



**HPS MACRO SIG  
WHAT IS MACRO?**

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10<sup>th</sup> February 2026

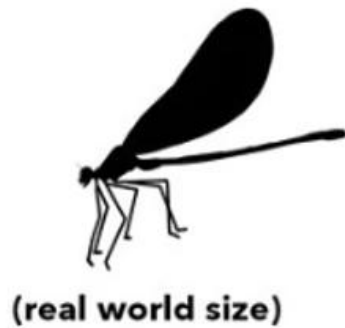
David Butler

# MACRO PHOTOGRAPHY – THE BASICS!

- What is the difference between macro and close-up?
- Macro = life size on the sensor & upwards  
Typically 1x to 5x (1:1 to 5:1)
- Close-up = smaller than macro (less than life size)!  
Typically 0.1x to 1x (1:10 to 1:1)
- Anything larger - table top?

# A BIT MORE ON MAGNIFICATION

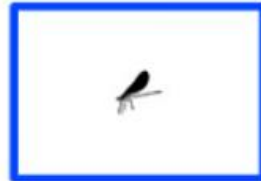
## Example Magnifications



1:10



1:6



1:4



1:3



1:2



1:1



$$1:10 = 0.1X$$

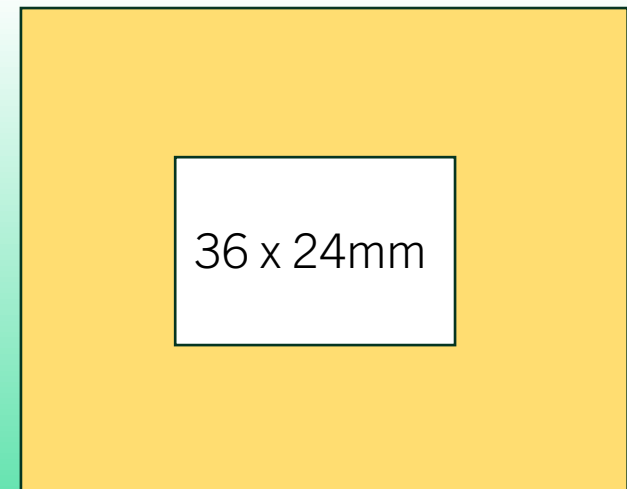
$$1:4 = 0.25X$$

$$1:2 = 0.5X$$

$$1:1 = 1.0X$$

# WHAT SIZE SUBJECT SHOULD I AIM FOR (FOR 1:1)?

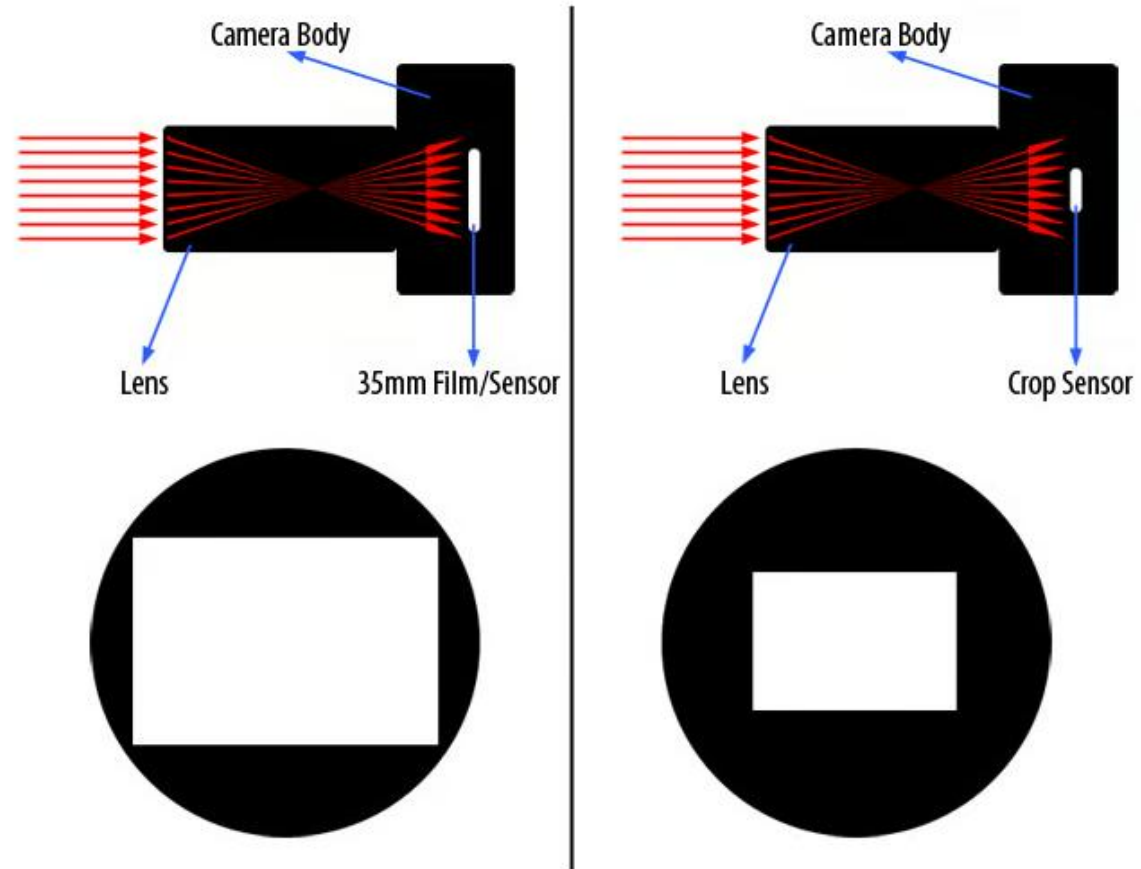
- Subject should fit into a frame measuring 36 x 24 mm – gives 1:1 on a full frame (FX) camera sensor
- Cut an aperture in a piece of card!!
- Using a 36 x 24 mm aperture means that you get the same field of view irrespective of sensor size
- But what does this mean for other sensor sizes?



## OTHER CAMERA SYSTEMS

	Format / size (mm)	Type / brand
Full frame (FX)	36 x 24	Any full frame DSLR or mirrorless
APS-C (DX)	23.6 x 15.6	Nikon, Pentax, Sony etc
APS-C	22.3 x 14.9	Canon
Micro 4/3	17.3 x 13	Olympus, Panasonic
1/1.7 inch	7.6 x 5.7	Compact (& other sizes)
1/4 inch	3.2 x 2.4	Camera phone (& other sizes)

# SMALLER SENSORS CROP THE IMAGE



*35mm Film / Full Frame vs APS-C / Crop Sensor Comparison*

# SMALLER SENSORS CROP THE IMAGE

**Same magnification, different sensors**



Full Frame



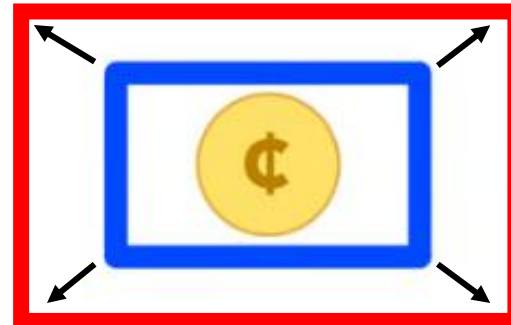
APS-C

# HOW TO GET SAME FIELD OF VIEW IRRESPECTIVE OF SENSOR

To get same field of view with smaller sensor move further back and reduce magnification!



Full Frame



APS-C

## OVERALL EFFECT OF SMALLER SENSORS

- To *obtain the same field of view* (e.g. 36 x 24 mm image) the implications of a smaller sensor are:

Lower magnification is required – have to move camera further away

Increased distance increases depth of field

- For macro photography a small sensor camera may be an advantage!

## HOW TO GET TO 1X OR MORE MAGNIFICATION

- Use a macro lens – some are limited to 1:1 (1X)
- Teleconverter on a compatible macro lens increases magnification (1.4x TC on a 1:1 lens > 1.4X)
- Extension tubes / bellows with a prime lens (35mm lens plus 36mm tube > 1.2X)
- Reverse wide angle prime (with or without tubes) > 3X or more possible
- Reverse wide angle prime on a telephoto prime > 20mm reversed on 200mm > 5X

# DEPTH OF FIELD – FRIEND OR FOE?

- Depth of field decreases as subject to camera distance reduces
- Historically small apertures (f16 or f22 or even f32) were used
- Digital image processing allows focus stacking!

**Depth-of-field Table**

[mm]

Magnification	f/2.8	f/4	f/5.6	f/8	f/11	f/16
1×	0.396	0.560	0.792	1.120	1.584	2.240
2×	0.148	0.210	0.297	0.420	0.594	0.840
3×	0.088	0.124	0.176	0.249	0.352	0.498
4×	0.062	0.088	0.124	0.175	0.247	0.350
5×	0.048	0.067	0.095	0.134	0.190	0.269

# DEPTH OF FIELD SOFTWARE

- For example [photopills](#) app for Android or Apple
- Or online:
- <https://www.photopills.com/calculators/dof-macro>

## MACRO DEPTH OF FIELD (DOF) CALCULATOR

Camera

Focal length  mm

Aperture

Aperture is already an effective f-stop

Set to YES if you're using a Nikon camera. These cameras automatically correct for the effective f-stop and show it on the LCD display.

Pupil magnification

When using long focal lengths, such as 105mm or 180mm, enter the pupil magnification to get more accurate results. Set it to 1 if you don't know its value.

Focusing distance

Distance from the subject to the camera sensor. It must be at least 4 times greater than the focal length.

Extension tube length  mm

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Magnification	1.00x (1:1.0)
Effective aperture	f/8.0
Depth of field	0.48 mm
Smallest Subject which can fill the image	24 mm
Safe step size for stacking (20% image overlapping)	0.38 mm

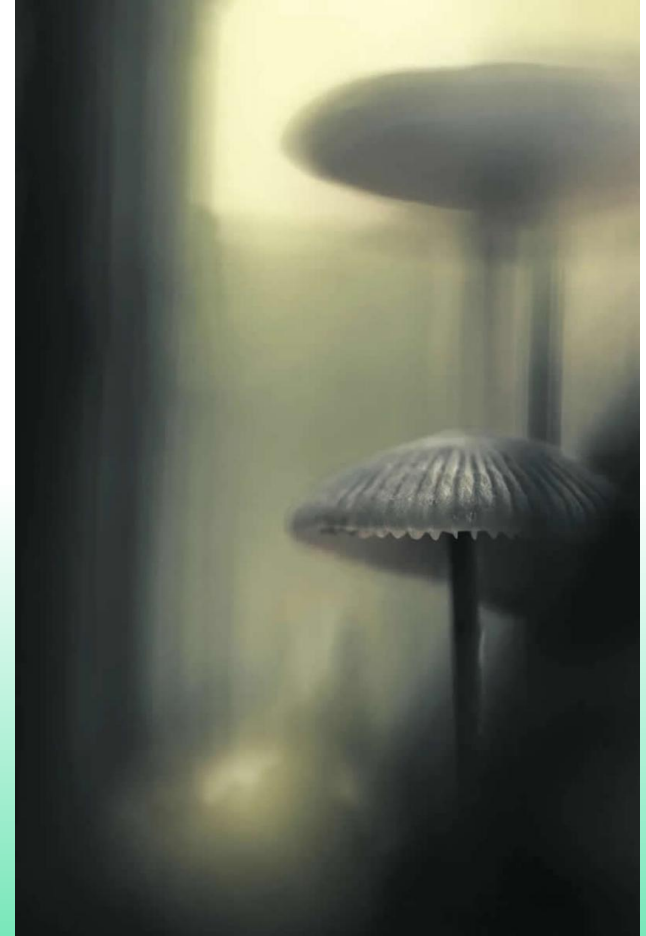
# DEPTH OF FIELD – DOES IT MATTER?



CUPOTY - Close-up  
Photographer of The Year  
2025, Fungi & Slime Mould  
Category

👉 2nd Place: "Cribraria  
Cluster" by Barry Webb

3rd place: 👉  
"Twilight of the Gods"  
by Cédric Rousseau



# WHAT IS FOCUS STACKING?

- Lets get the definitions right!
- Focus bracketing = taking a series of images at different focus points to stack or blend together (either in camera or post processing) to produce an image with more of the subject in focus.
- Most useful for macro but can be used in other photographic genres – e.g. landscape
- Focus stacking = the process of blending the individual images together
- Some cameras, notably OM, can combine bracketing and stacking together in camera. Often just called stacking!

# HOW TO FOCUS BRACKET: FOCUS SHIFT VERSUS CAMERA SHIFT!

1. Take a series of images of the subject at a range of focus points with a fixed camera to subject distance. Many mirrorless cameras can do bracketing automatically and some can also stack the images.
2. Focus camera on nearest point of subject then take a series of images with the camera moved progressively closer to the subject, without changing focus. Camera is usually mounted on a macro rail which allows either motor driven or manual precision movement.
3. Many experts recommend an aperture of f8

# HOW TO STACK INDIVIDUAL FOCUS BRACKETED IMAGES IN POST PROCESSING

- Standard image editing software Adobe LR plus PS, Affinity
- Specialist stacking software
- CombineZP by Alan Hadley (free but complex)
- Helicon Focus
- Zerene Stacker

# DEMONSTRATION 3X MACRO STACK



# DEMONSTRATION 3X MACRO STACK



# FINAL STACKED IMAGE



- 3X Image magnification
- 12 images of centre of Gerbera taken at 0.2mm intervals
- 28mm 'junk' lens reversed on 36mm Nikon F extension tube on F to Z converter
- MF ½ sec ISO1000 f8 kitchen panel ceiling lights