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Stareye Hermit Crab, Olympus EM-5, Olympus 60mm macro at 1:1, Nauticam NAEM-5 housing, ISO-200, 1/250th, F/7.1.

at 1:1 will not all be the same image size.

So how do we define what is a 1:1 or “life size” photograph or video capture. The term 1:1 or “life size” represents a reproduction ratio where the subject you are photographing is the same size on the image sensor as it is in real life. So if you have set your macro lens to 1:1 and you take a sharp photo of a subject which is 20 mm in length then it should take up the same

20 mm’s on the image sensor or film.

If you are using a camera with a 35 mm “full frame” sensor like the Nikon D-800 where the sensor size is 35.9 X 24 mm your subject should have about 8 mm of negative spare on each side if the subject is centered and on a flat plane in the frame. With a 1.5X “cropped” sensor like the one in the Nikon D7100 the sensor size is 23.5 X 15.6 mm so at 1:1 the 20 mm subject would have about 1.75 mm on



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Stareye Hermit Crab Eye Detail, Olympus EM-5, Olympus 60mm macro at 1:1, Nauticam NA-EM-5 housing, ISO-200, 1/250th, F/9, SAGA +15 Closeup lens.

each side when centered.

With a Micro 4/3 camera like the Olympus OMD E-M1 the image sensor is 17.3 X 13 mm and in this case the 20 mm subject would be cut off by 1.35 mm on each side. So the smaller the sensor the smaller the subject that will fully fill the frame with a macro lens set at 1:1. Smaller sensors also increase depth on field for a given angle of view for like F/ stops. So a lens with a 24 degree angle

of view on a 35 mm sensor at say F/11 will have less depth of field than a lens with a 24 degree angle of view on a M43 camera at F/11.

Bottom line is that everything in photography is a tradeoff. Better overall image quality with a larger image sensor verses a much smaller critter filling the frame with a small sensor camera.

When you add the SAGA close-up lens into the equation nothing

changes regarding the physics of the sensor size. With a +5 wet lens on a 100 mm macro lens at 1:1 on full frame the reproduction ratio becomes 1.5:1, at +10 2:1 and at +15 3:1 give or take a small amount. The reproduction ratio remains the same for every sensor size. If you were to compare actual image sizes using the 35 mm 36 X 24 mm sensor as the base line and the smaller M43 sensor with a +15 close-up, with the macro lens at 1:1. The 3:1 or three times life size the same image on the M43 sensor would be a subject size of about 6:1 or six times life size on the 35 mm sensor quite a difference.

For my in water testing I used the SAGA PRO +15 Extreme with my SAGA flip adapter. This lens can also be mounted directly to a macro port with 67 mm threads. To get the very smallest of subjects I used the Olympus E-M5 M43 camera with the Olympus 60 mm macro lens which has an angle of view of twenty degrees (120 mm equivalent in 35 mm) in a Nauticam NA-EM5 housing with two Inon Z-240 strobes set to manual. The EM-5 camera was set for manual focus and the 60 mm macro lens was racked out to the 1:1 mark on the lens.

Once in the housing the lens would remain at 1:1 during the entire dives unless I was reset the camera to auto focus. I did this so that I would know for sure that the images were always being taken at 1:1 and not effected by the auto focus moving me off the 1:1 mark. I rely heavily on auto focus when shooting macro and I have observed that all of my students doing the same. As a result we have all auto focused the macro lens in the 1:2 or even 1:3 range thinking we were at 1:1 then introduce the close-up lens to try to increase magnification with less than stellar results.

Until the macro lens is set at 1:1 the wet lens



Shortfin Pipefish, Olympus EM-5, Olympus 60mm macro at 1:1, Nauticam NA-EM-5 housing, ISO-200, 1/250th, F/7.1.

only acts as a placebo and does not really increase magnification beyond what the 1:1 macro lens can do on its own. As you use close-up lenses with greater and greater powers like the SAGA +15 the need to have the macro lens as close to 1:1 as possible to get the most magnification out of the close-up lens you are using. This is why it is so important to know what your personal equipment can achieve when it comes to macro.

With the SAGA +15 wet lens mounted to the port a less than 10 mm long subject fills the entire M43 frame when the housing is moved in to achieve sharp focus. Since I am not using AF I need to move the lens towards the subject until the subject comes into sharp focus. With the +15 lens this is easier said than done and a high quality accessory view finder like the Nauticam 45 degree finder I use helps tremendously in obtaining sharp focus.

You must first find the subject, then get it



Shortfin Pipefish, Olympus EM-5, Olympus 60mm macro at 1:1, Nauticam NA-EM-5 housing, ISO-200, 1/250th, F/7.1, SAGA +15 Closeup lens.

centered in the lens, then get close enough for sharp focus while allowing the strobe light to reach the subject. For maximum depth of field I shot many of the images for this review in the F/16 to F/22 range. Depth of field with a +15 close-up lens is very shallow even on a small sensor camera. When sharp focus is reached with the +15 lens you are within about 10 mm of your subject so proper subject selection becomes half of the battle. No need to try this lens on a skittish fish or other fast moving subject because you just won't get close enough for a well focused image.

The +15 close-up lens is a unique lens for a very select group of very small subjects. It is for the more advanced macro photographer and I would not recommend the lens for those just moving into macro photography. I would instead suggest that they start with the SAGA +5 and work up to lenses with greater magnifications like the SAGA +15 Pro



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Cushion Sea Star Detail, Olympus EM-5, Olympus 60mm macro at 1:1, Nauticam NAEM-5 housing, ISO-200, 1/250th, F/7.1, SAGA +15 Closeup lens.

lens if really small critter photography becomes their thing. I would also stick to the +5 (or more advanced +10 at most) for Kit lenses like the Sony 18 to 55 mm zoom for the NEX cameras or 12-50 mm & 14-42 mm zooms for M43 cameras. Corner sharpness with the SAGA +15 is quite good on the small sensor cameras and I would expect to see it fall off just a bit going to full frame although I have not yet tested that theory. I would also expect to see the same excellent image

quality from the +5 and +10 offerings as well.

The SAGA achromatic wet close-up lenses can be found at your local SAGA retailer or by going to the sagadive.com web site. The SAGA lenses retail as follows.

+5 lens, 160.00€ \$250.00

+10 lens, 195.00€ \$300.00

+15 lens, 255.00€ \$410.00

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