

Lighting for Macro Work

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A number of technical difficulties need to be overcome when shooting up close. Primary among these is light, or lack thereof to be more precise. For a start, often the subject matter that interests macro photographers can only be found under bushes or other shadowy recesses or, I'm referring of course to insects here. If there is an abundance of daylight over the subject, then they are likely to be extremely active and photographing them takes on new dimensions of perseverance and patience. Then comes the issue of the lens that is used. Because of the extremely close-focusing that is required for macro lenses to reproduce the scene at a ratio of 1:1 (the subject is reproduced on the focal plane at exactly the same size as it is in life – there is no magnification or reduction in size to the original) only a sliver of the subject will fall within the depth of field of the lens at any given aperture (see box). Moreover the choice of focal length at such great magnification has a negligible impact on the depth of field, so opting for a wider angle macro shot will only affect the background and working distance, not the depth of field. To be able to get anything near the actual width of an insect (a praying mantis for instance) requires extremely small apertures. This in turn



necessitates the use of auxiliary lighting.

The problem with using flash is that it is not a particularly attractive or natural looking lighting source when used on its own. Although, to be fair, flash lighting, even when modified, isn't exactly 'natural'. The other option is to increase the ISO in order to obtain higher shutter speeds. However, this increases digital noise in the photograph. As good as modern day cameras are at shooting in the near dark thanks to

To be precise about the amount of depth of field for a macro lens and aperture combination at a reproduction ratio of 1:1

F2.8 – 0.28mm
F4 – 0.4mm
F5.6 – 0.56mm
F8 – 0.8mm
F11 – 1.1mm
F16 – 1.6mm
F22 – 2.2mm
F32 – 3.2 mm
F45 – 4.5mm

$$\text{Total Depth of field} = 2fC(M+1)/M^2$$

C = diameter of the circle of confusion which here is 0.025mm as calculated for a 35mm frame.

F = aperture setting

M = magnification where life size (1:1) is equal to 1

increasingly higher ISO abilities, if you are shooting professionally you will often need the highest image quality (IQ) possible. That means you will be shooting in the lower ISO regions, once more pushing the shutter speed down.

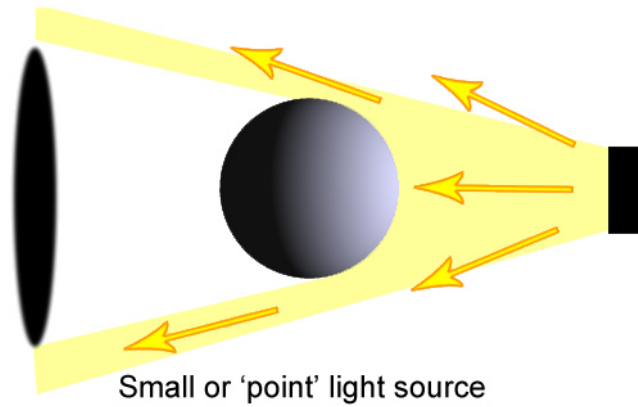
Thus, auxiliary lighting is a necessity for high quality macro photography. As mentioned above, straight flash does not produce the greatest of results, so the answer is either to use a specialised macro photography rig or to modify the light in some way.

To look at a specialised lighting setup first. A number of camera manufacturers as well as independent flash manufacturers create special lighting units for macro photography. A popular choice at the moment for Nikon users is the SB-R1 lighting kit which consists of two small SB200

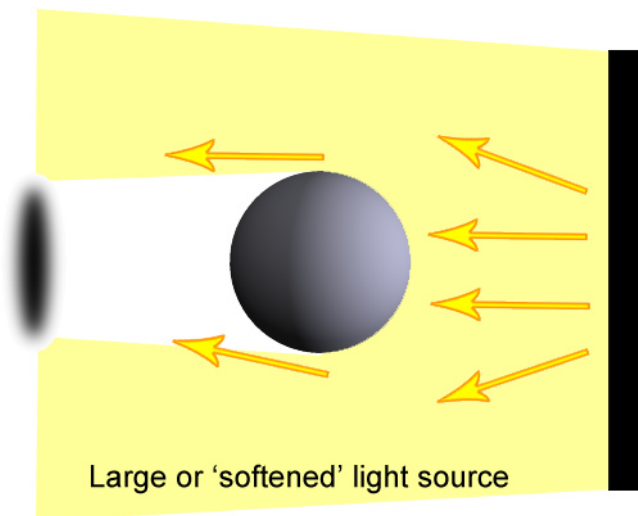


This unit enables the photographer to throw light onto subject directly in front of the camera. It is a variation on the older 'ringflash' units that were essentially a flash tube that attached to the front of the camera lens so as to produce a shadowless light onto the subject. The use of two flashes recognises that many photographers don't actually want shadowless images. Units like the SB-R1 are extremely versatile, but pricey. They also do not overcome the problem associated with the size of the light source itself.

Studio photographers are well aware of the impact on lighting that the size of the lightsource has. The myriad number of light modifiers from umbrellas (both reflecting and shoot-through), bounce cards and softboxes are testament to this. The softbox in particular is used to create a large soft lightsource that has a sort of wrap around effect. The premise behind the softbox is quite simple. A small light-source is considered 'hard' because of the nature of the shadows that it throws.



Note: The larger the light source the more light that can shine on the three dimensional subject. A small light source casts light on a smaller area thereby creating harsher shadows.



The large light source softens the shadows on the subject and creates softer, smaller shadows behind the subject as lightsource is bigger than the subject itself. With a large enough light-source it is possible to predict that the shadow would be soft and small enough as to be almost indiscernible .

I like to approach my macro subjects much like I would approach studio photography. This means moving and modifying the light source around the subject rather than fixing it to the lens. Studio lighting can use simple one-light setups through to multiple lights situated in various positions around the model. To this effect I find that studying studio lighting setups is actually extremely productive in visualising lighting for macro photography.

Simple studio lighting can consist of a single flash positioned away from the camera. When two flashes are used one flash is usually used as the primary light source, while the second is used for fill light (to put some light into the shadows cast by the primary light). The specialised macro flash





units now provided by Canon and Nikon are essentially miniaturised versions of a classic portrait lighting setup where there is a key light to one side of the camera (usually at 45° to the subject) with a fill light on the opposite side of the camera. This setup can be reproduced using conventional flashguns, but

admittedly at the downside of being more cumbersome (see photograph of myself in the water).

My most simple setup only consists of a single flash with homemade softbox fired off camera via a flash cable or through Nikon's creative lighting system (CLS) wireless flash triggering. The image at the beginning of the article was created with the setup illustrated below. The ladder in the background is actually holding the branch steady. Because the light source is so close to the subject



(the paper wasp nest) and so much larger than the subject itself, the lighting has a wrap around effect on the subject. To me this far preferable to the harder light created by specialised lighting rigs that attach to the front of the lens. With a single flash head and a large softbox the shadow is

considerably softened to the point that a fill light is not necessary. If I do want to boost the light in the shadows I'll sometimes use a reflector to bounce light toward the main light.



Observant readers will no doubt comment on the bulky nature of the setup used in photographing the wasp. However, a tripod holding the flash is not always necessary. Sometimes simply resting the flash on the ground suffices. I will also occasionally use an aluminium arm to hold the flash off camera, thereby allowing me to move about freely. If I have the luxury of it, I will also ask for help from an assistant, student...or my ever patient wife. In the image on the right a student is seen

helping me hold a flash aloft to photograph a Setaro's Dwarf chameleon. As can be seen, the image only required a single flash with attached softbox.



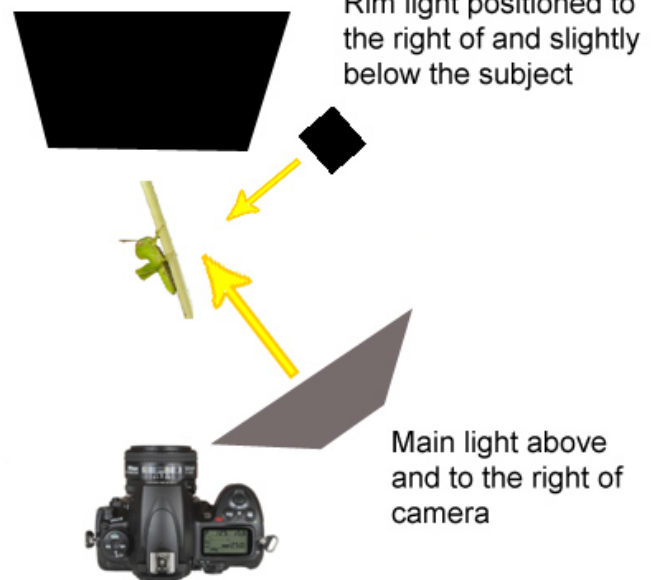
This is not to say that a single flash gun is always the best approach. I often shoot with two flash guns, using the second, not as a fill, but as a rim or hair-light (again taken directly from studio

photography). The second flash gun is now positioned behind the subject facing toward the camera, usually off to the left or right so that flare isn't a problem. The result is that the edge of the subject is highlighted, pushing it out from the background.



The image of the grasshopper nymph on the left is a good example. Here I also used a black background to create a sense that the image was actually photographed in a studio (it wasn't) as I wanted the clean lines of the insect to show out against the dark background.

Black card background behind subject



One of the things that my students are often surprised about is the fact that I hardly ever use TTL flash metering. Thanks to the advent of digital photography and the histogram it is extremely easy to set up your lighting so that the exposure is accurate. My flashes are set to manual so that I can decide the flash output. As good as TTL is it just doesn't seem to always work with some of the trickier lighting situations.



- 1 - Mode setting
- 2 - Flash output - this is always expressed as a fraction with full power depicted as 1/1
- 3 - The distance and aperture settings don't play a role since light modifiers are being used and the focusing distance is too small.

Manual, on the other hand, is far easier to use and gives consistent results. By taking test exposures – which can be done even before you photograph your subject – you can fine-tune the flash output for

the image. Understanding how to use the manual mode is as simple as realising that the flash output is read out as a fraction of the full output that the flash is capable of. Full output will read as 1/1. By clicking on the decrease button you then start to take the flash output downwards in $1/3^{\text{rd}}$ stops (at least on the SB800 that I use). With practise it is easy to read the histogram and determine whether the flash is too bright (too strong an output) or too dim (too weak an output) and how to correct for this. Using the distance scale doesn't really work since the focusing distance is often down to less than 30cm and of course having a softbox, or even bouncing the light off a reflector further diminishes the actual light that will land on the subject (the distance measurement is a calculation that the flash makes based on the assumption that you are pointing the flash directly at the subject).

Using Nikon's CLS (other manufacturers have similar wireless solutions) has further expanded the possibilities for creative macro lighting. It is now possible to have multiple flashes, all in manual mode, which can be controlled from the camera itself. The creative decision you have to make is where you want your key light to fall and how strong a fill, background and/or rim light you want – setting them accordingly.

A closing comment: there are many more lighting techniques available. The particular setup that I use revolves predominantly around a large softened light source. I have also experimented quite successfully with using mirrors as reflectors (far brighter than conventional photographic reflectors), polarising the light source (by polarising the light source and cross polarising the lens it is possible to eliminate specula highlights as well as emphasise the structure of an insect's compound eye). I keep coming back to the softbox approach as the results are consistently good and easy to predict. This is not to say that I won't come across a new technique tomorrow that is better or more useful to me. One should always strive to innovate in one's images, and that includes trying new techniques.

