

# Close Up & Macro Photography

Follow-Up to Macro Evening

Thursday, 1<sup>st</sup> November 2012

Bury St Edmunds Photographic Society  
November 2012

# Macro & Close Up Photography

## Definition.

The definition of macro is “Extreme close-up photography, where the size of the subject on the negative or image sensor is life size or greater”.



Coin filling 35mm frame

## Equipment Options for Macro.

1. Macro Filter/Adapter.
2. Extension Tubes on Standard Lens.
3. Reversing Ring.
4. Macro Lens.

### Macro Close Up Lens Filter/Adapter.

A close-up filter is one that attaches onto the end of a camera lens via a screw thread. The purpose of the filter is to decrease the minimum distance that a lens requires to focus.



Close up Filter

Close-up filters are measured in Dioptre, with +2 being weak and +10 being strong. A dioptre is a measure of the lens power. Filters can be stacked.

Price. Typically £80.00 for a 58mm Close Up Filter Set including +1, +2 and +3.

*Pros.* Relatively low cost way of getting into close up photography.



Canon 18-55mm Lens +3 Close up Filter

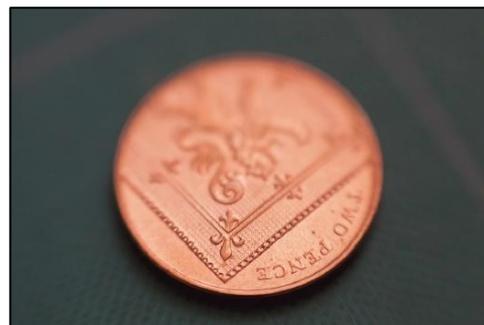
*Cons.* The quality will not be as good as the other options with colour aberration and distortion. The greater the magnification, the greater the colour aberration and distortion. Unless you have several lenses with the same filter thread you will need to decide which of the lenses you will use the close up filter with.

### Extension Tubes on Standard Lens.

An extension tube is a hollow light-tight tube that fits between the lens and the camera body. It moves the lens further away from the camera and the front element closer to the subject. The closer you can focus the more magnification you get.



Canon 85mm Lens



Canon 85mm Lens with 65mm Extension Tube

# Macro & Close Up Photography

Extension Tubes can be purchased with or without electronics. Without electronics the price is typically £15 - £20 but all the adjustments have to be made manually. It is possible to purchase Extension Tubes from the likes of Canon and Nikon however a much more cost effective option is to use Kenko, who provide a set of three with electronics for approximately £140. With the electronics the camera can control the lens.



Kenko Extension Tube

*Pros.* Image quality is excellent as it is down to the lens. Cheaper than purchasing a macro lens. Using a 50mm standard lens with Extension Tubes is lighter weight than say a 105mm a macro lens.

*Cons.* Unlike with a macro lens that can be used for other work e.g. portraits and will allow focusing to infinity, the range of focus with extension tubes can be very restricted.

## Reversing Ring.

Reversing Rings are probably the least expensive way to create a pseudo macro lens. They allow you mount a lens using the filter thread on the front of the lens.



Nikon Camera with Reversing Ring



Nikon Camera with reversing Ring fitted



Reversing Rings cost as little as £3.00.

# Macro & Close Up Photography

Obviously with the lens on the camera the 'wrong' way it means that there is no connection between the lens and camera body by way electronics.

It is possible to connect the electronics on a Canon with a Novoflex EOS RETRO Reverse Adapter however these cost circa £260. Not much short of the cost of a dedicated macro lens.



*Pros.* Very low cost.

*Cons.* Lens/Camera combination is vulnerable as the filter threads on the lens are not designed to take the weight of the lens/camera. No electronics unless an expensive adapter is used.

## Macro Lens

A true macro lens enables you to reproduce your subject at 1:1 life-size on your sensor. Most macro lenses have a fixed focal length ranging from 50mm to 200mm, (aka 'prime') optics and they can be used for general photography.

### Short Macro Lens (30-50mm)

Shorter lenses are primarily designed for smaller sensor cameras. Shorter focal lengths mean greater depth of field, which can be worked to your advantage. The disadvantage is that you have to get closer to your subject, which means shooting skittish subjects such as butterflies is a challenge. You also have to take care that your lens does not block the light source because you may be working at only a few inches to get the 1:1 magnification.



Canon 60mm Macro Lens

### Typical Prices

Canon EF-S 60mm f/2.8 USM Macro Lens - £350.

Sigma 50mm f/2.8 EX DG Macro Lens - £270.

Nikon 40mm f/2.8 G AF-S DX Micro Lens - £200. Note Nikon refer to macro lenses as 'micro'.

### Standard Macro Lens 60 – 100mm.

This is the most common focal length for macro lenses and provides a more comfortable working distance of between 9 – 12 inches for 1:1 macro (depending on which focal length you are using), and in most cases are well suited to portraits, since the focal length is more flattering when photographing faces.



Canon 100mm Macro Lens

# Macro & Close Up Photography

## Typical Prices

Canon EF 100mm f/2.8 USM Macro Lens - £430.

Nikon 85mm f/2.8 G ED AF-S VR DX Micro Nikkor Lens - £380.

Sigma 70mm f/2.8 EX DG Macro Lens - £370.

## Tele Macro (150 – 200mm)

With a working distance of a foot and a half to two feet for 1:1 magnification, tele-macro lenses let you get up close to the hard-to-reach subjects and skittish creatures who don't want you to invade their space. These lenses are generally pricier, require larger filters and are somewhat bulkier than standard Macro lenses.



Canon EF 180mm Macro Lens

## Typical Prices

Canon EF 180mm f/3.5 L USM Macro Lens - £1,240

Nikon 200mm f/4 AF Micro Nikkor Lens - £1,200

Sigma 150 f/2.8 EX DG OS HSM Macro Lens - £700.

*\*The above content was provided courtesy of Peter Hrebien.*

## The Challenges with Macro Photography.

Assuming that you have some suitable equipment the main challenge with macro photography is the depth of field and focusing. Depth of field varies with aperture. The following table gives the depth of field v aperture for a Canon cropped sensor and a full frame camera using a 105mm macro lens:

105mm Aperture	Subject Distance 150mm		Subject Distance 300mm	
	Cropped Sensor	Full Frame	Cropped Sensor	Full Frame
f/2.8	0.22 mm	0.34 mm	0.87 mm	1.37 mm
f/4	0.31 mm	0.49 mm	1.25 mm	1.96 mm
f/5.6	0.43 mm	0.69 mm	1.75 mm	2.74 mm
f/8	0.62 mm	0.98 mm	2.50 mm	3.92 mm
f/11	0.85 mm	1.35 mm	3.43 mm	5.39 mm
f/16	1.24 mm	1.96 mm	4.99 mm	7.84 mm
f/22	1.71 mm	2.96 mm	6.86 mm	10.78 mm
f/32	2.48 mm	3.92 mm	9.93 mm	15.86 mm

You have just about everything conspiring against you. You need a small aperture to get the largest depth of field but then you need a lot of light on the subject because you have a small aperture. When you use a small aperture such as f/22 or f/32 diffraction comes into play so the lens will not be at its sharpest. Focussing is also an issue as the depth of field is so shallow that the slightest movement, if you are hand holding is going to put the subject

# Macro & Close Up Photography

out of focus. With large subjects such as butterflies getting all of it is a challenge especially as they can be pretty skittish.

## Useful Equipment.

Tripod.

Essential, especially for static subjects. A tripod that has an adjustable arm is particularly useful as you can adjust the arm to make into a boom to get the camera close to the subject. Some tripods you can reverse the centre column so the camera goes below allowing you to get the camera right down to ground level. Tripods that allow the legs to be adjusted out thus lowering the camera are of great benefit especially if you are using the centre column as a boom arm.

Remote Release.

It goes without saying that a remote release is an important part of the kit as with static subjects and a small aperture you are likely get into some slow shutter speeds. If you don't have a remote release you can use the timer on the camera and set it to say 2 seconds.

Lights.

For static subjects lights are essential. You can now purchase LED (Light Emitting Diode) lights that are very bright and run off four AA cells. You can buy LED lights from the mainline photographic suppliers but they will not be cheap. [www.7dayshop.com](http://www.7dayshop.com) is worth checking out these are circa £19.00 each. They can be stacked or more useful to place them on opposite sites of the subject.



Flash

The alternative to LED lights is flash. The issue with flash and macro is that you need to get the flash unit off the hot shoe as when you get close to the subject the lens will put the subject in shadow. Needless to say a flip up flash on a DSLR camera is not much use.



Nikon Macro Flash

Getting the flash off the hot shoe either means using a wireless

trigger or the built in flash as the master and the separate flash gun as the slave, or you can purchase a cable that connects the flash to the hot shoe. By far the better option is to use a flash mounted on the end of the lens itself. Nikon make a macro flash that comprises of two of their smaller flash guns mounted on a bracket that attaches to the lens. Obviously these are not cheap being Nikon. The alternative is a Ring Flash and several companies make these including Canon, Sigma, Sunpak and Nissin. Some such as the Nissin comprise of two flash tubes that can be controlled independently so that you have control of the light on each side of the subject. The Sunpak is complete ring so that if you get the highlight in the eye of the subject it will



Nissin Ring Flash

# Macro & Close Up Photography

appear as a complete ring as opposed to two halves with a small gap in between. Such Ring Flash Guns are in the £275 - £350 price range.

## Reflector.

Whilst on the subject of adding light to the subject a simple and low cost method is to use a reflector. It is possible to purchase a reflector that attached to the lens although I could believe that this could easily get in the way especially if trying to get in close.

A reflector does not have to be mounted on the lens and could used to the side to push light into the subject.

## Macro Rail.

As can be seen from the table above that shows the depth of field it can only take a very small amount of movement to put the subject out of focus. Macro lenses that include vibration reduction or image stabilisation can help considerably especially if the camera is set to continuous focus, for subjects that move or fly away. When you have static subjects and you have plenty of time to compose the shot it is better to move the whole camera and lens either closer or away from the subject to get the subject in focus. This is where a macro rail comes in very useful. The rail mounts to the tripod and the camera to the adapter on the macro rail. You can then move the camera not only towards and away from the subject but also to the side using a vernier type adjustment. This allows for very precise adjustment. These cost around £60 depending upon the manufacturer.



Velbon Macro Rail

## Wimberley - The Plamp.

The Plamp is an umbilical arm which can be used to hold macro subjects and other useful objects. One end of the Plamp clamps to your tripod while the other grasps the object. The Plamp is very useful when trying to take close up pictures of plants etc. when the wind is blowing or keeping vegetation out of the shot, when you have forgotten your scissors. It is not designed for holding creatures whilst you photograph them - they don't like it! Like anything from Wimberley it is not cheap for what it is at circa £30. An extension is available to extend the length for £7.99.



Wimberley - The Plamp

## Rolson Helping Hand

As demonstrated by Jo, a very useful and inexpensive tool is the Rolson Helping Hand. Comprising of a heavy stand with a bar and crocodile clips it is a very useful tool for holding the subject whilst you photograph it.



Rolson Helping Hand

# Macro & Close Up Photography

Obviously not live subjects! The Rolson Helping Hand is available from the discount shops for typically £2.99. Probably one of the cheapest photographic accessories you can get.

## Knee Pads

With macro photography you are invariably going to spend time on your knees, or even lying down. Another very useful and cheap accessory is knee pads. Good old Rolson do a very nice pair of knee pads for about £6.00 or £3.00 via EBay. If you are old though, the problem isn't getting down, gravity takes care of that, it is the getting up!



## Ground Sheet or Linpix Photography Mat.



It is useful to have a groundsheet or similar to put down on the ground to save you getting damp. You could of course use a ground sheet that you would use for camping, or you could splash out on a Linpix Photography Mat. These roll up conveniently and can be attached to your photography bag or simply hang on your belt.



## Angle Finder/Pull out Viewfinder.

Whilst on the subject of getting down on the ground, many of the subjects will be at ground level and if you want to get the camera down to the level of the subject then you are likely to encounter an issue whereby you cannot get your eye to the viewfinder unless your camera is fitted with a pull out screen that can be



Canon Angle Finder

rotated through 90 degrees. In this case an Angle Finder can be of use, although these are somewhat expensive if the camera manufacturer own brands are used at circa £225.

An alternative if your camera is equipped with Live View is to use a product such as the Hahnel Liveview, which connects to the video out on the camera and sends the image to a receiver via wireless. Controls on the receiver allow you to press the shutter button remotely.



Hahnel Liveview

## Light Tent

A fairly inexpensive accessory if you are looking to do close up & macro photography, especially if you are into selling small items on EBay is a Light Tent and set of lights. This is a portable photo studio kit which can be folded up into a neat carry case that in size is similar to a standard laptop carry case. Wherever you go,



Light Tent & Lights

# Macro & Close Up Photography

the kit is an excellent carrier for photographing all those small items in great detail, such as for phones, jewellery, insects, watches and just about anything which fits within the confines of the studio.

Enclosed by velcro strap, it easily folds out from the carry case and can be quickly setup to form a complete square house. They typically come with 4 different coloured backdrops, 2 working lights and a metal camera stand which can be adjusted in all directions or pushed forward to give close up views by using the macro function on your camera. On EBay Light Tents range from £25.00 upwards.

The lights are typically 35 watt halogen therefore they will give off some heat and they do of course require power. If you already have lights then the likes of Wex sell Light Tents. I bought one two years ago and I have not taken it out of the plastic bag! They are very useful, I am told!

Ok in case you are wondering, most of the text above for the Light Tent was compliments of EBay.

## **Technique.**

Your technique will largely depend upon your kit and the subject. Static subjects are easy as you have plenty of time to compose the picture and get the lighting right. I would always recommend the use a tripod or find some way to fix the camera, which could be a beanbag. I would also use a remote release. I would try and put plenty of light on the subject so that I can use a small aperture to get as much of the subject in focus. As the subject is not moving you can afford to use a slow shutter speed. If the shutter speed gets below 1/30 sec consider using the mirror up feature if you have that on your camera. This should stop any movement of the camera caused by the mirror operating known as 'mirror slap'.

As for focusing, you would naturally use the view finder to set the focus. If you have live view and you can zoom in then this is an excellent way of getting the focus spot on.

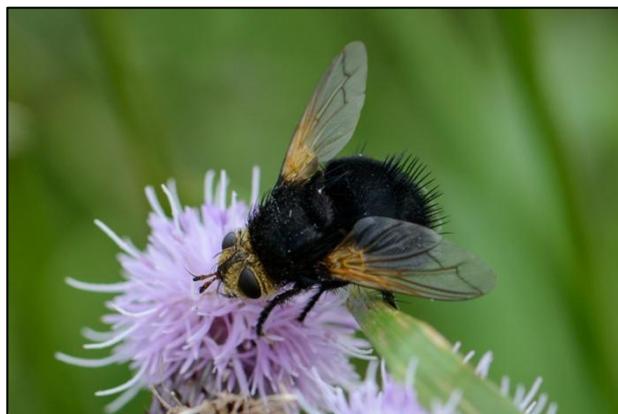
The real challenge is subjects that move or fly away. This is when it pays to know your subject and its characteristics. Insects generally don't like the cold and are less likely to move when it is cold. Subjects that are mating often are less concerned about performing for the camera as their minds are on other things. Using a tripod is not normally an option for subjects that can fly, unless it is cold, as by the time you have set the tripod up that have buzzed off, literally. Where a tripod can be of use is where the subject returns to the same perch. Dragonflies are a good example, and if you can believe Jo, talking to them helps as well.

Butterflies are also a challenge for two reasons; firstly they can fly and often do so when you approach them and secondly, they pose a challenge in respect of depth of field. The wingspan of a butterfly can be anything up to 2 inches in this country and considerably more in other countries. If the butterfly has its wings open then you need to try and get them parallel to the film or sensor plane thus minimising the distance front to back distance. Again cold is good, as is letting them come to you. With the resolution we have on modern

## Macro & Close Up Photography

digital cameras I would always recommend taking shots before you get in too close. You can always crop in post processing and still end up with a reasonable picture.

Getting the focus somewhere near and then moving your position slightly towards or away to get the actual focus point is probably better than trying to manually focus or use auto focus as unless you are resting the camera on something you will no doubt be moving and then you are trying to adjust for that the same time. Doing this I would take a number of shots in the hope that one will be in focus. You can easily delete the duff ones. For the Tachinid Fly opposite, I probably took 10 images to get two that were reasonable.



Tachinid Fly

Another useful thing I have found is to remove the lens filter if you have one fitted. I have found the images to be sharper without the filter. You can always put it back on afterwards and if you have a lens hood that will provide adequate protection.

### Focus Stacking

Another technique to overcome the challenge of depth of field is to use Focus Stacking. Most are familiar with HDR whereby you take three or more pictures of the same subject at different exposures and then combine the correctly exposed parts of each image into one composite image using software such as Photomatix. Several cameras now have HDR built into them, including the iPhone. Focus stacking is similar in that a number of pictures are taken of the same subject at different focus distances with the aim of creating an image with a much greater depth of field than could be achieved with a single shot. Using computer software the sharpest parts of all of the images are combined into one image.

As with HDR it is pretty important that the subject does not move otherwise the result will contain some blurred parts or ghosting.

A trawl of the Internet will result in a number of applications/software packages that are designed to facilitate Focus Stacking. These include:

- Adobe Photoshop CS5/6 - Proprietary
- Combine ZP - Free
- Extended Depth of Field – Free for research purposes
- Helicon Focus - Proprietary
- Tufuse - Freeware
- Zerene Stacker – Proprietary

There are two stages to Focus Stacking just as there is with HDR:

Stage one is to take a series of shots of the subject with the focus point at different parts of the subject. Think of it as taking a number of slices. To do this you need have the camera very steady,

# Macro & Close Up Photography

which normally means a tripod. To take the multiple shots with different focus points you can either do this by hand, in which case it is important not to move the camera when adjusting the focus and pressing the shutter, or if the camera permits you can hook it up to a computer that has suitable software and let it take the shots for you. The number of images that you need to take will depend upon the distance front to back and the aperture and hence depth of field that you have available.

Stage two is to process the images. This does require a computer and suitable software. If it is a case of having a play, then any of the free packages should do the trick. If you intend to do a lot of focus stacking then it will probably be best to purchase a software package. The software will analyse each image or slice and combine the sharpest parts into one image that contains the sharpest parts of all images.

I did experiment earlier in the year with NKRemote to control the camera and CombineZP. NKRemote is software that allows you to hook up a Nikon using the cameras USB port and control it from the computer via its USB port. NKRemote does cater for focus stacking i.e. taking multiple images and adjusting the focus but it does not do the image processing to 'stack' the images. CombineZP does the stacking and worked reasonably well although there were some strange artefacts at the front of the stacked image, but given that it is free it was pretty good.

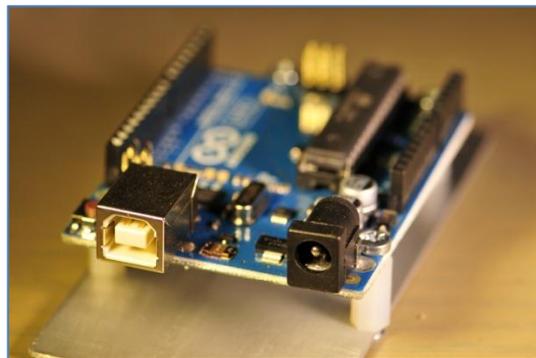
The software that I demonstrated was Helicon Remote and Helicon Focus. Helicon Remote controls the camera again via the USB ports and Helicon Focus does the stacking. As was demonstrated, it is pretty easy to use and simply involves clicking on the nearest part of the subject using the live view on the computer screen, storing it and then repeating the exercise on the further most point and storing that. You select what aperture you require and the software then calculates how many pictures or slices that it needs to take. Clicking that start button causes the computer to set the focus for the nearest point, take a picture then adjust the focus for the next point and take a picture and so on until all images have been captured. The software then invites you to open Helicon Focus. Doing so then presents you with the option to process the images. Having done this it is a case of sitting back and watching the action happen.

There are some good demonstrations on the Heliconsoft website.

<http://www.heliconsoft.com/>

If anyone member of the Society is interested in purchasing Helicon Focus, Heliconsoft have offered us a 15% discount on their regular price of \$200 for the Helicon Focus Pro, which comes with Helicon Remote. If anyone is interested, please let me know and I will provide you with the code.

Focus stacking is not just limited to close up or macro. It can be used with landscape photography where you want to have something in the foreground in sharp focus along with the distance objects.



Individual Shots - Shallow DOF



Stacked Focus - Sharp across Whole Image

# Macro & Close Up Photography

In this case you would probably need only to take two shots, one with the foreground in focus and the other with the distance objects. The Helicon website shows an example of this.

General Comment.

Close Up and Macro photography can be very rewarding but also very challenging. When it comes to plants and insects macro photography provides a fascinating insight into another world. The fact that a fly can fly and has computing power and muscles etc. to do so is truly amazing and surely demonstrates that we have along way to go as yet in the macro world of flying. I once knew a photographer who said it was his ambition to photograph the eye of a bee so that it filled the whole of a 35mm frame and had every part in focus. That was in the days before digital. I went some way to doing this earlier this year when I was cleaning out a nest box and found three bees that were obviously cold and were very slow moving. I had time to get my camera, attach the 105mm macro lens with the 2x converter and also attach the ring flash. The result I got can be seen opposite, but it does demonstrate the very shallow depth of field, so it will not be appearing in the Natural History competition.



If you have any tips on Close Up/Macro photography, please send them to me so that I can update this document such that they can be shared with others.

John Lord  
Secretary  
Bury St Edmunds Photographic Society  
November 2012  
Mobile: 07973 202078  
Email: [lord.j@btconnect.com](mailto:lord.j@btconnect.com)