

Macro Photography

From Snapshots to Great Shots

Learn the best ways to compose your pictures!



Get great detail in your subjects!



Rob Sheppard

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Peachpit
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I dedicate this book to my beautiful wife
whose support and love always keep me going.

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ISO 200 • 1/320 sec. •
f/11 • 300mm (MFT)

Introduction

Welcome to a Special World

Close-up and macro photography have become easier to do and more accessible for all photographers. Even point-and-shoot cameras often have a close-up mode, some allowing shots as close as an inch away from the subject. For the photographer with a DSLR, the options for close-up work expand greatly and are explored in this book.

One of the very cool things about close-up work is that it allows you to take a picture of a subject to see it better. We don't often get in close to the world and so many of the small details pass us by. Any close-up photo will show you detail that is largely unseen by all of us, and certainly if we only casually look at the subject.

This book will show you a whole range of techniques to truly take you beyond the snapshot and get you great shots. But I will warn you—this type of shooting can be addicting! Since you can do it almost anywhere, you may find yourself constantly discovering new subjects up close all around you, which can be frustrating if you don't have a camera nearby.

I want you to feel encouraged as you explore some amazing worlds of the close-up. Sometimes photographers feel inadequate next to more advanced photographers, feeling they need more knowledge, different gear, and so forth. While it is true that experience can help you with the craft of photography and with better realizing your vision as a photographer, you also can take wonderful close-up photos with whatever your skill level and whatever your gear. This book will offer some ideas to help you grow as a photographer of the details around us. But don't let anyone keep you from experimenting just as you are right now, even if you are still learning.

Do you know what the best gear is? The gear you have and can use right now. The gear that sits on "Someday Isle" isn't helping you right now, and it might never be useful to you. This book will tell you how to choose and use gear for close-up work and also what true macro gear might actually be.

I'm going to show you how to deal with sharpness challenges up close and offer some techniques so you can get images as sharp as the pros do. I'm also going to offer some ideas on why different focal lengths can be important for good close-up work, focal lengths you may already have but just need the right accessory to help you focus closer. In fact, sometimes a true macro lens can keep photographers from their potential with close work because it is only one focal length.

Light is of course critical to any photography, but there are some nuances to working with it up close. You will learn how different types of light affect the close-up subject and even how these nuances can affect how you photograph. Light can change the approach you need for close-up work. You'll also find some information on using added light up close, such as flash and LED lights.

Finally, I want to help you try your skills with all sorts of subjects, so I include a chapter on getting close to different subjects. You will find a variety of subjects scattered throughout the book in the photos I have chosen because I want to encourage you to engage with different subjects with your own photography. If you are in a location with an iconic scene such as a range of mountains, your choices for subject matter are somewhat reduced when doing landscapes. But with close-ups, your subject matter is unlimited. Without even leaving the parking lot, you could spend a great deal of time exploring the macro world around you.

Above all, I hope you have fun. We don't even have to change that Star Trek imperative to have it work without ever leaving earth! "Explore strange new worlds, to seek out new life ... to boldly go where few [photographers] have gone before."



ISO 200 • 1/80 sec. •
f/8 • 60mm lens (MFT)

4

Optimal Focusing

Focus point, depth of field, and sharpness

In the previous chapter I covered the first challenge, controlling camera movement during exposure, to achieve sharper photos. In this chapter I'll discuss the second challenge, focusing so that the shot makes sense to the viewer; and the third challenge—also related to focus—controlling depth of field when you're going close.

What is sharp in the image? Where should your sharpness be emphasized? How do you determine the best depth of field for a particular shot? These are challenges that all close-up photographers face.

Poring Over the Picture

Even though the tail is out of focus, it is still important to the composition.

Critical focus is on the eyes.

Depth of field is very limited, but that also creates emphasis for the image.

By not showing the ends of the wings, I can ensure that the viewer sees the face of the insect.



When you are this close to a subject, you had better be sure you are focused on the right part of it. This dragonfly was photographed early one misty morning. It was covered with water droplets so it could not easily fly. That allowed me to get close. Then I made sure the eyes were sharp because the eyes of any creature need to be sharp or the viewer will not see the photo as sharp.

● — The background is a pleasant soft green from shallow depth of field.

ISO 800 • 1/100 sec. •
f/8 • 60mm lens (MFT)

The Focusing Challenge

No matter what you do, your area of sharp focus is always going to be very narrow when you get up close. We're going to look at depth of field in the second section of this chapter, because there are some things that you can do to use depth of field effectively. Still, the closer you get, the shallower the depth of field becomes no matter what you do. This is a matter of physics, not about the gear or technique you use.

Figure 4.1

Notice how much of this photo is out of focus, yet people will perceive this shot as very sharp because the critical parts of the little katydid nymph are very sharp.

ISO 400 • 1/800 sec. •
f/3.2 • 90mm lens
(APS-C)

So your focus point becomes critical as shown in **Figure 4.1**. Very little of this image is actually sharp, yet you perceive it as a sharp photo because the important part of the image is absolutely sharp. You can't count on this to simply happen. You have to choose very carefully what should be sharp in your picture. If you miss the right focus point for your subject, your picture will look out of focus and not sharp even if you have done everything right and there is something in the picture that is sharp.

This can make all of your best efforts go to waste. I have seen photographers get very frustrated with this, so much so that they quit doing close-up work or they start buying additional equipment in hopes of solving this problem. This is not an equipment problem. As you'll see, it is a problem that can be made even worse by autofocus.



The key to getting your focus in the best place for your image has to do with one very simple thing—paying attention. You simply have to pay attention to where your camera is focused, what is most important in your picture, and what the photograph looks like.

For the digital photographer of today, that last point is really easy to deal with—use your LCD. This is a key part of a digital camera. Take your shot, then check the image in the playback on your LCD. You don't have to do this all the time, but if you are not sure about where the focus is in your picture, use that LCD. Newer cameras have very high resolution in their LCDs, which make this easier to do, but all cameras can help you if you simply magnify the image. Play back your image on the LCD, then magnify it over the point where it should be sharp to be sure that it is.

Here are some tips to help you determine the best point for focus:

- What is key to the composition? It should be sharp, as seen in **Figure 4.2**.
- What is getting the strongest light? Light has a big influence on what a viewer sees in a photograph. If light is picking out a part of your subject to emphasize, then that should be sharp.
- Are the eyes sharp? If you are photographing insects, spiders, or any other small critters, be sure that the eyes are in focus. People expect eyes of living beings to be sharp and if they aren't, the picture is considered to be out of focus, as seen in **Figure 4.3**.
- What is the boldest part of your subject that is visible in the image? If it is a bold part of your subject and emphasized by your composition, it needs to be sharp.



Figure 4.2 This tight shot of a yellow flower works because it is sharp where it must be sharp to support the composition.

ISO 200 • 1/2000 sec. • f/5.6 • 14–42mm lens (MFT)



Figure 4.3 This could be a very cool photo of a baby praying mantis, but it isn't, because the sharp focus is on its rear rather than its front.

ISO 400 • 1/100 sec. • f/11 • 90mm lens (APS-C)

AF and MF

Autofocus (AF) is a very important and totally valuable technology for cameras. However, it doesn't always work very well for close-up and macro work. That doesn't mean you can't use it for close-up work. I often do. But the challenge is that when you get up close, there are lots of things that your AF system can focus on, and it doesn't know the difference between one or the other, as you can see in **Figure 4.4**. As soon as AF finds something sharp, it's done! It doesn't matter if that is the best focus point or not, because your camera doesn't care. The camera only cares that it found something it can render as sharp.



Figure 4.4 There are so many “edges” in this image that AF could focus on, including the back eye and all of the edges of the leaves. MF was used for the shot.

ISO 400 • 1/60 sec. • f/8 • 180mm lens (APS-C)

With manual focus (MF), you deliberately focus your camera lens on a specific point within your scene. Because you are using MF, you are the one making the decision—the choice as to what should be sharp and what can be allowed to go out of focus. This does not mean, however, that MF is always the best way to go or that it is always going to be easy.

For MF, do a rough focus with your lens, then move your camera gently toward and away from your subject to refine your focus. This is a very effective way of ensuring that the key part of your subject is in focus. Things will snap in and out of focus in a much more obvious way than if you were to simply rotate the MF ring of your lens. (Obviously, you have to be careful that you're not bouncing your camera all around or you will have sharpness problems from camera movement during exposure.)

You can use this same idea with AF, but you have to be able to lock your focus. Get in close using your AF to get your rough focus. Next lock your focus and move your camera gently toward and away from the focus point until it looks sharp, then take the picture. All cameras will lock focus by default when you press the shutter button halfway (unless you have changed how the button functions in your camera's custom functions). Many cameras have a button on the back of the camera that is either programmed for locking focus or can be programmed for locking focus.

Regardless of how you lock your autofocus, it is important that you watch what your autofocus is doing when you are focusing up close. Pay attention to the autofocus points so that you know where your camera thinks it should be focusing.

The Focusing Rail

A focusing rail is a special accessory that fits between your camera and tripod head. It has a geared track with knobs that allow you to move the camera toward and away from the subject (there are even some models that allow side to side movement, too). This gives you precise control of moving the camera for focus while keeping the camera absolutely locked down tight to the tripod.

I have used this tool in the past, but not anymore. It adds a lot of bulk and weight to your gear—too much bulk and weight for me. I mention it because it can be a useful tool for the right photographer who is willing to carry this extra bit of gear.

Live View Benefits for Focusing

If your camera has Live View and you aren't using it, get out your camera and your manual to learn how to turn it on and start using it. Live View is one of the most important technologies in digital cameras for close-up and macro work.

Live View is simply the LCD display of what your sensor sees as it looks through the camera lens. If you are using a traditional DSLR, the camera mirror is locked up for Live View, so the lens is projecting the subject directly onto the sensor and the camera is then interpreting that look and displaying it on your LCD. If you are using a mirrorless camera, there is no mirror so what you see is always what the sensor sees.

Now you can literally focus on your sensor so that the sensor precisely captures what should be sharp (**Figure 4.5**). In addition, you get a very important aid to this focusing—you can enlarge the image on your focusing screen in order to more precisely focus your shot. Here's where you can use your MF and rotate your focus ring until this area is sharp because you have magnified the image to only see that.

Another benefit to Live View is seeing what your depth of field looks like. You have to set your camera to display the actual shooting f-stop. By default, to allow for more accurate focusing the camera shows you the wide-open, maximum f-stop of the lens, but most cameras allow you to set up a depth of field preview that shows up on the LCD.

When you start using Live View for focusing, you may find that it is challenging to do. Don't give up! This is simply something you have to practice, just like learning to ride a bicycle. Once you practice a bit with it, you will discover that it works for all sorts of subjects that you might not have expected.



Figure 4.5

Live View allows you to focus quite precisely by seeing exactly what the sensor sees and by enlarging the view.

The Depth of Field Challenge

Depth of field is the distance of sharpness in depth from close to far. It is not an on/off, either/or part of sharpness. Depth of field changes continuously from absolutely sharp to absolutely out of focus with a continuous range of nuances in between. With close-up work, it will be important how sharp the background appears, not necessarily whether it is actually sharp or not. Just because a background is out of focus does not mean it is unimportant. Also, deep versus shallow depth of field should never be an arbitrary decision. Choose what is appropriate to the subject and what you want from your photo, as shown in **Figures 4.6** and **4.7**.

No matter what you do, depth of field is always relatively shallow when you're up close. Because of this, many photographers think that they have to stop the lens way down to $f/16$ or $f/22$ in order to get a good picture. That's not true. In fact, that may cause problems for you that can reduce the possibility of you getting a great shot. Depth of field is a lot more than whether or not you shoot at $f/16$.



Figure 4.6 This image and Figure 4.7 have the same framing, but not the same composition. This prairie sunflower gains an emphasis in this composition through the use of shallow depth of field.

ISO 400 • 1/100 sec. • $f/2.8$ • 12–35mm lens (MFT)



Figure 4.7 In this image, greater depth of field gives more emphasis in the composition to the setting and environment around the flower.

ISO 400 • 1/6 sec. • $f/11$ • 12–35mm lens (MFT)

To fully understand depth of field, it is good to understand the three major factors that affect depth of field as you are shooting: aperture or f-stop, focal length, and distance to the focus point.

- **Aperture:** The aperture that you choose for a given shot has a big impact on depth of field. Small f-stops give more depth of field, while large f-stops give less depth of field. This gets a little confusing because of the way numbers are shown for apertures. A large f-stop will show as a small number such as $f/2.8$ or $f/4$. A small f-stop will show as a large number such as $f/16$ or $f/22$. The reason the numbers work like this is that they are actually fractions. Just keep this in mind: Small numbers mean small depth of field and large numbers mean large depth of field.
- **Focal length:** The next two chapters deal with focal length and close-ups with much more detail than I can give right here. However, it is important to keep in mind that wide-angle focal lengths give more apparent depth of field whereas telephoto focal lengths give less. This is one reason you see different focal lengths for macro lenses, i.e., choosing a different focal length changes the depth of field you get.
- **Distance to focus point:** Depth of field changes with your distance from your focus point, increasing as you get farther from your subject and decreasing as you get closer. In fact, as you move in closer to your subject, depth of field declines rapidly. When you are at true macro distances, there is nothing that you can do to get more than a fraction of an inch of distance that is sharp. This is a very good reason why you need to pay careful attention to where your focus point is.

Looking at Depth of Field Changes

In the photos you see in **Figure 4.8**, the basic composition does not change, but the choice of aperture does change, which then affects how you see the composition. This is an important exercise for photographers to do if close-up and macro photography is something they really want to get better at. Doing this at least once to get a better feel of the craft of choosing an f-stop will teach a photographer more about depth of field than anything else I know.

The difference in depth of field, and the look of the background, is quite dramatic when you compare the widest f-stop at $f/2.8$ to the smallest at $f/16$. However, if you look closely, you'll see there is a change in the relationship of the subject to the background with every change in aperture.



Figure 4.8 This series of images of a little wishbone bush flower changes only in the aperture used. Notice how the depth of field changes; compare not only the extremes, but also the more subtle, yet still important, changes from f-stop to f-stop.

ISO 200 • f/as shown • 1/varies depending on f-stop • 60mm lens (MFT)



One time when I was writing for a photography magazine many years ago, I wrote about changing your f-stop to affect the appearance of the background and how even the change of a single f-stop could make a difference. The editor got an angry letter from a reader that said I didn't know what I was talking about because it was only if you change from a very wide f-stop to a very small f-stop that you would actually see any difference. Obviously he had never done this exercise! Those differences from f-stop to f-stop can be very important to an image because they affect emphasis within a composition as well as whether a background is distracting or not.

So how do you know what aperture to choose? First, you need to consider if deep or shallow depth of field is more important for your subject. Second, take the picture and look at the image on your LCD. Take two or more and change the aperture if needed. With practice, you will start to see differences that matter as you change your aperture.

Using Deep Depth of Field

Since depth of field is always shallow close-up, using the adjective "deep" for depth of field might be pushing it a bit. Still, sometimes it is appropriate to use deep or at least deeper depth of field than others.

Deep depth of field allows you to emphasize relationships among details of your subject because you're able to see more of it in focus. It also allows you to create relationships between a subject and the background because now you'll actually be able to identify elements in the background (even if they are not sharp). Deep depth of field can tell your viewer whether a mushroom clump is growing in a pine forest or a maple forest because of what shows up in the background, as shown in **Figure 4.9**.

Figure 4.9
By using a wide-angle lens and a small aperture, I was able to connect this clump of mushrooms to its environment.

ISO 200 • 1/13 sec. •
f/11 • 12–35mm lens
(MFT)



This is also about composition. Many photographers think that composition is only about what is framed within the viewfinder or on the LCD. Composition is much more than that. It is also about emphasis and depth of field, which strongly affect emphasis.

When you get really close, deeper depth of field can simply help you capture more of the subject in focus. When your subject is significantly bigger than the shallow depth of field of a close shot, even just a little deeper depth of field can help the viewer better identify what the subject is and what the picture's about.

Something you really need to keep in mind about deep depth of field is that as you allow more things to become defined by sharper details, you are also encouraging your viewer to look at them. That's great if you want them to look all around your picture and not just at your subject but it can also be a problem if you don't. Think carefully about why you might want deep depth of field and then check your LCD to make sure that that's really what you expected.

Using Shallow Depth of Field

Shallow depth of field is very easy to get when you're up close because you don't get a lot of depth of field anyway. However, to really use shallow depth of field effectively, you need to go beyond thinking that an out-of-focus background is enough. As you can see from Figure 4.8, sometimes even a slight bit of depth of field can be too much if you're trying to isolate and emphasize your subject.

Shallow depth of field is really useful in doing exactly that— isolating your subject within the photograph. There is no question that when your subject is sharp against a very blurred background, you're helping your viewers see exactly what you want them to see, as shown in **Figure 4.10**.

There are no distractions of sort-of-sharp things in the background to attract the viewer's eye.



Figure 4.10 By shooting with my lens wide-open at its maximum aperture of $f/2.8$, I could create a simple, beautiful background to isolate my subject, a daddy longlegs.

ISO 400 • 1/125 sec. • $f/2.8$ • 60mm lens (MFT)

Beautiful soft backgrounds also come from using a shallow depth of field. This is most pronounced when your background is most out of focus. Since distance affects depth of field, one way that you can ensure that your backgrounds are strongly out of focus is to move your camera position so that anything behind your subject is farther away.

For example, photographers often photograph flowers pointing their cameras down at the flower at a 45-degree angle. When you do that, the background is fairly close to your subject and will show up even when depth of field is limited. If you drop your camera position to a lower angle, often the background will now be much farther behind your subject. That immediately creates a softer background that can contrast nicely with your subject.

Aperture Priority AE

Because depth of field, both shallow and deep, is so important to close-up and macro work, most photographers find that Aperture Priority Autoexposure (AE) is a good way to go for exposure. You will find that a lot of pros (like me) use this almost exclusively (with occasional uses of manual exposure). With this, you choose the aperture for depth of field and the camera sets the appropriate shutter speed. A caution: Pay attention to the shutter speed being chosen by the camera. Remember that shutter speed has a big impact on sharpness because of camera movement challenges during exposure.

The Diffraction Problem

Small apertures have a problem that many photographers are not aware of. If you are arbitrarily stopping your lens down to $f/22$ or smaller so that you get more depth of field, you may actually be reducing the sharpness of your photograph.

What happens is this: As apertures get very small, the rays of light coming through the lens bend or diffract along the edges of the diaphragm blades that make up your lens opening. This diffraction softens sharp edges so that the picture starts to lose its sharpness, image brilliance, and contrast. This gets worse as you focus closer. You can see the effect of diffraction on sharpness in **Figure 4.11**, which shows details of the scene shown in **Figure 4.12**.

All lenses are affected by diffraction through small f -stops because this is an optical issue due to the physics of light, not to any lens quality issues—but there is no way to make a blanket statement about diffraction problems for a particular f -stop. This depends on the lens and especially the focal length. The only way that you can know what your lens will do at small f -stops is to do some tests.

For this reason, if I don't absolutely need the smallest f -stops, I will often shoot at $f/8$ or $f/11$. On some lenses, I don't have any problem stopping down to $f/22$, but I have also owned lenses where the change from $f/16$ to $f/22$ was so significant that I never used $f/22$.



Figure 4.11
This piece of petrified wood made a nice test subject to look at the diffraction effect on a 12–25mm lens with extension tubes. This is the entire shot.

ISO 200 • 1/100 sec. •
f/8 • 12–35mm lens (MFT)

Figure 4.12 This series of images shows a detail of the original shot from Figure 4.11. The middle range at f/8 is definitely sharpest, and f/22 takes a serious hit in sharpness.



Focus Stacking

Focus stacking is a unique digital way of dealing with depth of sharpness independent of traditional ways of dealing with depth of field. With this technique, you shoot a series of pictures as you change your focus point from near to far (near to far will depend on what your subject is), then you bring those images into the computer and use software to combine the shots into one image with deeper focus.

I used this technique for a shot of a green lynx spider just after it molted its old skin (**Figure 4.13**). Both spider and old skin are sharp. This would be impossible with just one shot. I shot several images, changing the focus slightly each time, to be sure the spider was sharp in at least one image and its old skin was sharp in another. Then I combined them in Photoshop to give a great range of focus without making the background too sharp. Luckily, there was no wind and the spider was resting after its molt.

I don't do this a lot because it is challenging and time-consuming. Your camera has to be locked down and the subject can't be moving. You need to change your focus point quickly through a series of shots that can be used in the computer later. David FitzSimmons is a master of this technique and uses it extensively in his *Curious Critters* series.

If you have Photoshop, combining the shots is fairly easy to do. There is also some dedicated software to help simplify this process. The actual techniques are not within the scope of this book, but you can learn about them by Googling focus stacking online.



Figure 4.13 Focus stacking made this shot of a green lynx spider just after it molted its old skin possible.

ISO 200 • 1/80 sec. • f/10 •
60mm lens (MFT)

Chapter 4 Assignments

Try the aperture roundup

One thing you can do to give yourself an advantage over most other photographers is an exercise that gives you a more intuitive feel for f-stop choice. Set up your tripod with camera and lens focused on a close-up subject that won't be moving and that has lots of stuff in the background behind it. Set your lens to manual focus so that the focus never changes off of the same spot on your subject. Do a whole series of photos as you change your f-stops from the widest aperture possible on your lens (such as $f/2.8$ or $f/4$) to the smallest (such as $f/22$).

Test for diffraction challenges

Here's an exercise that is easy to do, but that most photographers have never done! Check out how well your lens or lenses do with diffraction effects. Set up your camera on a tripod, with the lens focused on something with good detail and something that won't change position (this could be a magazine or newspaper page). Be sure your lens is manually focused. Then try a series of shots starting at $f/11$, then $f/16$, next $f/22$, and then any smaller apertures your lens might include. Compare the shots on your computer screen, enlarging details as needed.

Go for deep detail

Set your lens to $f/16$ (using a wide-angle or at most slight telephoto focal length—not a strong telephoto), then take at least 20 photos in a row of varied close subjects where you deliberately try to include environment in the background. Use your LCD to help you refine your shots, always watching what is happening to the details in the background.

Isolate your subject

Set your lens (not using a wide-angle focal length) to its maximum aperture (the lowest number f-stop), then take at least 20 photos in a row of varied close subjects where you now deliberately try to isolate the subject from the background. Move your position as needed to increase the distance between subject and background. Again, use your LCD to help you refine your shots, always watching how the background appears.

Share your results with the book's Flickr group!

Join the group here: https://www.flickr.com/groups/macro_fromsnapshotstogreatshots/

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