the wings from above, the orange color of the top of the wings shines through. There is also a white border around the wings. This is called a halo. This effect is caused by tiny hairs that are located at the tip of the wings. The sun lights these up strongly. Usually a halo is undesirable, but in this case, it gives the image something extra.

A Meadow Brown butterfly shot against the sun. 400 mm, 1/350 s, f/8, ISO 500.

To make a backlit shot, take the picture at an angle from below while the sun is behind the butterfly. It is important that the sun is high. Otherwise, no light falls on the flowers and you get more of a silhouette effect. It works best when the background is in the shade because if the background is too bright, the translucent effect becomes less visible. Also, don't use the sky as a background, but try to find a position and angle where there is a dark background behind the butterfly.

When photographing dragonflies with backlight, you get a completely different effect. The body of a dragonfly does not let light through and the same holds for the veins in the wings. This results in a strong contrast between these parts of the insect and the light background. In this case, it is

important that the light falls on the background or that you take the shot with the sky as a background. The silhouette of the dragonfly then becomes most clearly visible.

Make sure the exposure is set to the background and not to the insect. Otherwise, the insect will become too light and the light areas in the background will lose all detail. It is often best to underexpose the shot slightly by using a negative exposure compensation or a low ISO value. In the image below of a Migrant Hawker dragonfly, the background was very light. By choosing aperture f/16 and ISO 100, the photo remained nice and dark, and enough detail became visible in the sky. When editing the image, the contrast between the insect and the background can be enhanced further.

A Migrant Hawker dragonfly shot against the sky. 200 mm, 1/350 s, f/16, ISO 100.

Using a flash

If it is dark, a flash can be used to provide extra light. With the correct settings, flashes are easy to use.

Many photographers don’t like flashes and don't know how to work with them. But shooting with a flash is not difficult at all. Only a few settings are important. Flashes can help photograph butterflies and dragonflies because they allow for faster shutter speeds and smaller apertures. If the insect is in the shadow, a high ISO value is required when shooting without a flash, which can reduce the image quality. With a flash, there always is enough light and you can choose the exposure settings you want. The colors are often better, but there is also the risk of hard shadows.

This Green Longhorn moth was in a very dark spot, so a flash was essential to make it clearly visible. 100 mm, 1/320 s, f/13, ISO 200, flash.

There are different types of flash units. To photograph butterflies and dragonflies, it is best to use a **speedlight** that is placed in the flash shoe on top of the camera. There are speedlights with different strengths. You don't need a strong flash for this type of shot because the subject is fairly close to the camera. It is advisable to use a flash with a rechargeable battery. With these flashes, the time required between flashes is smaller, so you can take shots in quick succession. I always have a small speedlight on my camera and use it when necessary.

Using a flash has a strong effect on the photo. Colors become brighter and the background becomes darker. This makes the butterfly or dragonfly more prominent. Below you can see an example of a Small Copper butterfly. The left shot was taken with ambient light and the right shot with a flash. The shot without flash required ISO 1250, so some noise reduction had to be applied. In the shot with a flash, a smaller aperture of f/13 could be used for a bit more depth of field. It's not that one image is better than the other, but they do give a different feeling. You must always ask yourself whether the flash makes the shot stronger or weaker. The ambient light is often softer while the flashlight is a bit harsher. When in doubt, it is best to take both shots and compare them afterwards.

A Small Copper butterfly shot without flash (left) and with flash (right). Left 100 mm, 1/350 s, f/8, ISO 1250 and right 100 mm, 1/320 s, f/13, ISO 400.

A flash can only be used if the insect is the closest subject in the shot. For example, if there are blades of grass or twigs between the camera and the insect, they will be illuminated far too brightly by the flash.

Flash settings

A flash has several settings. These can be adjusted on the flash itself and sometimes also in the menu of the camera. I recommend doing it on the flash unit.

- **Strength**. You can set the power of the flash. This is indicated in fractions of the maximum strength. A value of 1/2 indicates half of the maximum strength and 1/4 a quarter. Most flashes also have an automatic setting called **TTL** (through the lens). With this setting, the camera determines how much flashlight is needed for a correct exposure. It's easiest to use this setting.
- **Zoom**. Some flashes can zoom in or out when the focal length of the camera lens is changed. In this way, they narrow the light beam so that more light falls on the subject. It's best to set this to automatic, which is always the default.
- **Flash compensation**. When using the automatic TTL mode for strength, the camera determines the exposure, and this might not be what you want. The exposure can be adapted with the flash compensation that can usually be set on the flash unit. You indicate how many stops extra or less flashlight you want. I usually use a value of +1 to overexpose the shot slightly. This puts a bit more light on the insect. Check the manual of the flash unit to see how to adjust this value.

Camera settings

When using the automatic TTL mode of the flash, you don't want the camera to adjust the exposure settings to the available amount of light. After all, that amount of light is low and if the camera adjusts the exposure, it will most likely choose a slow shutter speed or a high ISO value, both of which are not necessary because the flash will provide enough light. Hence, when using a flash, you must work in the manual mode of the camera and choose the exposure settings yourself as follows.

- **Shutter speed**. Every camera has a maximal shutter speed at which you can use a flash. This is usually in the order of 1/250 s. It is best to choose this shutter speed. For my camera this is 1/320 s. That is why all photos in this book that were taken with a flash have this shutter speed. By choosing the fastest possible shutter speed, less ambient light falls on the sensor, so the exposure is mainly determined by the flash. If the shutter speed is too fast, only part of the photo will be properly exposed. You can't use a flash with an electronic shutter with

most cameras. So set the shutter mode to mechanical or electronic first curtain, as explained on page 35.

- **Aperture**. By using a flash with TTL, you can use any aperture you want. Depending on the desired depth of field, choose a small or large aperture. Realize that with a large aperture, a lot of ambient light falls on the sensor. The background remains lighter than with a small aperture.
- **ISO**. The ISO value must be set manually. Don't choose auto ISO because in that case the camera will choose the wrong exposure based on the ambient light! Depending on the selected value, the ambient light plays a larger or smaller role. For most cameras, ISO 100 gives the best image quality. But by choosing ISO 200 or 400 less flashlight is needed, so the flash is charged faster and is sooner ready for the next shot.

Diffuser

A flash can result in harsh shadows in the image. This is especially true if the insect is close to the camera, and a strong magnification is used. In this case, you can use a **diffuser**. A diffuser distributes the light coming from the flash over a larger surface, making the light source bigger. This will soften the shadows. Most flashes come with a small plastic diffuser that can be put on the flash. Sometimes it is built into the flash. This helps if you're shooting with a flash indoors because the light bounces off the walls and ceiling. In outdoor shots, this diffuser has virtually no effect because the light source is still very small.

The easiest and cheapest solution is a diffuser that can slide around the lens. This is a piece of fabric with a hole in it that the lens passes through. The flash illuminates the back of the fabric, which forms a large, soft light source. You can also use a sheet of white paper with a hole in it. There also are diffusers that are placed on the front of the flash and form a small soft box (see the image below). Keep in mind that with a diffuser much less light falls on the subject. For distances up to a meter, a diffuser works well, but if the insect is further away the amount of light will not be enough to properly illuminate the subject (unless you use a very strong flash).

A flash with a small soft box as a diffuser.

Ring flashes and macro flashes

In addition to speedlight flashes, there are also ring flashes and macro flashes. **Ring flashes** are shaped like a ring around the front of the lens. As a result, a subject is illuminated from all sides and there are no hard shadows. Without shadows, however, you can lose contrast, and the result sometimes looks unnatural. **Macro flashes** consist of two smaller flashes that are attached to a unit on the camera's flash shoe via flexible arms. This gives you light from two directions, typically left and right from above. This results in natural light with soft shadows. However, ring and macro flashes only work if the subject is close to the lens. For most photos of butterflies and dragonflies, ring flashes and macro flashes are unsuitable, unless you are taking close-up shots.

Triggers

A **trigger**, also known as a **transmitter**, is used to remotely control a flash. The trigger is placed in the flash shoe on the camera, and you can now place or hold the flash wherever you want. If the flash must be fired, the trigger sends a signal to the flash units that then produces the flash. Multiple flashes can be controlled with a single trigger. With the help of a trigger, flashlight can fall on the subject from a different angle. For example, you can hold the flash in your left hand and aim it at the insect from above while taking the shot with your right hand. This gives a more natural light direction.

Guide number

Each flash has a **guide number** that indicates how strong it is. It indicates the maximum distance at which you can shoot with the flash at ISO 100 and aperture 1. Of course, you don't have a lens with aperture 1, so you must divide the guide number by the aperture. With a flash with guide number 60, you can shoot with aperture 4 up to 15 meters at ISO 100. When doubling the ISO value, the distance becomes 1.4 times larger. So, with ISO 200 you can shoot up to 21 meters. However, there are a few catches. Manufacturers like to show the largest possible guide number. Some manufacturers therefore use ISO 200 instead of ISO 100. In addition, the largest zoom value is usually used. With a normal lens of, for example, 50 mm, the maximum distance is considerably smaller. The maximum distance is also measured indoors. Outside, the maximum distance is smaller because no light is reflected from walls and ceilings.

Using a fill flash

If a butterfly or dragonfly is in the shadows, a fill flash can be used to lighten up the subject and make the details and colors stand out better.

Sometimes you see a beautiful butterfly or dragonfly, but it is in the shade, or the sun is on the wrong side. A photo then becomes flat, or the insect can become too dark. This is especially the case if the sunlight falls on other parts of the image. In such a situation, it can help to use a fill flash. With a fill flash, you still largely use the available ambient light, but some extra flash is added to light up the insect more. It is a technique that is often used in portrait photography, but it also works with butterflies and dragonflies.

By using a fill flash, the details of this Banded Demoiselle damselfly are much better visible. 400 mm, 1/320 s, f/8, ISO 500, fill flash.

Using a fill flash is not difficult. You need a simple speedlight flash unit that you fix onto the camera. It doesn't have to be very strong. If the camera has a built-in flash, that can be used as well. Do not use a diffuser for the flash. The settings are different from when using the flash as a primary light source.

Expose the shot as you would do without a flash. Preferably use the manual (M) mode of the camera with automatic ISO, but aperture priority (Av or A) can also be used. The full auto mode usually doesn't work well with a fill flash, although some cameras have a special mode for this. Choose the maximum flash sync speed for the camera (see the textbox at the end of this section) or choose a slower shutter speed if more ambient light is desired. Choose the desired aperture and let the camera determine the ISO value. This results in the same exposure as if you do not use a flash.

For a fill flash, the flash must be set to manual mode. When using the automatic TTL mode, no flash or only a very weak flash is produced because there is enough ambient light. Choose a flash power of 1/2 or 1/4, for example. The best value depends on the strength of your flash and the distance to the subject. Keep in mind that if the distance doubles, four times as much flashlight is required. You may need to try out a few different values to get the correct exposure.

Below you can see an example. The Scarlet Darter dragonfly in the left image was shot without flash. The right image uses the same settings but also a flash with a limited power (1/8 in this case) was applied. As a result, more detail and color are visible in the body of the dragonfly.

A Scarlet Darter dragonfly (male) shot without a fill flash (left) and with a fill flash (right). 150 mm, 1/250 s, f/11, ISO 400.

The fill flash can cause the image to become overexposed. You can correct this by underexposing the shot using a negative exposure compensation. The background then remains a bit darker while the insect is well exposed by the flash. By playing with exposure compensation on the one hand and flash power on the other, you can determine the desired balance between the effect of the ambient light on the background and the flash on the insect. Optionally, the exposure can be set manually in the camera to have full control over this. The example below of another Scarlet Darter dragonfly shows the normally exposed photo without flash on the left. On the right, an exposure compensation of -2.5 is used with a reasonably strong fill flash. This gives a completely different result.

On the left a Scarlet Darter dragonfly (female) shot without fill flash, 135 mm, 1/350 s, f/8, ISO 640. On the right it was shot with a fill flash and 2.5 stops underexposed, 135 mm, 1/320 s, f/8, ISO 100.

Using a fill flash works especially well if there is a clear separation between the subject and the background. The background is further away from the camera, so less flashlight falls on it, keeping it darker.

When the background is very light compared to the foreground, it is also good to use a fill flash. You can then set the exposure to the light background and light up the dark foreground with the right power of the flash. The image below is an example of this. This Monarch butterfly was in a greenhouse (it does not occur in the wild in the Netherlands). The greenhouse was dark inside, but a

lot of light came from the outside. A shot without a flash would greatly overexpose the background or the butterfly would remain much too dark.

A Monarch butterfly in a dark greenhouse. 270 mm, 1/320 s, f/8, ISO 320, fill flash.

The effect of a fill flash can also be achieved when editing the image. To do this, you apply an adjustment using a mask, so that only the insect or only the background is changed. You can then lighten the insect's shadows slightly, increase the vibrancy of the colors, and increase the clarity or dynamic contrast. A good mask is essential, otherwise the adjustments will continue into the background. But modern photo editing software can easily create these masks. The image quality remains better when using a fill flash though. For more information on photo editing, see the next chapter.

Instead of a flash, also a lamp can be used to create extra light. For example, you can point a strong flashlight at the insect. Usually this does not disturb the insect. Special LED panels for photography are also available for sale. These offer light in different colors. Some LED lights flash at a high frequency. This saves energy. However, this can lead to undesirable effects when photographing because only part of the photo is properly exposed. Check this in advance.

Flash sync time

Every camera has a maximum shutter speed that can be used in combination with a flash. This is called the **flash sync time**. This is often 1/125 s, 1/250 s or 1/320 s. When choosing a faster shutter speed, only part of the image will be exposed by the flash. When applying a fill flash you can't use a faster shutter speed either. This flash sync speed can lead to motion blur, especially when using a strong telephoto lens. Image stabilization in camera and lens is then essential. A fill flash does not work with flying butterflies or dragonflies. To freeze the movement a fast shutter speed of, for example, 1/1000 s would be required, but that is not possible in combination with the fill flash. In such a case best use the flash with TTL and don’t use ambient light. The flash is much faster than the flash sync time, so, even though the shutter stays open longer, the insect is exposed very briefly, freezing the movement completely.

Low-key and high-key

In low-key and high-key photography, the dark or light tones predominate in the image. How do you take such special shots of butterflies and dragonflies?

In low-key photography, most of the photo is dark or even black. Often only the subject is highlighted. This makes the image mysterious and emphasizes the contours of the insect. There is usually little color in most of the image, but you can also make a single color pop out. Often these images are converted to black and white to emphasize the contours even further. But you can also leave color in the subject.

Usually, low-key photos are taken in a studio where the subject is lit from an angle against a black background. This is more difficult for living butterflies and dragonflies. In this case, the best way to achieve a low-key effect is to use a flash and make sure the background is far enough away so that it turns completely black. Choose a small aperture and a low ISO value, as explained in the section on flashes on page 113. You get the best effect by underexposing the shot a bit using a negative flash compensation. This emphasizes dark tones in the image.

Moths lend themselves particularly well to low-key photography. When photographing them in the evening, you can easily get a dark background. Below is an example of a Pale Prominent moth. This is a moth with a special shape that is emphasized by the fact that the shot was taken from the side and converted to black and white.

A low-key shot of a Pale Prominent moth, shot in the evening. 100 mm, 1/320 s, f/13, ISO 200, flash.

Dragonflies are difficult to photograph in low-key. Because the patterns in the wings are dark, they largely disappear against a dark background and only the body remains visible. If you want to emphasize the details in the wings, it is better to take a backlit shot where the silhouette of the wings is visible against a light background, as discussed on page 111.

With high-key photography, the light tones dominate. The butterfly or dragonfly is shot against a light background and there should also be many light tones in the subject itself. This often results in

a somewhat dreamy atmosphere due to the lack of contrast. Attention is drawn to those parts of the insect that still have dark tones in them.

You can't use a flash for high-key unless you're working in a studio with multiple flashes. The ambient light is therefore important. Shoot the insect against a light background, for example a (cloudy) sky, but also make sure that there is enough light on the subject. It is best to overexpose the shot a bit. If necessary, make an exposure bracket with an exposure compensation of 0, +1, +2 and +3. Then you can choose the best-exposed shot afterwards.

A high-key shot of a Scarlet Darter dragonfly. 400 mm, 1/500 s, f/11, ISO 800.

Since you can't achieve the perfect lighting conditions in nature, it is necessary to edit the image for a good low-key or high-key effect. You can then further adjust the exposure, enhance or reduce details, make the image black and white, and add a light or dark gradient or vignette. Both images above have been edited in this way. For example, in the low-key image, a dark gradient was added to make the right side of the moth darker than the left. This puts more emphasis on the head. See the next chapter for more information on editing your shots.

7. Editing images

Modern cameras produce beautiful JPG images. The cameras apply certain edits to these images to improve them and compress the RAW images to decrease their size. But to keep full control over your shots, it's best to shoot in RAW format and edit the images afterwards with one of the many photo editing programs. Many photographers have little desire to edit their photos, but it will improve the quality considerably. And it's not much work or difficult at all. In this chapter, we will discuss the most important techniques for editing your images of butterflies and dragonflies.

JPG or RAW?

Cameras can produce images in both JPG format and RAW format. What are the pros and cons and when is it best to use each format?

You can set whether a camera should save the image in JPG format, RAW format, or both. When choosing JPG format, the resolution and the quality can be set. The higher the resolution and quality, the larger the file size. The RAW files are a lot bigger. With my camera with a 32 MP sensor, the RAW files are about 40 MB in size, while the highest quality JPG files are only 10 MB in size.

In the past, the size of the image files was an important matter. Memory cards were small and the number of shots that could be stored was therefore highly dependent on the file size. Nowadays this is no longer the case. A 256 GB memory card can be bought for less than 50 dollars and can store around 5,000 images. It is therefore best to let the camera store the images in both RAW format and the largest and best quality JPG format. Then you will have all the options to use and edit the shots later.

JPG images are ready to be used and shared. The camera has already edited these images automatically. Noise reduction is applied, if necessary, the shots are often sharpened, and the colors are adjusted based on the white balance setting. You can also set certain creative filters in most cameras or take special photos, such as portraits or sunsets. The camera adjusts the JPG image accordingly.

The **RAW image**, on the other hand, stores exactly what the sensor in the camera registers. No processing is applied. The white balance or the creative settings have no effect on this. You get the raw data, hence the name. The RAW image is therefore initially always less beautiful than the JPG image. Below an example is shown. The left image is the JPG image produced by the camera while the right image is the unprocessed RAW image. The colors in the JPG image are more vibrant, and if you look closely, you'll see that the JPG image is less noisy and sharper.

A Common Darter dragonfly. On the left the JPG image from the camera and on the right the unprocessed RAW image. 300 mm, 1/320 s, f/16, ISO 3200.

To get a good result, a RAW image must always be edited. At a high ISO value, noise reduction must be applied, and the tones and colors must be adjusted, otherwise the image will remain too flat. You can choose the desired white balance setting yourself. The photo processing software uses the setting of the camera by default, but you are free to make the image a bit warmer or cooler. After these limited adjustments (and the removal of the distracting element at the bottom right), the image below was created, which is clearly better than the JPG version.

The slightly edited RAW image.

Of course, the JPG image can also be edited, but you will never get the same result. First, JPG images are compressed. This reduces the amount of detail in the photo. In most situations this is not a problem, but when cropping the image strongly, for example, artifacts will show in the image. In addition, the **color depth** of JPG images is smaller than with RAW images. JPG stores a color using 24 bits, 8 for each of red, green and blue. That means that 256 shades of red, green and blue are possible. The camera's sensor can distinguish many more shades and often uses 12 bits or even 14 bits. At 12 bits, there are more than 4000 different shades of red, green, and blue.

With more different shades, there is much better opportunities to improve the image. For example, in the white wings of some butterflies, the JPG image contains few different shades. The RAW image retains a lot of detail that can be brought back when editing, for example, by making the wings a little darker, as in the image below of an Orange Tip butterfly.

An Orange Tip butterfly. On the left the JPG image from the camera and on the right the slightly edited RAW image, containing many more shades of white. 400 mm, 1/350 s, f/9.5, ISO 160.

RAW images cannot be printed or posted on social media. To do so, the (edited) RAW image must be exported to a format that is supported. When exporting an image, you can also change the size and make other adjustments. There are several different file types to choose from.

- **JPG** is the most common type of image file. The files are relatively small and can be used anywhere. But they are compressed, and some image quality is lost.
- **PNG** is also a popular type of file. It is widely used for websites. The files are compressed but without loss of quality. They are considerably larger than JPG files.
- **TIFF** files deliver the best quality and are used by professionals to print photos. But the files are significantly larger than the JPG and PNG files.

In most situations, it's best to choose a JPG file when exporting.

Photo editing software

There is a lot of different photo editing software available. The Windows or MacOS operating systems contain free software with basic functionality to enhance your photos. This software cannot handle RAW images, but you can use it to edit the JPG images. Many camera manufacturers provide free software to read and edit the RAW files from their cameras. For example, Canon provides Digital Photo Professional (www.canon-europe.com/software/digital-photo-professional/) and Nikon has NX Studio (www.nikon.co.uk/en_GB/product/apps-software/nx-studio). In addition, various commercial packages are available:

- Lightroom and Photoshop (www.adobe.com/products/photoshop-lightroom.html)
- ON1 Photo RAW (www.on1.com)
- Luminar Neo (www.skylum.com/luminar)
- Capture One (www.captureone.com)
- Affinity Photo (www.affinity.serif.com/photo)

You can usually use the software for free for a limited time to try it out. Before making a choice, read some reviews on the Internet or watch some introductory videos. Each of these programs is different, but they all require a significant time investment before you fully understand how they work.

Some photo editing software adjusts the images you edit directly. In that case, it is advisable to make a copy before editing the image. This is called destructive processing. Other software is **non-destructive**, which means that the edits you make are not actually applied to the original image but are stored in a separate file (or in the image file itself). When loading the image into the program, these edits are performed again so that the result is shown. You can always undo editing steps or revert to the original. That way the original image is never lost.

Cropping images

Cropping and rotating images can often significantly improve the composition.

Cropping and rotating images is very easy. You can do this with both RAW and JPG files. Every photo editing program has functionality for this, including the software that comes for free with your computer's operating system. There are four reasons to crop photos.

- Increase the **magnification** to reveal more detail.
- Improve the **composition**.
- Remove **distracting elements** from the image.
- Adjust the **aspect ratio**, for example, by making the image square.

We will discuss each of these in more detail.

Increasing the magnification

Sometimes it's impossible to get close enough to a butterfly or dragonfly. Plants may get in the way, or the insect flies away when you approach it. In this case, you have a photo in which the insect is too small. Fortunately, modern cameras produce images with a resolution of 24 MP or more, and that is not needed for most applications. So, you can easily crop the image quite a bit. This way the insect fills a larger part of the image, allowing viewers to see more detail. The image below of a Ruddy Darter dragonfly is an example of this. In the original shot, the dragonfly is lost in the overall image. In the edited image, the dragonfly is clearly visible while the grass still plays an important role to draw the viewer in. It would have been better to zoom in more while photographing, but the dragonfly flew off too quickly for that.

By cropping this image, you can see more details of the Ruddy Darter dragonfly. 270 mm, 1/350 s, f/8, ISO 640.

As already mentioned in chapter 2 on page 23, cropping an image has a different effect than taking the shot from closer range. When taking the shot from a closer range, the magnification becomes stronger and thus the depth of field decreases. When cropping an image, the depth of field does not change. This keeps the background a little less blurry, even if it is at a great distance. You can see this in the image above. Sometimes that effect is desired and sometimes not.

Improving the composition

The main reason to crop an image is to improve the composition. As we have seen in chapter 5, there are certain compositional rules regarding the positioning of the elements in the image, such as the rule of thirds. Lines in a photo should run in the correct way, for example from a corner of the image. When photographing, you usually don't have the time or the ability to determine the

composition perfectly. In that case, it's best to frame the shot a little wider so that it can be cropped when editing and possibly rotated to get the desired composition.

The image below of a Migrant Hawker is an example of this. What I like about this shot is that the dragonfly is exactly in the same orientation as the side branch. Together with the main branch, they form the letter Z. By rotating and cropping the image a bit, this shape becomes more prominent.

By rotating this image of a Migrant Hawker dragonfly and cropping it a bit, the letter Z formed by the dragonfly and the branches becomes more prominent. 270 mm, 1/350 s, f/8, ISO 640.

Remove distracting elements

Sometimes a photo contains distracting elements, for example a branch or stem running through the image or a light or dark spot in the background. Small distracting elements can easily be removed with retouching (see the next section), but large elements are often easier to remove by cropping the image so that they fall outside the picture. Rotating the image can also sometimes help to remove such elements. Try to keep the right composition though.

By cropping this image of a Black Darter dragonfly a little, the distracting elements on the right and bottom left disappear. 400 mm, 1/350 s, f/9.5, ISO 320.

Adjusting the aspect ratio

Most cameras produce images with a 3x2 ratio by default. So, the image is one and a half times as wide as it is high. This is a great ratio to print the photo in landscape or to show the photo on social media. In some cases, though, a different aspect ratio is desired. The aspect ratio can be set in the camera, but it's always easier to crop the image afterwards.

A vertical image enhances vertical lines, such as a dragonfly positioned vertically up. Of course, you can also achieve this by turning the camera when shooting. If the subject is squarer in shape, then an

aspect ratio of 1x1 (square) can reinforce this. The photo below of an Eyed Hawk-moth is an example of this. You also sometimes need a square photo on the internet, for example as a profile picture.


Sometimes a square image works better, such as for this Eyed Hawk-moth. 100 mm, 1/320 s, f/13, ISO 400, flash.

Effect on image quality

Cropping an image has no effect on the image quality. After all, the pixels remain the same. The resolution does decrease, especially if you cut off large sections. But this is only noticeable when the photo is printed in large format. Of course, it is always better to choose the best possible framing when taking the picture but preferably make the overall photo a little too big rather than too small.

When rotating at an angle other than a multiple of ninety degrees, new pixel values are calculated based on several values in the original image. This will influence the image quality. The image usually becomes a little less sharp. This can easily be corrected by sharpening the image. Always do the rotation first, before further editing the image.

Expanding the canvas

If you framed the shot too narrowly, it would be nice to be able to expand the whole picture. However, this is very difficult. If the outside of the image is very blurry, this will work. The extra space can be filled with the same blurry color and a gradient can be used if necessary. Recently, several image processing programs have added functionality to extend the image (also known as the canvas) with the help of AI. Here, the software analyzes the photo and fills the extra space with logical elements, based on millions of other photos. We will discuss this and other AI-based techniques in more detail in a later section on page 136.

Adjusting tone and color

Another early step in photo editing is to develop the image to adjust the tone and color, for example, by changing the exposure.

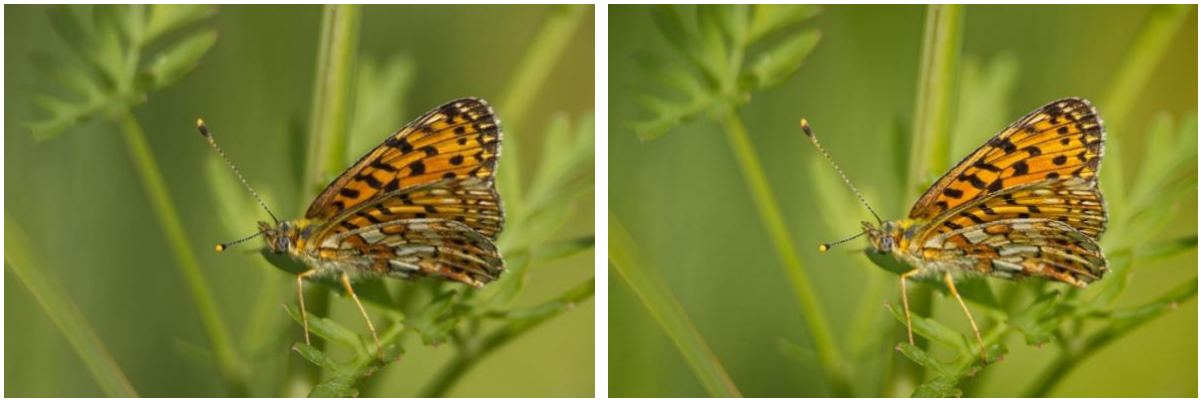
RAW images contain the pixel values from the sensor, and these give a rather flat image with dull colors and not much contrast. When developing an image, you adjust two aspects: the tone and the color. Photo editing software can do this automatically. It then does the same thing that the camera does when it creates JPG images. But with shots of butterflies or dragonflies, the result is often not so good, so it is better to develop the images manually. This is very simple, using just a few sliders.

Tone

Tone refers to the brightness in the image. To adjust the tone, you can first adjust the global exposure with a slider. This is important if the shot is overexposed or underexposed as a whole. In addition, the contrast can be adjusted. A little extra contrast can make the image stronger. To work in more detail, there are several sliders that can be used to adjust certain aspects of the tone.

For example, you can lighten or darken the black tones or the shadows. Often, it helps to lighten the shadows a little because some parts of the image can be very dark. It is best to leave the black parts unchanged.

Likewise, the whites and the highlights can be adjusted. Many butterflies and dragonflies have white or shiny parts. These can quickly become overexposed. You can then darken the white tones and/or the highlights. However, do this as little as possible because it will make the image flatter. The software has a setting to see which parts of the image are washed out, where all detail in the light areas has disappeared. Move the white tones and highlights sliders back until (almost) no part has been washed out.

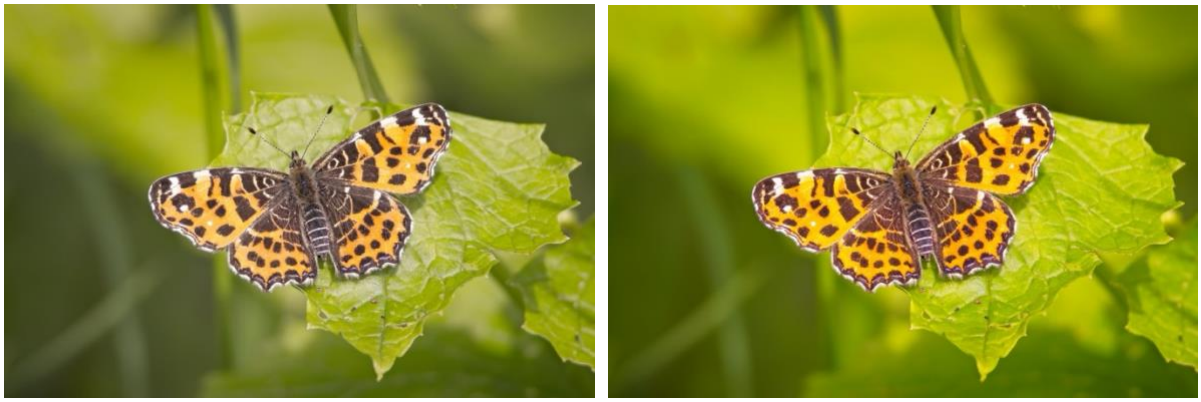


By slightly lightening the shadows, this Small Pearl-bordered Fritillary butterfly becomes more colorful. 400 mm, 1/350 s, f/8, ISO 200.

Color

In addition to the tone, you can adjust the color in the image. For this there are again several sliders. When editing RAW images, the editing software chooses the white balance that was set in the camera. This is expressed by the color temperature. It can easily be adjusted. This allows you to make the image warmer or cooler. In addition, the color tint can be adjusted. This compensates for a green or magenta color cast. Butterflies and dragonflies are often surrounded by a lot of green and that green color can also affect the other parts of the image. In that case, you can move the color tint a little bit towards magenta to remove the green color cast.

In addition, there is the option to adjust the color saturation and change the vibrance of the colors. I usually opt for a little more vibrance and a little less saturation. This makes the image less flat and makes the colored butterfly or dragonfly more prominent. In the beginning people often tend to make the saturation too strong, but that leads to unnatural colors, so be careful with the amount you add.

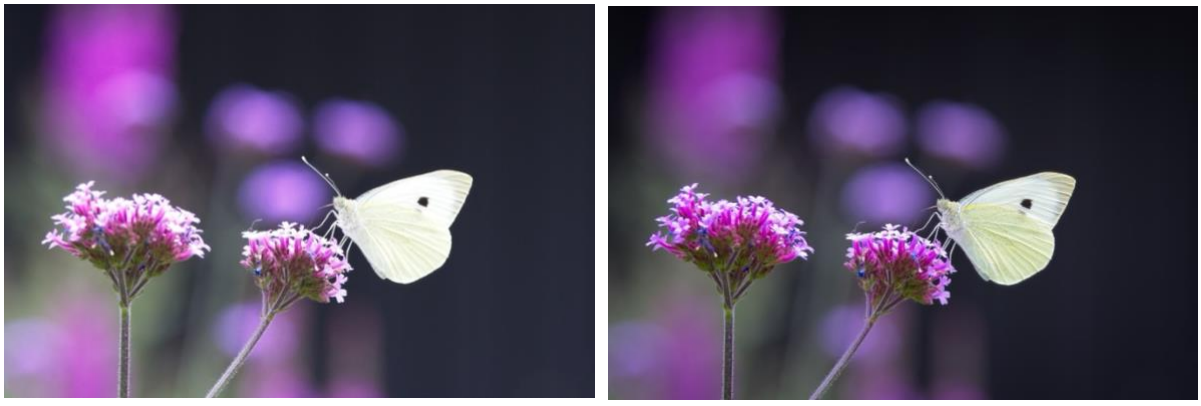


By enhancing the saturation and vibrance of the colors of this Map butterfly, the edited image on the right is less flat, but you quickly do too much (as in this example). 400 mm, 1/350 s, f/8, ISO 400.

Local changes

In some situations, you may want to adjust the color and tone of specific areas or elements of your photographs. The changes should be local rather than global to the entire image. For example, if there is a lot of color in the background, it helps to reduce the vibrance of the background, while enhancing the vibrance of the flowers and the butterfly or dragonfly in the foreground. The image below is an example of this. In the original shot at the left, the background attracts too much attention. In the edited image at the right, this has been corrected. The saturation and vibrance of the colors have been adjusted and a bit more contrast has been added in the foreground, making the colors and details in the flower and butterfly clearer.

To make such adjustments, a mask must be defined. This used to be difficult, but modern photo editing software has AI-based tools to automatically select the background, the foreground or the butterfly, for example. You can then make certain changes to only one of those parts of the image. We will discuss masking in more detail on page 141.

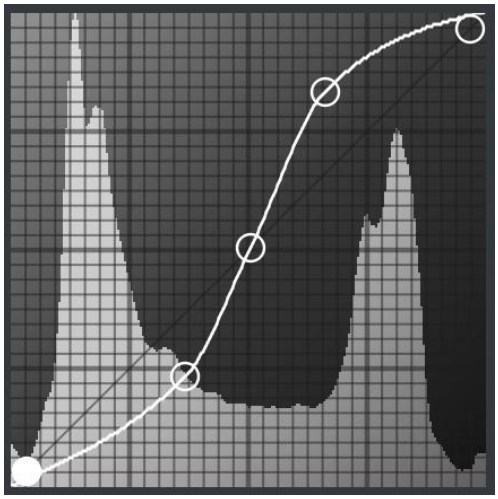


In the right image of this Large White butterfly, the saturation and vibrance of the colors in the background have been reduced somewhat, but they have been increased in the flowers and the butterfly. 200 mm, 1/350 s, f/8, ISO 800.

The histogram and curve

In photo editing software, the histogram of the image can be displayed, just like in most cameras. The **histogram** shows for each brightness value the number of pixels that have that brightness. Together, these make up the brightness intensity distribution. This can be shown globally or by color. If there are many low-intensity pixels on the left side of the histogram, then a large part of the image is dark. It may then help to increase the exposure. Similarly, if there are a lot of high-intensity pixels on the right then it can help to reduce the exposure. Any edit that adjusts the tone also changes the histogram. Paying attention to the histogram while editing can ensure that the total range from completely black to completely white is used as optimally as possible.

To get more control over the different tones in the image, you can adjust the **curve**. In the background of the curve, you can see the histogram (see image below: the curve is the white line with circles on it). The curve is initially a straight line from the bottom left to the top right. You can move positions on that curve up or down by moving the markers on the curve. By moving a marker, the tone of the pixels with that intensity is changed, along with the intensities around it so that you get a smooth gradient. For example, the curve in the example below makes the darker tones darker and the lighter tones lighter, resulting in more contrast in the image. It is also possible to adjust the curve for a specific color to add more contrast in just the red colors, for example.



The curve filter with the histogram in the background.

Adjusting certain colors

The sliders to adjust the saturation and vibrance work globally on all colors at the same time. But sometimes you want to adjust just a single color. For example, you might want to adjust the green of the background or the orange of the butterfly, which is also easily possible. Lightroom, for example, has the color mixer and the dot color, and ON1 Photo RAW has a filter for this. In these tools a certain color is selected, and the different settings are adjusted of the pixels with approximately that color. You can also specify the range of colors to which this operation should be applied. With this technique, for example, the green background of photos can be desaturated, making the insect more visible.

Noise reduction and sharpening

Modern AI techniques make it possible to easily remove noise from a photo. They can also sharpen the image in a natural way.

Noise refers to a visual distortion that appears as random, grainy, or speckled patterns, particularly in darker areas of an image, and is often caused by factors like high ISO settings or poor lighting conditions. This used to be a big problem. Photos with ISO values above 400 were very poor.

Sensors are not perfect, and small errors occur when measuring the amount of light. At a low ISO value, a lot of light falls on the sensor and those errors are almost negligible. But at a high ISO value, the amount of light per pixel is relatively small. The camera amplifies this intensity value. A small error in the measurement is also amplified into a much larger error. This creates the noise. Today, the sensors of modern cameras are much better at handling high ISO values, and there is excellent software for removing noise from images. ISO values of 6400 and higher can therefore be used without problems.

In the past, to remove noise, the intensity of pixels with noise was replaced by a kind of average of the intensities around them. The noise disappeared, but the image became less sharp. Modern software works very differently. It uses AI to recognize the logical structure of a block of pixels and replace it with a version without noise. The sharpness remains unchanged as a result. Millions of photos were used to train the software to achieve this.

Noise reduction is very easy to apply. You simply select the option, and the software starts calculating to create a version of the image without noise. There are several settings to determine exactly how the noise reduction works, but usually the default settings are fine. The software is smart enough to choose the best settings. At high ISO values, you should always apply noise reduction, unless you want to deliberately include the effect of noise in your photo.

A detail from a shot of a Black-tailed Skimmer dragonfly, taken with an ISO value of 5000. Left image without noise reduction and right image with noise reduction. The noise has disappeared, while the details have been preserved. 100 mm, 1/350 s, f/16, ISO 5000.

The software can also make an image sharper. This works in a similar way to noise reduction. With the help of AI, small blocks of pixels are replaced with versions that are sharper. In doing so, only those parts that are already reasonably sharp are made sharper, so, blurry backgrounds stay blurry. This software is getting smarter and smarter and can now also recognize and correct certain forms of motion blur.

Sharpening and noise reduction are often linked to each other. When reducing noise sharpness should be maintained, and with sharpening, noise can become more visible, which should be avoided. I usually use them in combination. This helps to make the small details of the insects more visible, such as the hairs around the head of the butterfly in the image below.

A Small White butterfly, at the left the original, and at the right with sharpening applied. 100 mm, 1/320 s, f/13, ISO 200, flash.

Noise reduction software

Noise reduction is built into cameras but is only used for the JPG images. The RAW images contain the information recorded by the sensor, including the noise. Photo editing software, such as LightRoom and ON1 Photo RAW, includes software to remove this noise. But there are also special noise reduction apps, such as Topaz Photo AI (www.topazlabs.com/topaz-photo-ai) and DxO PureRaw (www.dxo.com/dxo-pureraw), which often work a little better and have more customization options.

Retouching

If an image contains distracting elements, it is often possible to remove them using various retouching techniques.

A beautiful photo can be flawed by a distracting element, such as a twig in the wrong place, a spot in a leaf, threads of spiders, or light or dark spots in the background. Fortunately, you can easily remove these elements.

As mentioned earlier, you can start by trying to crop or rotate the image in such a way that the distracting elements disappear from the image. But if that fails, photo editing software has several options for retouching the image. A brush can be used to indicate which area needs to be removed and the software uses information from the nearby pixels in a smart way to fill in the area with more neutral elements.

The simplest way is to let the software decide for itself what the best way is to fill the area. You only must indicate the distracting area, and the software will do the rest. If this does not give the desired result, there is the cloning option. The cloning option copies an area you specify to fill in the removed part.

There are several settings here. You can specify how soft the transition should be between the area and the surrounding pixels, the so-called feathering. The opacity of the fill can also be determined (referred to as density). Sometimes it is nicer to still see part of the old pixels.

Recently, new AI techniques have been introduced to remove elements and fill in the area based on information from many millions of photos. This is referred to as generative removal. This is even more powerful and easier to use, but there are also drawbacks. We will discuss this in more detail on page 136.

Retouching works especially well if the area doesn't have too much specific detail. It is normally effective to remove distracting elements from the background, or small spots on leaves or stems. If distracting elements run over the insect, the technique usually does not work well.

In the example below, it was easy to remove the light twig (except for the middle part). The light spot in the bottom right of the background was also removed. But removing the branch that passes behind the antennae would be much more difficult (there is also no reason to do so).

A Comma Butterfly, before and after retouching. 100 mm, 1/320 s, f/13, ISO 200, flash.

Sometimes the new content does not quite match the old area, and some distracting edges remain visible. In this case, it can help to blur the area a bit as well. Adding blur can sometimes even remove the entire distracting element without the need to use other tools.

You can try to remove every spot and imperfection in the image, but these are shots of nature and nature is not perfect. If you take it too far, the result becomes unnatural. Also, it is a lot of work to remove all these imperfections. So better first take a good look at the image to determine which elements are really distracting and only retouch the essentials.

Sensor dust

When using a camera with an interchangeable lens, there is always the risk that dust will get into the camera when switching between lenses. This dust can end up on the sensor and cause small spots in the image. Cameras use various techniques to prevent this as much as possible, but it cannot be completely avoided. These dust spots can easily be removed with the retouching tool. Nowadays, the software can often automatically recognize and remove dust spots. If there are too many dust spots, you can have the sensor cleaned at a photo shop. It is strongly discouraged to do this yourself as the likelihood of damaging sensitive internal camera components is too great.

Generative AI

With the help of AI, it is possible to replace parts of your photo with other content that fits seamlessly with the photo.

With generative AI, the software generates part of the image based on information it has learned from many other images. Generative AI is currently on the rise, and more and more photo editing software supports it. But the larger the part that is generated by AI, the less you can see it as your own work.

There are two forms of generative AI that are generally seen as acceptable: Removing distracting elements and expanding the image when the subject is framed too tightly or because you want to change the shape of the image. In addition, there is a third, more questionable form in which parts of the photo are replaced by completely different elements. We will briefly discuss each of these techniques. My experience is that currently the software works rather poorly for the type of shots we discuss in this book. Apparently, the AI is not very good at dealing with close-up nature shots yet.

Removing elements

In the previous section, we have seen how to retouch an image. When retouching, parts of the image are replaced by other parts of the same image. **Generative removal** of elements has the same purpose, but in this case the area is logically filled with data learned from millions of other images.

Using generative removal is extremely simple. You select the part you want to remove and let the software generate new content. The result is not always what you want, so you will sometimes have to try a few times. A disadvantage is that the resolution of the new content is often a bit lower than that of your image. This is not a problem when dealing with elements in the background, but if there is overlap with the main subject (the butterfly, dragonfly or flower) this can be visible.

With generative removal, the stem and leaf on the left side have been removed in this shot of mating Blue-tailed Damselflies. 200 mm, 1/350 s, f/8, ISO 500.

Expanding the canvas

A second form of generative AI is used to expand the canvas of your image. This is sometimes referred to as **generative crop**. Cropping normally involves cutting away parts of the image. But if the butterfly or dragonfly is framed too tightly, you may wish to expand the image. Again, this works very simply. You indicate the new size of the image, and the software automatically fills in the empty parts on the outside in a logical way. Again, you will sometimes have to try several times to get the desired result.

With generative crop, the canvas is extended to the left and upwards so that the Small Heath butterfly in the right image meets the rule of thirds. Further editing is needed to make the background a bit blurrier. 400 mm, 1/350 s, f/8, ISO 250.

Replacing elements

In the third technique, called **generative fill**, a part of the image is selected, and you tell the software what to replace it with or what to add to this part. For this a so-called prompt is used. You type in English or another natural language what should be generated in the area. For example, you can ask to place a certain butterfly on a flower, or to replace an existing butterfly with another species. Beautiful images of butterflies and dragonflies can be created this way, but they are not the insects that you have photographed yourself. For small changes such as adding some extra flowers in the background, this may be acceptable, but if you let AI generate the main subject, this has little to do with photography.

Whose picture is it?

Generative AI is controversial. It allows people to create images that they haven't photographed at all. As indicated above, the software can replace the butterfly in your photo with another type of butterfly that you have not seen. The question then is whose photo it is? If you want to make something beautiful to put on the wall, there is probably nothing wrong with this. But if you want to show others what a great shot you have taken, this is of course not acceptable. Many photo competitions therefore forbid the use of generative AI techniques. I do not find the generative removal of distracting elements a problem. Generative crop where the photo is expanded slightly is usually fine as well. But the generative fill of elements is a step too far for me. You will have to decide for yourself what you do and don’t find acceptable.

When applying generative AI, most photo editing software sends your photo to their server, where the process is carried out. The terms and conditions often state that they can use this photo to further train their AI. This means that others may be able to see (parts of) your photo. Whether or not you find that acceptable is up to you. With photos of butterflies and insects it is probably not a problem, but with personal photos you may not want this. It is recommended to review the terms and conditions of your software, especially when it comes to privacy. (This issue also occurs when storing images in the software vendor's cloud.)

Emphasis on the insect

The butterfly or dragonfly is usually the most important subject in your photo. How do you ensure that the subject draws the most attention from the viewer?

It is important to consider how viewers will approach your work for the first time, especially how your composition steers the gaze of the person looking at your photo to the most important subject. That will usually be the butterfly or dragonfly, so the insect must stand out while the background shouldn't attract too much attention. In chapter 5 on composition, we have seen several ways to ensure this, such as the use of lines and the rule of thirds. But more attention can be drawn to the insect when editing the image. There are various techniques for this.

Local adjustments applied only to the subject

The butterfly or dragonfly can be adjusted locally. To do this, a mask must be created that contains the insect so that desired operations are only applied to the insect. See the next section on page 141 for methods to create masks.

For example, the clarity of the insect, also known as the dynamic contrast, can be enhanced. This increases the difference between the light and dark parts of the insect, leading to more sharpness and making the subject clearer. The increase can be made dependent on the size of the light and dark areas. To make small hairs clear, choose small areas and to brighten areas on the wings, choose large areas.

The shadows in the insect can be lightened or the vibrance of the colors can be increased. Make sure that the insect remains in balance with the environment, otherwise you get the feeling that it is floating above the rest of the image.

In the image on the right of this Green-banded Peacock butterfly, the clarity and vibrance of the butterfly have been increased but these have been reduced in the background. 180 mm, 1/320 s, f/8, ISO 800, flash.

Adding blur

As discussed in chapter 4 on page 78, a blurred background gives tranquility in a photo. This automatically draws attention to the insect in the foreground. This can be achieved while taking the shot by choosing a wide aperture and making sure the background is as far away as possible. But you don't always have this option. When photographing with a telephoto zoom lens, the smallest aperture value is limited (with my lens this is f/8). And sometimes the background is just very close to the insect.

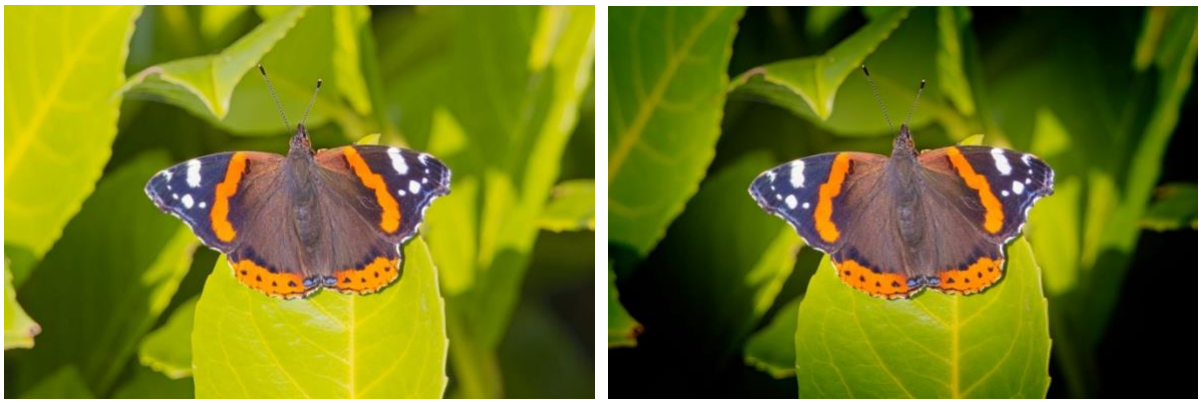
Blur can also be added when editing the image. To do this, you need to mask the background. This mask usually doesn't have to be very precise because the background is already somewhat blurred. Keep some distance between the mask and the parts that need to stay in focus, otherwise you run the risk of creating a halo around the subject. There are two ways to blur your background. First, you can reduce the clarity (dynamic contrast). If this is insufficient, the sharpness can be reduced or a blur filter can be applied.

Another option is to use a filter that simulates lens blur. You can set exactly how the bokeh (the blur) of that lens should behave. The software then uses AI to determine the depth of different parts of the image and applies the correct blur based on that depth. You can indicate which depth should remain sharp.

In the right image of this Common Blue butterfly the background has been blurred, especially on the left. 200 mm, 1/350 s, f/8, ISO 800.

Add a vignette

A vignette is a simple way to draw the viewer's attention to a certain part of the image. A vignette applies a gradient to make the image a bit darker towards the outside. The center of the vignette is placed at the position where you want to put the emphasis, such as the head of the insect. You can make this gradient very strong, but that makes the image look unnatural. A subtle gradient is often hardly noticeable, but it still influences the viewer. All photo editing software has simple tools for adding vignettes. In some situations, it may work better to add a light vignette, for example in high-key photography.



In the right image of this Red Admiral butterfly a (too) strong vignette has been applied to draw all attention to the butterfly. 280 mm, 1/350 s, f/8, ISO 400.

Working with layers

When using software that allows for layers, you can also proceed in a different way. Make two identical layers by copying the layer containing the image. In the top layer, remove everything except the subject, using a mask. In the bottom layer you can remove the subject although that is usually not necessary. Now edit the subject layer and the background layer separately. This makes it possible to, for example, sharpen the layer with the subject and blur the other layer. Also, a vignette can be applied in the background layer only. Extra layers can be added to edit certain parts of the image differently. When you're done, the layers can be merged, although this is not required. When exporting the image, the layers are merged automatically.

Creating masks

To apply edits to only a part of the image, a mask is needed. There are several ways to create these masks.

A mask determines which parts of the image a filter or edit is applied to. For example, you might want to apply some edits only to a butterfly, while you might want to apply other edits to parts of the background. Photo editing software has many different methods for creating masks, the most important of which we discuss here. For the examples in this section, we use the image below of a Broad-bodied Chaser dragonfly.

A Broad-bodied Chaser dragonfly. 400 mm, 1/350 s, f/8, ISO 500.

A mask is basically a black and white image with the same size as the photo. Where the mask is white, the editing operation is applied and where it is black, the operation is not applied. For gray parts, the operation is partially applied. A mask can have hard edges or soft edges. Hard edges are used to indicate an area very precisely, such as the insect. Soft edges are used if you want the parts that are being edited to flow smoothly into the unedited parts, such as when blurring a part of the background. Often it is not necessary to make the masks very precisely.

A soft mask made with a brush and a hard mask created using AI.

In the past, creating a mask was precision work, but nowadays the software helps with this. The following techniques are available.

- **Brush**. The mask can be drawn with the help of a brush. You can choose the size of the brush, the density (degree of transparency) and the feather that softens the mask outwards. This works fine for many applications. Due to the soft gradient, adjustments flow smoothly into the part outside the mask. Brush masks van be used, for example, to make parts of the photo a bit darker or lighter. Lighting is referred to as **dodge** and darkening as **burn**.
- **Exactly**. Here you let the mask follow an area exactly, for example the insect. Nowadays, this can easily be done with the help of AI. This type of mask is used when it's important that the edit doesn't go beyond the edge of the subject. A precise mask is required if, for example, you want to increase the saturation of the colors of the subject or make the insect lighter or darker. Be careful with the transparent wings of a dragonfly. These are usually considered to be entirely part of the insect. When making the insect lighter, the background behind the wings will also become lighter and that can look unnatural.
- **Linear gradient**. You indicate a line, and the mask then fills the section on one side of that line. Around the line, the mask ranges from 0% to 100% density. The width of the gradient can be set. For example, it is possible to make the photo darker or blurrier towards the top. Several gradient masks can be combined if necessary.
- **Radial gradient**. You indicate a circle or oval. The area inside (or outside) the oval then becomes the mask. Along the edge of the oval, the mask goes from 0% to 100% density. Again, Multiple masks can be combined. For example, you can create a vignette yourself by darkening the area on the outside. This gives more options than the standard vignette.

On the left a combination of two linear gradient masks and on the right a radial gradient mask.

- **Color range**. You specify a color and a range, and the mask selects all pixels in that color range. For example, this can be used to adjust the green of the background or to brighten the orange of a butterfly.
- **Luminance range**. Selection is not based on color, but on intensity. You can choose the range again. For example, all dark pixels can be selected or all light ones. If some parts of the photo are a bit overexposed, these pixels can easily be darkened with such a mask.
- **Depth mask**. This is a new technique in which the software uses AI to determine the depth of the different pixels. You can then apply an edit to the pixels that are far away or close by. For example, the image can be blurred towards the back or some haze can be added.

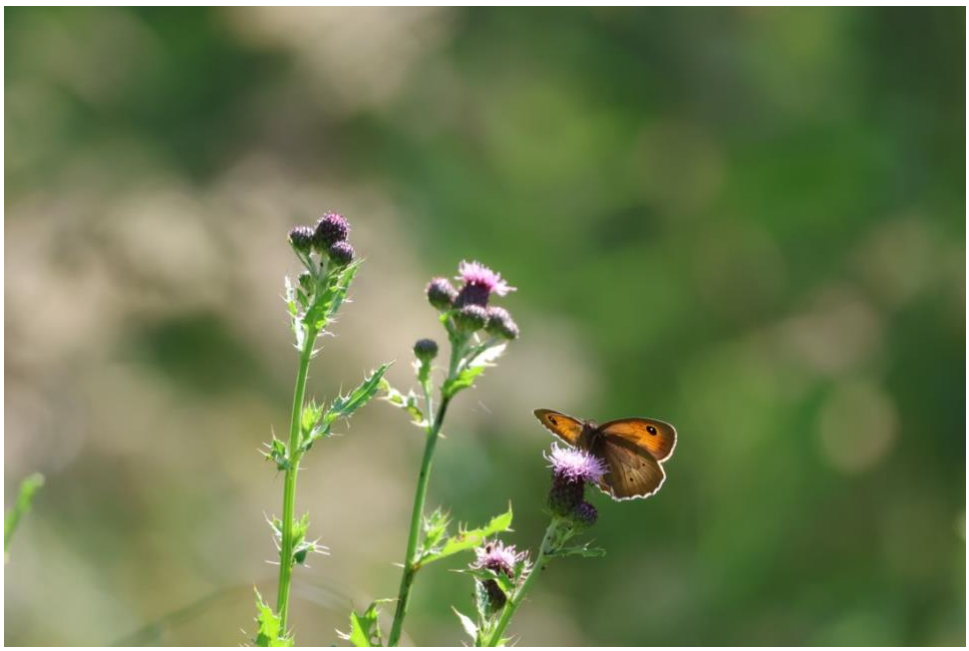
On the left you find a color range mask for the green colors, in the middle a luminance range mask and on the right a depth mask.

Masks can be edited. They can, for example, be blurred or sharpened, and they can be inverted. Masks can be made larger or smaller. And it is possible to copy, paste, and combine masks. It is worthwhile to delve into the possibilities of your software. If you can work well with masks, you can edit your images much better.

Two complete examples

By combining different editing steps, a reasonable photo can be turned into an excellent image.

In the previous sections, several techniques have been presented to edit your images. Ultimately, these techniques need to be combined to get the best results. It is important to first ask yourself what you want to achieve with a certain image. Where should the emphasis be? Do you want to highlight the details or the overall image? Do you want a cheerful, colorful image or a more subdued image? Here are two contrasting examples of the overall process to clearly show the effect of the different edits.



An unprocessed image of a backlit Meadow Brown butterfly. 400 mm, 1/350 s, f/8, ISO 500.

I took the above shot of a Meadow Brown butterfly with backlight. This image can be edited in different ways. For example, you can emphasize the repetition of the three thistles. But I chose to emphasize the backlight on the butterfly. This required the following operations:

- A large crop was applied so that the butterfly fills a much larger part of the image. The image was reduced to about a quarter, from 32 MP to around 8 MP, which is still large enough for most purposes.
- The middle flower got in the way. But it could easily be retouched because the background is blurred.
- By lightening the shadows slightly and enhancing the vibrance of the colors, the backlight on the butterfly becomes a lot more beautiful.
- By sharpening the butterfly and the flower on which it sits using a mask, more emphasis is placed there.
- The background was blurred a bit more, again using a mask.
- A weak vignette was added to draw the attention a little bit more to the center of the image.

Below the finished result is shown. The above list of edits may seem like a lot, but in the end, it was only five minutes of work.

The result of the editing steps. A backlit Meadow Brown butterfly.

The second example is a photo of a tropical Mylotes Cattleheart butterfly, shot in a greenhouse. It was very dark in the greenhouse, and I didn't want to use a flash, so this shot was taken at ISO 6400 which caused noise. And the photo is still a bit too dark.

A Mylotes Cattleheart butterfly in a dark greenhouse. 175 mm, 1/350 s, f/8, ISO 6400.

In this image I wanted to emphasize all the details in the butterfly, including the coiled tongue. To this end, I applied the following edits:

- The image was slightly cropped and rotated. This made the butterfly larger, and the white vein in the leaf disappeared. Enough space was left on the right side so that the butterfly does not look out of the image.

- Noise reduction in combination with sharpening was applied. This made the details more visible.
- The shadows were lightened a bit and the highlights were reduced, to make the light part at the top left less prominent.
- The white balance was made slightly warmer and the vibrance of the colors was increased.
- Using a mask, dynamic contrast (clarity) was then applied to the butterfly to make the details even clearer.
- And finally, a weak vignette was added to draw attention to the head.

Below is the result. The butterfly remains dark of course because that is its color. But the contrast with the background is much stronger, so you can see the details better.

The edited image of the Mylotes Cattleheart butterfly.

Editing this image also took only a few minutes. It is important to know the photo editing software you use. In the beginning, editing will take a little more time. In addition, it is important to know what you want with your photos. If you start adjusting things haphazardly, you will lose much more time and you will usually not achieve a satisfactory result. It is also recommended to look at the edited photo again after a while. Often this results in some adjustments that make the image even stronger.

Automatic editing

If you don't know how best to improve your image, so-called presets can be applied. A preset is a collection of settings and filters that produces a specific effect. Most photo editing software comes with extensive collections of presets. You can easily go through the different presets and see what the result is. Once you have found a preset that has a nice effect, it can be used as a starting point and you can further edit your images from there. Most presets work on the entire image, but recently, presets have been introduced that use AI to apply certain effects only to, for example, the background or the subject.

Nowadays, there are also possibilities to have the software analyze the image with the help of AI, to determine the best editing settings. This mainly concerns the tone and color. But for images of butterflies and dragonflies, the result is often not what you want.

Creative editing

Photo editing software can also be to produce creative versions of your shots. For example, you can make images black and white, apply artistic filters.

I usually try to make my images look as natural as possible. The edits I apply improve the image but do not change it substantially. But with photo editing software, it's also possible to create much more creative images. The software contains many tools to adjust the images in all kinds of ways. And there are also large collections of plugins to further edit your images. I give two options here, namely converting to black and white and adjusting the colors in the image, but there are many other ways to get creative with your shots.

Black and white

In the past, a lot of photos were shot in black and white. Color photos can easily be converted to black and white. This changes the experience of the photo completely. Colors in a photo can distract from what's important. The black and white version then shows the essence better. This is usually not a good idea with colorful butterflies. But with dragonflies with a lot of detail in the wings, a black and white version can be interesting. In the image below of a Green-eyed Hawker, all the green tones in the background are distracting. The black and white version of the image is calmer and puts more emphasis on the insect.

When converting this photo of a Green-eyed Hawker dragonfly to black and white, the background is less distracting and the atmosphere changes. 400 mm, 1/350 s, f/8, ISO 320.

There are many ways to convert an image to black and white. The easiest way is to set the saturation of the colors to 0, but that does not give the most striking effect. With special black and white filters, you can choose from many settings. This changes the way in which the different colors are converted into shades of gray. Below two other possibilities are shown for the same image. Best try multiple options and choose the settings that give the desired effect.

Two other black and white versions of the same image.

You can also convert an image to black and white to create a vintage effect. By adding grain and giving the image the color sepia, the image looks even older.

Editing colors

Interesting effects can be obtained in insect shots by playing with the colors. The image below gives an example. The Scarlet Darter dragonfly, as its name suggests, can have a bright red color. You can add extra emphasis to this by removing all other colors from the image. This is achieved by setting the saturation of the other colors to zero. In addition, in this image I have chosen to overexpose the background a bit by enhancing the highlights. This makes the red color of the dragonfly stand out even stronger.

A Scarlet Darter dragonfly in a white environment. 400 mm, 1/500 s, f/11, ISO 800.

With the help of a **LUT**, you can change the colors in an image. LUT stands for LookUp Table. It is a table in which for each color in the original image it is indicated what the corresponding color in the final image should be. With LUTs you can achieve a lot of special color effects. Photo editing software often comes with large collections of LUTs, and more can be downloaded or bought. In the image below of a Six-spot Burnet moth, I gave the colors a more retro look.

A Six-spot Burnet moth on which a LUT has been applied in the right image. 100 mm, 1/320 s, f/5.6, ISO 100, fill flash.

Artistic filters

There are large collections of artistic filters available that can be used as a plugin for the various photo editing software suites. An example of this is the free GMIC plug-in (www.gmic.eu) which contains more than 500 filters. With such filters, you can transform your photo into an image in any artistic style imaginable. The image below shows an example where I applied a cartoon filter to a photo of a Red Admiral. It uses only a few colors to give the feeling that the image is drawn.

The creative filters give endless possibilities, but I strongly advise you to think about what you want to achieve before getting started. Playing around with the different possibilities is fun, but it usually doesn't lead to good results.

A cartoon representation of a Red Admiral butterfly, generated with the GMIC plug-in.

Mirroring

Symmetry is a powerful compositional technique. Mirroring half of a butterfly or dragonfly results in very strong symmetry.

In chapter 5 on page 106, it has already been indicated that images with a strong symmetry are attractive. Butterflies and dragonflies lend themselves well to symmetrical images by shooting them straight from above or straight from the front. But you can go a step further and create this symmetry during editing by mirroring half of the insect. This is a simple process, provided you use a photo editing program that supports layers.

To start, select an image that already has a strong degree of symmetry, but it doesn't have to be perfect. Decide which half of the image you're going to use. The other half doesn't matter when editing. Here's how to proceed:

- Edit the image as you normally would. However, do not crop the image or apply a vignette. If necessary, retouch the half of the image that you are going to use.
- Shift and rotate the image so that the line of symmetry runs exactly vertically in the center. Crop the image if necessary to get the best composition. A square image often enhances the effect.

The original image of a Green-veined White butterfly and the edited, rotated and cropped image. 100 mm, 1/320 s, f/13, ISO 200, flash.

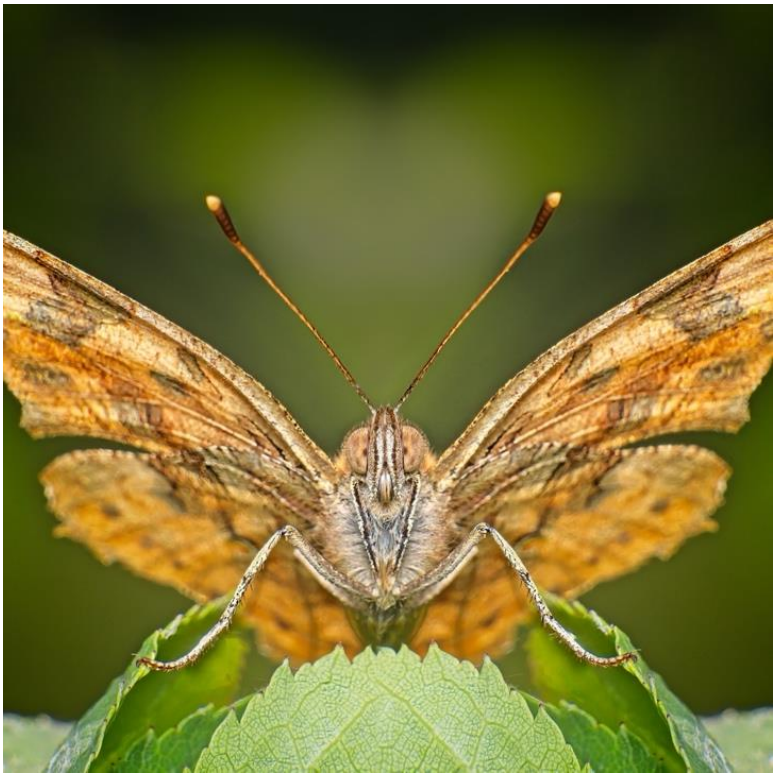
- Duplicate the layer that contains the image. You now have two identical copies. Make the bottom layer temporarily invisible.
- Remove the unwanted half of the top layer with a mask. Only keep the half that you want to use. Make sure there is a small gradient in the mask between the visible and invisible part, to be able to smoothly join the halves together.
- Now mirror the top layer and make the bottom layer visible again. Probably the two halves do not fit perfectly. Move the top layer so that they fit precisely.

On the left is the half of the image we use, and on the right the mirrored half is placed on top of the other layer.

- Now combine the two layers into a single layer.
- Edit the final image. If necessary, crop it a little, add a vignette, and retouch the place where the two halves meet. Optionally, you can edit both halves slightly differently so that there is a very small deviation in symmetry.

The final result. A mirrored Green-veined White butterfly.

The result will amaze you. Because you know how the image was created, it is immediately clear that one half was mirrored. But for other viewers, that is not so clear at all. They often have the feeling that there is something strange about the image, but they cannot put their finger on it. This leads to extra attention for the image because it raises questions. Below you will find a second example, this time with a shot straight from the front.



A mirrored Comma Butterfly. 120 mm, 1/320 s, f/13, ISO 200, flash.

8. Special projects

There are several special situations in which you can photograph butterflies and dragonflies. Each of these situations requires a different approach that we will describe here. We will discuss finding and photographing caterpillars, we will study eating, mating and flying insects and we will look at group photos with multiple butterflies or dragonflies in a single image. Finally, you will find information about photographing in tropical butterfly gardens and about attracting and photographing moths at night.

Photographing caterpillars

Some butterflies have beautiful caterpillars. But it is not easy to find them and even though they hardly move they are sometimes difficult to photograph.

All butterflies and moths go through the caterpillar stage before pupating into an adult butterfly. There are caterpillars in all colors and sizes. The caterpillar often looks nothing like the final butterfly. Brown moths can have caterpillars with bright colors and some beautiful butterflies, such as the Map, have rather boring caterpillars.

The colorful Lackey moth caterpillar and the corresponding adult. Left shot 400 mm, 1/320 s, f/22, ISO 400, flash. Right shot 100 mm, 1/320 s, f/13, ISO 400, flash.

Finding caterpillars

To find caterpillars, it is important to know what plant they feed on and what parts they eat (leaves, flowers or stems). It is also important to find out what time of year the caterpillars are present. And finally, look for caterpillars that are visible during the day. There are also caterpillars that are only active in the dark and hide during the day. All this information can be found on the Internet by searching with the name of the butterfly, or by consulting https://www.inaturalist.org/.

Now look for host plants that are partially eaten. Caterpillars do nothing but eat. They start tiny and grow through several molts to their final size. They can also change in appearance during that process, as can be seen in the image below of caterpillars of a Swallowtail.

On the left the young caterpillar of a Swallowtail butterfly, only one centimeter in size. On the right the final caterpillar is four centimeters. Both shots 150 mm, 1/320 s, f/13, ISO 400, flash.

If you have found a partially eaten host plant, check whether new leaves have formed at the eaten parts. If that is the case, then the feeding is old, and the caterpillars have probably already moved on. If the feeding is recent, examine the plant carefully. Also look under the leaves because caterpillars can often be found there. It helps if you know what the caterpillar looks like and have an idea of its size. Small caterpillars can easily be missed. Note that there are also many other insects that eat leaves, so the feeding tracks do not have to be from caterpillars.

If you know there are caterpillars somewhere, check back regularly. The small caterpillars grow quickly during a few weeks, and can be photographed in different stages. Sometimes you're just lucky. Always keep your eyes open for caterpillars. For example, the caterpillar below of an Orgyia antiquoides was just sitting on a bench where I went to rest for a while.

The caterpillar of an Orgyia antiquoides moth. 300 mm, 1/350 s, f/8, ISO 320.

Photographing caterpillars

Since caterpillars move very slowly, there is plenty of time to photograph them, so you can try to make a nice composition. One problem, however, is that caterpillars are long and thin. This means that it is difficult to get the entire caterpillar in focus. Only when photographing the caterpillar straight from above or from the side will it become sharp from front to back. Of course, you can also choose to have only a part in focus, preferably the head.

In general, it is nicer to photograph the caterpillar from the side. Choose a low position so that the legs can be seen (the number of abdominal legs is also important for identification). Some caterpillars have parts that stick out and are usually best seen from a low point of view.

If the caterpillar is in a twist, a shot from the side does not work. In this case, choose a high viewpoint and photograph the caterpillar from above. This reduces the required depth of field. However, you will often have to choose a small aperture, as in the photo of the Lackey caterpillar at the beginning of this section where f/22 was used.

The caterpillar of a Dark Tussock moth. 100 mm, 1/320 s, f/13, ISO 400, flash.

Some caterpillars have hairs, such as the Dark Tussock moth above. This gives an extra challenge when photographing. Ideally, these hairs should be in focus, but they stick out in all directions, requiring an unusually large depth of field. To compensate, try to provide contrast with the background. While editing the image, you can further enhance the contrast and sharpness of the hairs.

Since caterpillars eat leaves, it is nice if that is reflected in the photo. You can see this in the image below of the caterpillar of a Brimstone butterfly. This caterpillar usually sits along the midrib of the leaf, which is seen clearly in the image.

The caterpillar of a Brimstone butterfly on a leaf. 100 mm, 1/320 s, f/13, ISO 400, flash.

While eating

Many butterflies drink nectar from flowers and dragonflies eat insects. These situations give great photo opportunities.

Butterflies and dragonflies have very different diets. Where butterflies mainly drink nectar from flowers, dragonflies eat other flying insects that they pluck from the air. While eating, the butterflies and dragonflies are usually easier to approach so this is a good moment to photograph them.

Butterflies drink nectar from flowers with their long tongue. To photograph this process, it is best to take a low position and shoot from the side or diagonally from the front of the butterfly. Make sure the tongue is clearly visible against the background, as in the image of a Small Skipper butterfly below. Avoid that the tongue is in front of the body of the butterfly, otherwise, it is lost in the overall picture.

A nectar-drinking Small Skipper butterfly. 400 mm, 1/350 s, f/8, ISO 200.

With a shot from the side, you can focus on the eyes, as you almost always do. But when taking a shot (diagonally) from the front, you must focus on the tongue because it is closer to the camera than the head. That can be difficult because it is such a small part. Instead, you can focus on the flower at the correct position. The back of the butterfly won't be completely sharp, but that's fine as the emphasis should be on the tongue.

Dragonflies eat insects that they catch in flight. They then sit somewhere to eat the insect. Some dragonflies eat large insects such as butterflies and other dragonflies. In the image below a Blue Emperor dragonfly is eating a Broad Scarlet dragonfly. It may be a somewhat sinister image, but that's how it works in nature.

A Blue Emperor butterfly eats a Broad Scarlet butterfly. 125 mm, 1/350 s, f/8, ISO 800.

When a dragonfly is eating, it can easily be approached. However, it often sits in a hidden place, for example among the grass or in a tree, making it difficult to take a good shot. Objects are in the way and the background is close by and therefore not very blurry. Take shots from many different directions. Try to get both the dragonfly and the prey clearly visible in the image.

During mating

Mating dragonflies and damselflies are regularly seen and can easily be photographed. For mating butterflies, you need more luck.

The main purpose for adult butterflies and dragonflies is to mate. This mating usually takes a long time, and the insects are easier to approach during mating. This makes it possible to take beautiful pictures of the process, but there are several things to pay attention to.

Damselflies are the easiest insects to shoot during mating. They are regularly seen and their bodies form a beautiful mating wheel that sometimes has the shape of a heart. Mating can take hours, and the damselflies often sit motionless, so you can easily determine the correct position and angle for the shot.

The main challenge is to get both insects in focus. There are two pairs of eyes in the image, and preferably both heads should be in focus at the same time. This is only possible if both heads are at the same distance from the camera. A shot exactly from the side gives the best result, as in the image below. This also gives the best view of the mating wheel. Use a reasonably small aperture for sufficient depth of field, like f/8 or f/13. The wings will not be completely sharp, but that is not necessary. The emphasis is on the shape of the bodies.

Mating Emerald Damselflies. 400 mm, 1/350 s, f/8, ISO 1250.

Dragonflies are more difficult to shoot during mating. They can fly well while being connected and quickly take off when approached. The images also quickly become a bit messy. Because you must stay at a greater distance, the background becomes less blurry, and mating dragonflies are often less elegant than damselflies.

Mating Ruddy Darters dragonflies. 300 mm, 1/320 s, f/8, ISO 160, fill flash.

Photographing mating butterflies is a completely different story. You must be very lucky because they are rarely seen. Most butterflies can fly during mating. If you see a flying butterfly that looks unusually large or has a somewhat strange shape, there is a chance that it consists of two mating butterflies. Follow the butterflies until they settle and then try to photograph them. Unfortunately, they often sit in a difficult place, for example between the grass stems.

As with dragonflies, it is best to try to photograph them from the side. Then they are completely sharp, and the wings blend nicely. The image below is an example of two mating Small Heath butterflies. They were sitting amongst the grass stems. It was therefore difficult to take a shot in which they were both fully in the picture. Fortunately, mating also takes a long time with butterflies, so there is enough time to create a good composition, if they don't fly away.

Mating Small Heath butterflies. 400 mm, 1/350 s, f/8, ISO 250.

Group photos

The number of butterflies and dragonflies is declining in many places. But sometimes, you're lucky enough to be able to capture several of them in a single shot.

A group photo tries to capture several butterflies or dragonflies in a single shot. This gives a cheerful image, but it is difficult and requires luck. Dragonflies usually sit motionless so you can determine a good composition, but butterflies fly from flower to flower. It is best to photograph from a somewhat greater distance to have the best chance of getting several butterflies in the picture. The image can be cropped afterwards for the best composition.

You can choose to focus on one of the butterflies. This one must then be sharp while the other butterflies can remain more blurred. In this case, use a large aperture. If the other butterflies are almost but not completely sharp, they will distract the attention of the viewer from the main butterfly. It is better when they are completely out of focus, to put all emphasis on the chosen main subject. Of course, you can also try to get all the butterflies in focus. Then make sure that the entire bush of flowers is sufficiently sharp, wait until the butterflies are in a nice composition and take the shot. Several shots will be needed to get one where all the butterflies are in a nice position.

The image below captures three Small Coppers butterflies in a single shot. Unfortunately, you don't see that very often these days. There is a lot of detail in the image and that makes it a bit restless, but this is difficult to prevent with multiple butterflies in a single shot. All three butterflies are in focus because they are at the same distance from the camera. The three butterflies form a nice flow from the bottom left to the top right of the image.

Three Small Coppers butterflies in a single shot. 150 mm, 1/250 s, f/8, ISO 320.

Sometimes two butterflies are drinking nectar from the same flower. That gives a great opportunity to photograph them together. Focus on the flower and wait until the two butterflies are in a nice position, for example on either side of the flower. Choose an angle that allows the background to be as far away as possible and use a large focal length. This will result in a nice blurry background. The image below shows an example of two nectar-drinking Six-spot Burnets moths. Again, both moths are in focus because they are at an equal distance from the camera.

Two Six-spot Burnets moths on a flower. 400 mm, 1/350 s, f/8, ISO 640.

Dragonflies are almost never seen together in groups. But when damselflies lay eggs, you sometimes find them in large numbers in the same place. In some species of damselflies, such as the Azure Bluets in the image below, the males remain connected to the females while they lay the eggs. That produces a special image.

Azure Bluets damselflies laying eggs whilst still being clasped by the males. 230 mm, 1/350 s, f/8, ISO 400.

In flight

Shots of flying butterflies or dragonflies are beautiful, but they are difficult to take. How do you achieve this?

Photographing flying butterflies or dragonflies is a challenge. You must make sure that the insect is in the picture, the focus must be on the insect, and the right exposure settings are required to avoid motion blur. Butterflies behave very differently from dragonflies when flying. The two therefore require a different approach.

Dragonflies can fly very fast and often change direction suddenly, which makes it difficult to follow them with the camera, especially when using a telephoto lens. But fortunately, dragonflies regularly hover in a spot for a while. That's the time to take a shot. And since many dragonflies repeatedly follow similar flight paths, you can sometimes predict the place in advance.

A flying Green-eyed Hawker dragonfly which hovered in a spot for a while. 200 mm, 1/350 s, f/8, ISO 200.

It is impossible to focus on the flying dragonfly yourself. You will have to rely on the automatic focus of the camera. Choose a large focus area to increase the chance that the camera will focus on the insect. Use continuous focus and set the camera to track animals if it has that option. Try to shoot against a monotone background, for example water or the sky. If there is a lot of detail in the background, there is a good chance that the camera will focus on the background.

Since the dragonfly hovers in a fixed place, you don't need a fast shutter speed to get the body sharp. But the wings continue to move quickly. There are two possibilities here. You can go for a relatively slow shutter speed of, for example, 1/350 s, as in the image above. This leaves a lot of movement in the wings which gives a feeling of action. You can also go for a much faster shutter speed of 1/2000 s or less to completely freeze the movement of the wings.

Some species of dragonflies keep coming back to the same location. Darters, for example, use a limited number of preferred perches as vantage points to look for food and other dragonflies. You can anticipate on that. In the example below the Common Darter kept coming back to a post. I could

therefore point the camera at the area above the post and wait for the dragonfly to appear. Since this dragonfly did not float but kept moving, a shorter shutter speed of 1/1000 s was required to freeze the body.

A flying Common Darter dragonfly. 200 mm, 1/1000 s, f/8, ISO 2500.

Butterflies fly in very irregular patterns which makes it virtually impossible to photograph them in the air. An exception is the Hummingbird Hawk-moth. This moth hovers in front of the flowers while drinking the nectar with a very long tongue. At such a moment a shot can be taken, but you must be very quick because the butterfly flies from flower to flower. Continuous shooting can be used to increase the chance of getting a good shot.

A hovering Hummingbird Hawk-moth. 150 mm, 1/2000 s, f/6.7, ISO 2000.

To photograph other flying butterflies, with a modern camera you can use a technique called **pre-shooting**. Other names for this are, depending on the brand of camera, RAW burst, pre-burst or pre-capture. This works as follows. You point the camera at a butterfly that is sitting on a flower, for example. Press the shutter button halfway. The camera now starts taking continuous shots in rapid succession but only stores them in a buffer and not on the memory card. As soon as the butterfly takes off, press the shutter button completely. Normally you are too late, but with this technique the camera stores the last half second of images on the memory card. This usually includes a shot of the moment of flying away.

The photo below of a Red Admiral was taken in this way. There is still a good chance that the butterfly is not in an interesting position or is not sharp, because the movement is very fast. With a fast shutter speed and a reasonably small aperture, you increase the chance of success.

A Red Admiral butterfly takes off from a flower. 100 mm, 1/2000 s, f/8, ISO 640.

Burst mode

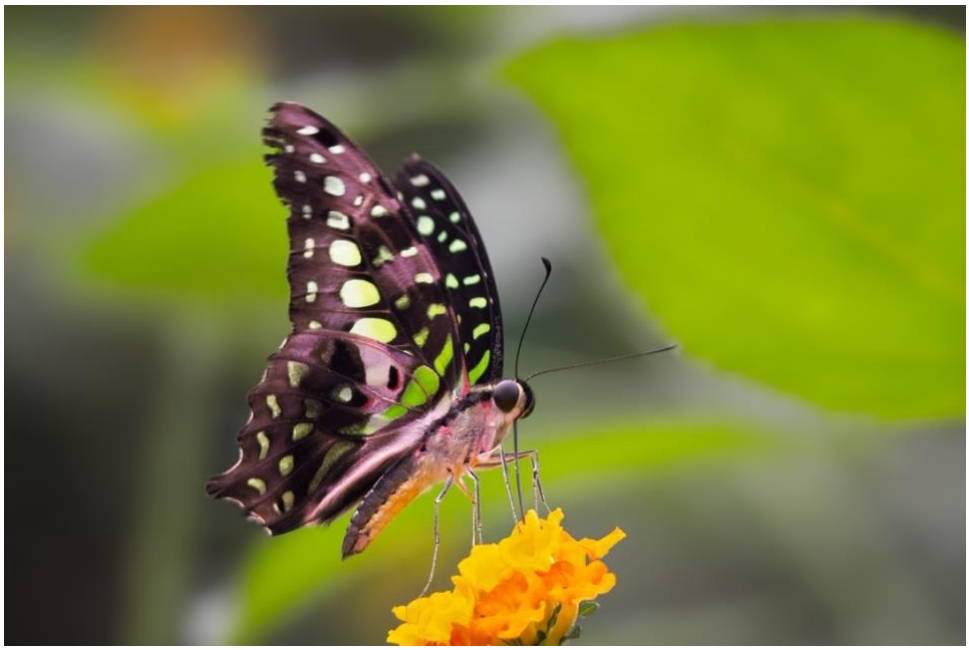
Cameras can shoot continuously in rapid succession, sometimes up to 40 frames per second. For this they use the electronic shutter. When photographing a flying butterfly or dragonfly, it can be useful to use this **burst mode**. You increase the chance that you will get a shot in which the insect is in a nice pose. However, the camera is often unable to focus on the moving insect quickly enough between images. Because the insect is close by, this means that many images will not be sharp. You also have to look at a lot of images afterwards to select the most beautiful ones. My advice is to do that in the camera. Then you can also be sure that a good shot was taken, before leaving the area.

Butterfly gardens

At many places there are indoor butterfly gardens with beautiful tropical butterflies. Photographing in a butterfly garden requires a somewhat different approach.

If the weather doesn't cooperate and you still want to photograph butterflies, you can visit one of the covered butterfly gardens that exist in many places. Here tropical butterflies can be found that are often large and have beautiful colors. Some of the butterfly species in the butterfly gardens can sustain themselves by mating and laying eggs. For the rest, the butterflies are imported in the form of pupae. Since butterflies only live for a few weeks, thousands of pupae are needed per year for a butterfly garden. In countries such as the Philippines and Costa Rica there is a large butterfly industry and pupae are shipped all over the world.

In butterfly gardens, you can usually photograph from a close range, although the butterflies, just like in nature, will regularly fly off when getting too close. You have plenty of time to take beautiful shots, so you many different compositions can be tried. The images in this section were taken in several different butterfly gardens in the Netherlands.



A Tailed Green Jay in a butterfly garden. 200 mm, 1/350 s, f/8, ISO 800.

Preparation

There are a few things to consider when photographing in a butterfly garden. To begin with, it is very hot and especially very humid in these covered gardens. So go dressed as lightly as possible and above all, take it easy. Your equipment also must get used to these conditions. When entering from the cold outside, there is a good chance that the lens and viewfinder of your camera will fog up. It will take some time before the camera is at the right temperature. You can always try to wipe away the condensation with a cloth, but it is better to wait a while. After 5 to 10 minutes, the problem is usually over.

It is important that no moisture gets into the camera. Preferably use a camera and lens that are weather sealed. If not, make sure that afterwards the camera has time to cool down again without condensation forming in the equipment. Don't walk straight into the cold. Do not change lenses in the butterfly garden because that increases the chance of moisture in the camera.

There are usually other visitors in the butterfly garden. Make sure you don't interfere with them. Do not stand in the middle of the path extensively photographing butterflies. Let other visitors also view the butterflies. Stick to the rules. Don't go off the paths to get closer to a butterfly. Most of the time, you are not allowed to use a tripod. A monopod may be possible.

A Glasswing Butterfly with largely transparent wings. 170 mm, 1/320 s, f/13, ISO 400, flash.

Finding the right butterfly

Although butterfly gardens contain many butterflies, it is still quite difficult to find specimens that are easy to photograph. Most butterflies fly around and are almost impossible to shoot. When it is sunny outside, the butterflies are more active. In cloudy weather or early in the morning, the butterflies sit still more often and are easier to photograph. The butterflies are also often located between the plants or very high. So you will have to look carefully for butterflies that are in a suitable place. Use the time it takes for the camera to warm up to walk around and see where the butterflies are before you start photographing them.

The choice of lens is important before going into the butterfly garden. Since lenses can't be changed, you're stuck with your choice. Butterflies in the garden are usually a bit closer than outside, so you don't need a strong telephoto lens. A zoom lens is useful because the butterflies are at different distances. I have taken almost all shots in butterfly gardens with a focal length between 100 mm and 200 mm. A macro lens is also not necessary.

A Mylotes Cattleheart butterfly, shot with a flash for extra light. 165 mm, 1/320 s, f/13, ISO 400, flash.

Exposure

Most butterfly gardens are quite dark and that makes photography a challenge. You have the choice of shooting with a flash or using the available light. The flash provides more light, but it can introduce shadows. Because the butterflies are quite far away, a diffuser will usually not work. A flash has the added advantage that any movements of the butterfly is frozen. For more information on using a flash, see chapter 6 on light on page 113.

Without a flash, you must choose the exposure settings carefully. A large depth of field is required, so an aperture of f/8 or more is recommended. There is no wind in the garden, so if the butterfly is not moving, you can use a relatively slow shutter speed (assuming your camera and/or lens has image stabilization). But if the butterfly moves, a speed of 1/350 s or faster is recommended. Set the ISO to automatic. However, pay attention to the value. Sometimes it can get very high in which case the image quality will decrease.

Some butterflies drink nectar while they keep flapping their wings, as in the image below of an Eastern Giant Swallowtail. In this case, 1/1000 s was needed to prevent motion blur. That led to an ISO value of 4000, but thanks to modern noise reduction, there is no noise in the image, and it remains sharp. For more information on noise reduction, see chapter 7 on page 132.

An Eastern Giant Swallowtail butterfly beating its wings while drinking nectar. 165 mm, 1/1000 s, f/6.7, ISO 4000.

Caterpillars and pupae

Some butterfly gardens breed butterflies themselves. In that case, caterpillars and pupae may be present. Because many of the tropical butterflies are large, this usually also applies to the caterpillars. You can take great shots of these caterpillars. Ask the staff if there are caterpillars present and where you can find them. Sometimes this is in the same area as the butterflies, but sometimes also in a special room. Proceed in the same way as described in the earlier section on caterpillars on page 155. Look for plants that have recently been eaten. Then look very carefully to see if you can find the caterpillars or pupae. Also look under leaves and along stems. In the image below you can see an example of a beautiful caterpillar and pupa of a Mylotes Cattleheart of which you saw the adult butterfly earlier in this section.

The caterpillar and pupa of the Mylotes Cattleheart butterfly. Left image 165 mm, 1/125 s, f/8, ISO 5000. Right image 135 mm, 1/320 s, f/11, ISO 400, flash.

Photographing moths

There are probably hundreds or even thousands of species of moths where you live, but most of them you never see. How do you lure these insects so that you can photograph them properly?

As discussed in chapter 1 on page 5, there are many more species of moths than butterflies. There is a group of diurnal moths that can also be seen flying during the day, but most species of moths can only be photographed if you manage to lure them at night. And contrary to what most people think, not all moths are gray or brown. They can have beautiful colors and patterns. Some moths are also very large. The Privet Hawk-moth in the image below is the largest moth in the Netherlands with a wingspan of up to 12 centimeters. It is considerably larger than the largest butterfly in my country. It is common in the Netherlands, but most people have never seen it.

The Privet Hawk-moth is the largest moth in the Netherlands. 100 mm, 1/320 s, f/13, ISO 400, flash.

You have the best chance of seeing moths when it is warm and a bit humid. Some drizzle doesn't stop the moths from flying around. However, if the temperature falls below eight degrees Celsius, there is little chance of moths. Most moths are seen in the summer, but even in the winter certain species of moths are active.

Sheet and lamp

The easiest way to see moths is to hang a white sheet outside with a strong lamp pointed at the sheet. Make sure the sheet stands tight and moves as little as possible, then the moths will stay on it. When there is wind, it is best to attach the sheet to a wall so that the wind has as little effect on it as possible. The lamp attracts the moths that then land on the sheet. Usually, they stay there all evening. But you should also look at places near the sheet and on the ground. The moths regularly come to rest there. Use a flashlight to look for the moths.

This Rosy Footman moth landed on the ground under the luring sheet. 100 mm, 1/320 s, f/13, ISO 400, flash.

It is best to use a UV lamp as a light source. UV light is largely invisible to the human eye. UV lamps give a blue glow and do not appear very strong but be careful not to look closely at the light source for too long as this can irritate your eyes. Moths, on the other hand, see the UV light very well and are attracted to it. If you want to get started as cheaply as possible, you can try to buy a second-hand face tanner. These emit excellent UV light. They are not waterproof, so it is useful to put an umbrella above them. In the image below, you can see my construction.

Attracting moths with a sheet and a face tanner. The umbrella protects against the rain.

You can also use a UV LED panel. 100-watt panels can be bought for about 25 dollars at Amazon. These are often used as black light at parties. They are waterproof so you can leave them outside in drizzle. They are a bit stronger than a face tanner and a bit easier to work with.

You don't have to wait outside all the time to see if moths are coming. Usually, a moth stays put for a very long time. I normally check every hour to see if there is anything interesting to see. Don't be surprised if the lamp also attracts other insects, such as various types of beetles, caddisflies and, of course, a fair share of mosquitoes. Sometimes hornets are also attracted to the light. These large wasps also hunt in the evening. They may look frightening, but when approached calmly, they won't hurt you. (If you are allergic to stings you should of course not get close to them.) When you're done with luring and photographing, carefully remove the moths from the sheet. For example, hold a bowl under them and tap on the back of the sheet. Then leave the moths in a safe place between the bushes, otherwise they will be eaten by birds the next morning.

Moths are easy to photograph when they have landed on the sheet. After they have calmed down, they usually sit motionless for a very long time. They can be approached without any problems. You need to use a flash, otherwise the blue light from the UV lamp will influence the colors in the image.

A beautiful Swallow-tailed Moth on the sheet. 100 mm, 1/320 s, f/13, ISO 400, flash.

One problem is that in the image you always see the weaving pattern in the sheet. That looks unnatural. This is not a problem for identification of the moth, but if you want to take a nice picture, the sheet forms a less attractive background. The sheet also gets dirty quickly and there are many other insects on it. But you can try to move the moths to a better location (see below).

Sugaring

Not all moths are attracted to light. Other species of moths can be lured with the help of syrup. There are many different recipes for this. They usually consist of a combination of sugar or honey, fermented fruits and alcohol. Here's an easy recipe.

> Take a jar of syrup or apple syrup. Add two overripe bananas, a good splash of dark beer or wine and a few tablespoons of sugar. Heat it a little and mix it well to create a spreadable

substance. Add some rum for extra alcohol if desired. Leave it covered for two days (preferably in the sun) so that the bananas ferment.

An hour before sunset, spread the syrup at eye level on tree trunks or walls, in as dark a place as possible. The moths smell this syrup from a great distance and are attracted by it. As soon as it is dark, regularly use a flashlight to check whether moths have come to the syrup. The moths disappear after they have eaten enough, so you should check at least every half hour. Remember that not all moths are attracted to syrup. Some moths don't eat at all.

A close-up of a Small Clouded Brindle moth eating syrup through its proboscis. 100 mm, 1/320 s, f/13, ISO 400, flash.

Photographing the moths that are attracted to syrup is not easy. The moth is often difficult to distinguish from the background. Moths that are attracted to syrup are active and you cannot move them. It might be possible to solve this problem when editing the photo. But you can also take the shot from a different angle, for example from the side as in the image above. The dark background adds more contrast in the image.

Since the moth is in a dark place, it can be difficult to focus. The cameras autofocus needs enough light to work properly. It is best to illuminate the moth with a flashlight. I hold the flashlight in my left hand while supporting the front of the lens. This way I can direct the light beam at the moth and the camera can focus.

Light traps

Light traps are specially designed to catch moths. They consist of a large bucket with egg cartons in it. A hole has been made in the lid which contains a funnel. Above this is a UV lamp and a few sheets of transparent plastic. The moths are attracted by the lamp and fly around it. They bump into the sheets of plastic and fall through the funnel into the bucket. Here they hide between the egg cartons to sleep.

You can buy ready-made light traps at entomology specialist shops. You can also make a light trap yourself. For instructions search the Internet. Some light traps work with a power bank, and can be used anywhere you go.

Put the light trap outside at sunset. You can leave it outside all night, and in the morning, you can see which moths you have caught. Make sure that the trap is not in the sun in the morning, otherwise the moth can become very active, and it is difficult to view or photograph them. The light trap can also be placed on your balcony. If light rain is forecast, put the trap under a roof.

On the left the light trap I use. On the right a Gold Spot moth in the trap. 100 mm, 1/320 s, f/13, ISO 400, flash.

In the morning you can empty the trap but first look around the trap. Not all moths end up in the trap. Moths are often found on the ground or walls or trees near the trap. Then open the lid very carefully, otherwise the moths will wake up and fly away. Now remove the egg cartons from the trap one by one and see what's in them. Sometimes you are unlucky, and only a single moth is found, but on other days there may be dozens of moths in the bucket. It's always a surprise.

Photographing moths

Since moths often stay in the same place for a long time, there is plenty of time to photograph them properly. You can also get very close and photograph them at interesting angles. Of course, in the evening a flash with a diffuser is required, or a strong hand lamp.

As mentioned earlier, a sheet is not an attractive background for a photo. The same goes for the egg cartons in a moth trap. If the moth is fast asleep, you can try to move it. To do this, slide a sheet of paper or a branch under its front legs. The moth usually crawls onto it. Then put it on a larger piece of paper or on a different background. You can also photograph the moth on a branch from all sides, such as in the image of the Privet Hawk-moth at the beginning of this section.

Choosing the correct exposure is difficult if a moth is sitting on the sheet or if you have managed to get it on a piece of paper. The white background often makes the moth very dark. Best increase the flash compensation to +2 or even +3 to prevent this. But be careful not to make the white background too white. You can also correct the tone of the moth when editing the image.

The Elephant Hawk-moth, on the left between the egg cartons in the light trap, and on the right on a piece of white paper. Both shots 100 mm, 1/320 s, f/13, ISO 400, flash.

Nectar plants

If you have nectar plants for butterflies in your garden, you can easily photograph moths by inspecting these plants in the dark with a flashlight as moths are also attracted to these flowers. Some species arrive early in the evening, such as the Large Yellow Underwing below, while other species only appear in the middle of the night. They only stay put for a limited time and they are active, so approach them carefully. Keep in mind that there are also quite a few species of moths that do not feed at all, so you will not find them on the flowers.

A Large Yellow Underwing moth in the evening on a flower. 100 mm, 1/320 s, f/13, ISO 400, flash.

Acknowledgements

First, I would like to thank all the butterflies and dragonflies who were willing to act as a model and let me photograph them. You sometimes made it very difficult for me by sitting in awkward places or flying away just as I wanted to take the shot. But luckily, you regularly showed me your beauty and sometimes even let me get very close to take close-up shots.

This large Blue Emperor dragonfly could be photographed up close, unlike most of its peers. 400 mm, 1/350 s, f/8, ISO 500.

I often went out alone last year, but sometimes I was in the company of other photographers who also wanted to photograph butterflies and dragonflies. That was not only much more fun but together you also see more. I would therefore like to thank the members of the butterflies and dragonflies project group of photo club Kiekendief in Dronten. The members of the photo working group of the KNNV department Northwest Veluwe were also pleasant company during various trips. In particular, I would like to mention Ati Vijge who helped me find caterpillars and Dick Dooijewaard with whom I regularly lured moths at night.

Being a member of photo clubs gives you the opportunity to show your work to others and get feedback. In addition to the above-mentioned photo club Kiekendief and the KNNV department Northwest Veluwe, I would also like to thank the members of De Iris in Harderwijk for their enthusiasm and helpful comments.

I have shared many of my photos in (Dutch) Facebook groups about butterflies, dragonflies and moths. I would like to thank the many members of those groups for all their comments and likes, which stimulated me again and again to photograph more and better.

The employees of ON1 have created the ideal photo editing program for me with their product ON1 Photo RAW (https://www.on1.com/). While working on this book, new versions were released regularly. These made editing my photos easier and the results got better and better.

The Dutch Butterfly Conservation (https://www.vlinderstichting.nl/english) offers an inexhaustible source of knowledge about butterflies and dragonflies that I have regularly drawn on for this book. They also do a lot of work to protect the butterfly and dragonfly population in the Netherlands from decline and to slowly grow again. The website of www.waarneming.nl was also an important source of knowledge for me. The site has regularly helped me to identify the butterflies and dragonflies in my photos. The large numbers of volunteers who post their observations on this site helped me to find interesting places for my photography. Many thanks for that.

Many people have read and commented on earlier versions of this book. This has significantly improved the content. I would like to thank Dick Dooyewaard, Harm Bruins Slot, Marcel Gort, Wim Hamer, Diana Kemperman, Piet Rosendal, Ati Vijge, Gerda Wiegers and Corine de Winter who read the earlier Dutch version of this book. And I would like to thank Margaret Stevens and Mark McCormack for their useful comments on the English edition.

And finally, I would like to thank you for reading this book. A writer is nothing without his readers. I hope the book has helped you to take more beautiful pictures of butterflies and dragonflies, and made you enjoy insect photography as much as I do.

Butterfly and moth images

Images of the following butterflies and moths can be found in this book:

Dragonfly images

Images of the following dragonflies and damselflies can be found in this book: