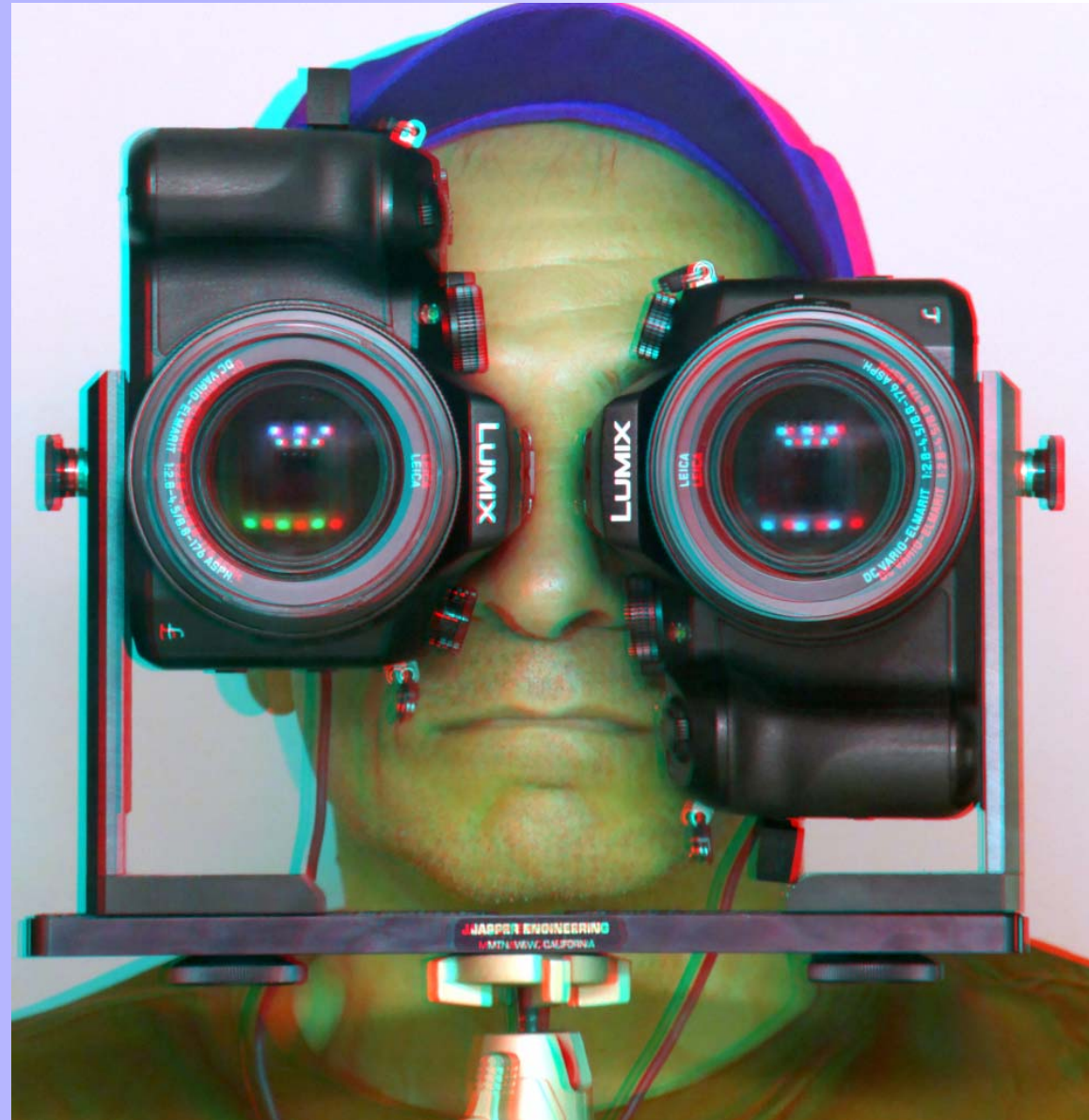


How to Take

# Close- Ups in 3D

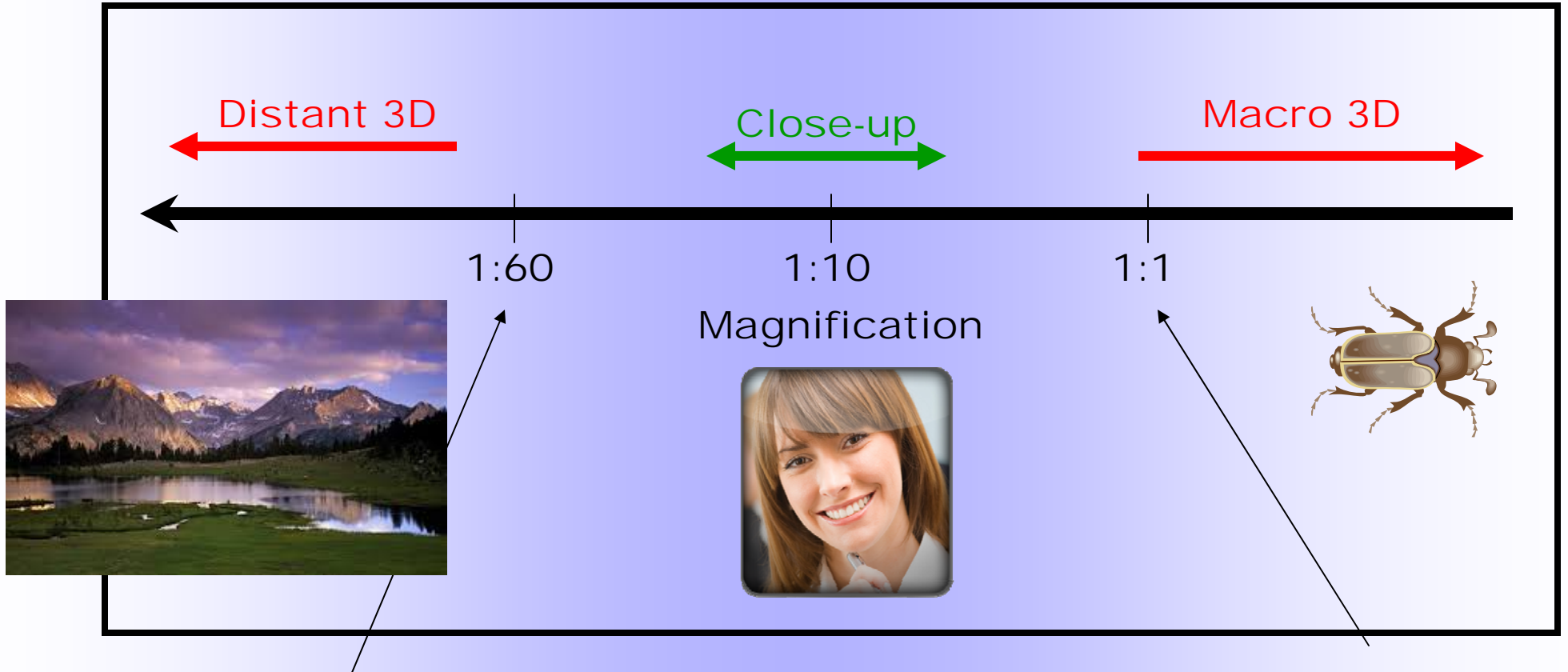
By George Themelis  
OSPS February  
2021



# Outline

- **Why?**
- **The Challenges**
  - **2D** (how to achieve the magnification)
  - **3D** (how to control the deviation)
- **Equipment & Techniques**

# What is a close-up?



## Traditional Distant 3D photography:

Normal photography when the near object is at 2.1m (7 ft) from the camera.  $M \sim 1/60$

## Traditional Definition of Macro:

Anything with magnification of **1:1 or larger** (or object size 24mm in height or smaller)

# Close-up Challenge

2D	3D
<p data-bbox="348 704 825 773"><u>Magnification</u></p> <p data-bbox="359 821 814 883">FL / Distance</p> <p data-bbox="201 1057 974 1211">Get closer to increase the magnification</p>	<p data-bbox="1356 704 1692 773"><u>Deviation</u></p> <p data-bbox="1251 821 1797 883">Base / Distance</p> <p data-bbox="1129 1057 1919 1211">Reduce stereo base to keep deviation small</p>

# Summary of Equipment for Close-Up

<i>Method</i>		<i>B</i>		
1. One camera and shift		0-inf	X	X
2. 3D camera		50-75mm	X	
3. Close-up 3D camera		20-40mm	X	x
4. 3D Camera + attachment		~30mm	X	x
5. 2D camera & 3D lens		10-15mm	x	X
6. Two 2D cameras & mirror (Macrobox)		0-50mm	X	X
7. Two 2D cameras + long lenses		100-150mm	X	x

# 1. One camera & shift

**Easiest & least expensive** (phone, even a stereo camera!)

How to do it: **Picture 1** → **shift** → **Picture 2**

Advantage: **Flexible stereo base**

Drawback: **For stationary objects only**

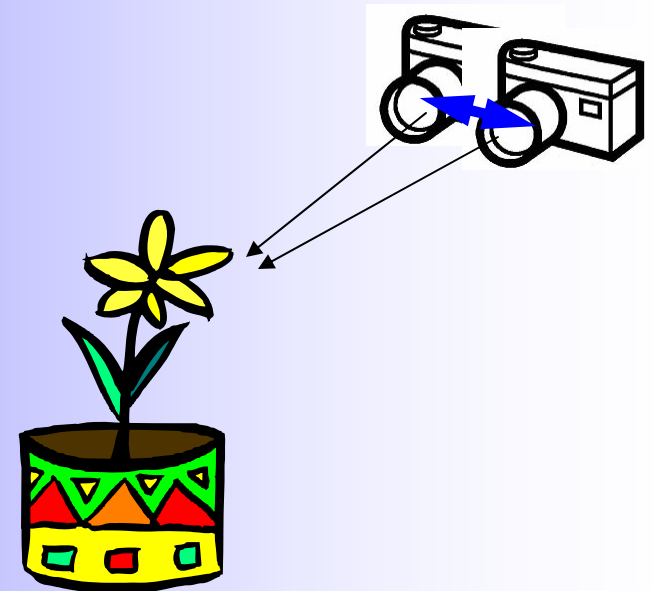
**Recommendation for Stereo Base:**

**~ 1/20 x Distance to Nearest Object**

Slide Bar or free held? With SPM, free-hand is OK

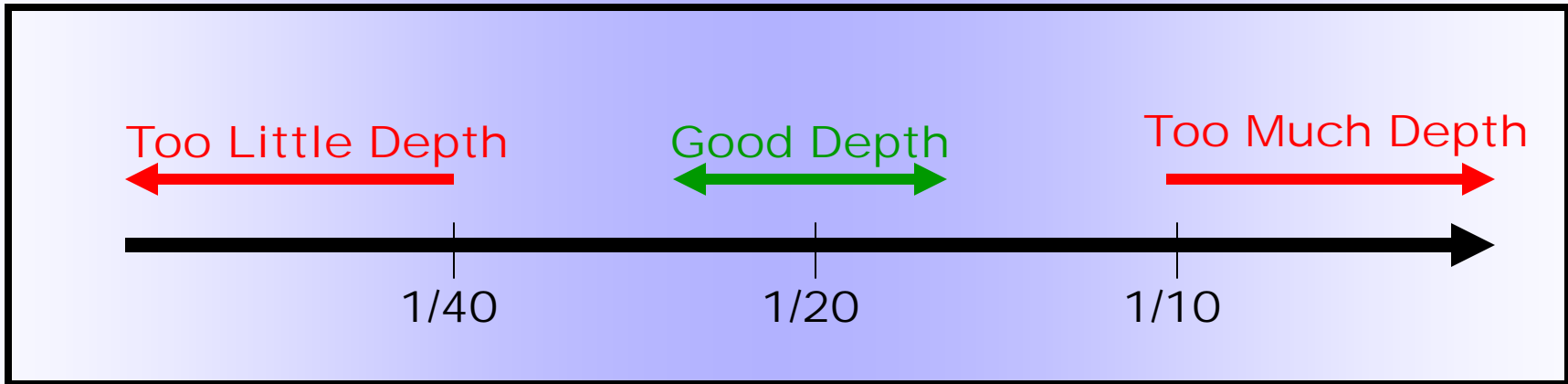
Converge or not? It is OK to converge to save image width

Flash? Do not shift flash if shadows are formed

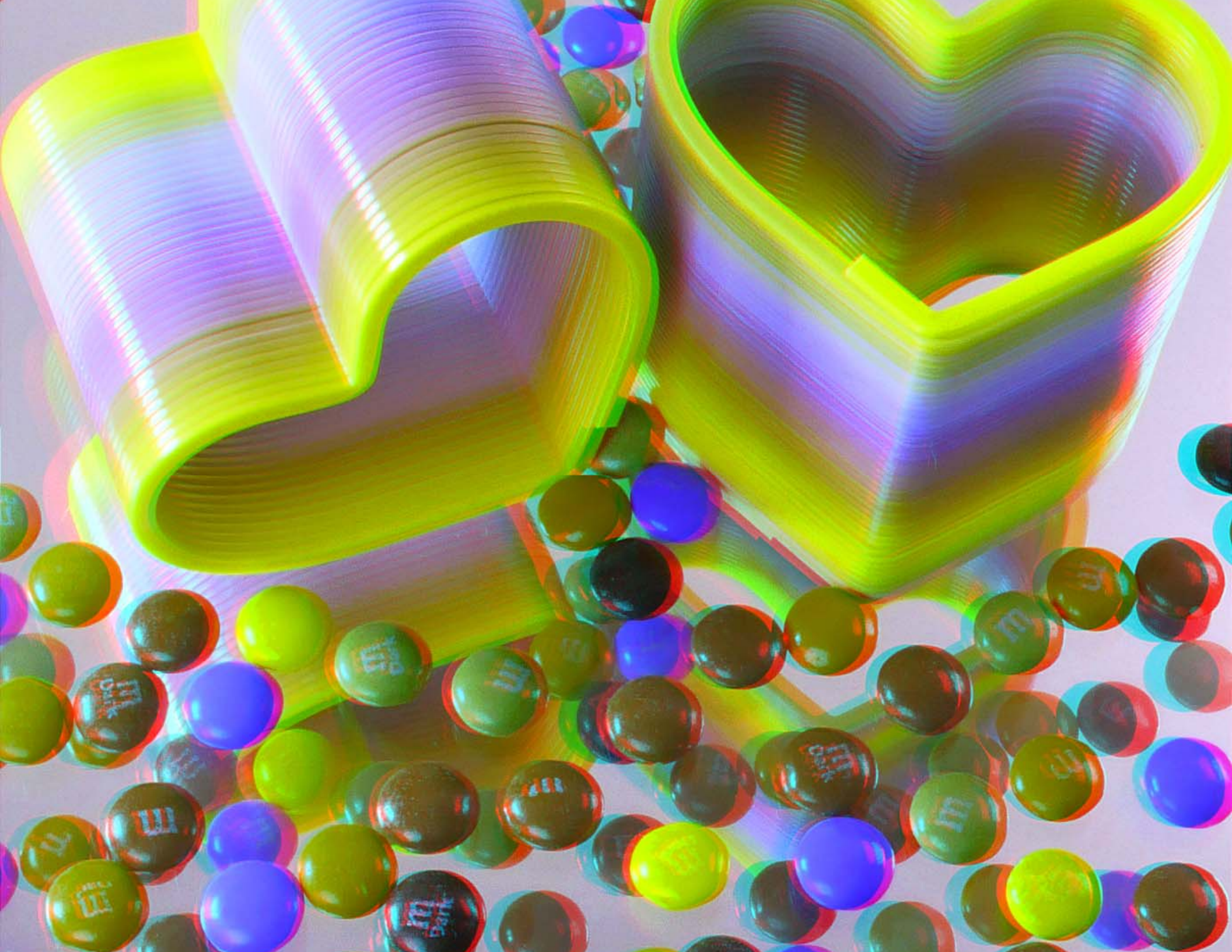


# Depth Ratio (B/I)

## Stereo Base over Distance



- Both the Stereo Base (B) and distance (I) are very important in 3D photography, but **it is the ratio of B/I that determines the amount of depth in the picture**
- For distant 3D photography traditionally a **ratio of 1/30** is recommended.
- Through trial and error, I have found that a **depth ratio of about 1/20 works well for close-ups**





Iphone cha-cha



Fuji W3 in Advanced 3D mode



## 2. Standard 3D Camera



A standard 3D camera ( $B \sim 60\text{-}75\text{mm}$ )  
can be used for close-ups

**if the background is blocked**

Instead of coming closer, it is better to:

**Stay back and zoom-in**

The Background is the  
ENEMY of close-ups

How to control/eliminate the background:

- **Use a physical barrier**
- **Use a featureless background**
- **Throw it out of focus**
- **Use strong flash** (darkens the background)
- **Photoshop** to the rescue

Barb Gauche





# 3. Close-up 3D camera



Panasonic Lumix 3D1



Horseman 3D



Macro Realist



Variety of 3D video digital cameras and phones, etc.



**B = 20 - 30 mm**



Nimslo with close-up lenses

# Panasonic Lumix 3D1



**Question:** Given the distance of the lenses  $B$ , how close can you get to your subject for a good close-up?

**Answer:**  $l \sim 20B$

**Panasonic:**  $B=30\text{mm}$ ,  $l \sim 600\text{mm}$  (24 inches, 2 ft)

This is approximately the distance of the extended hands



Lumix 3D1



Selfie w/ Lumix 3D1



I ~ 0.6m

D ~ 1/6

Selfie with  
the Fuji W3



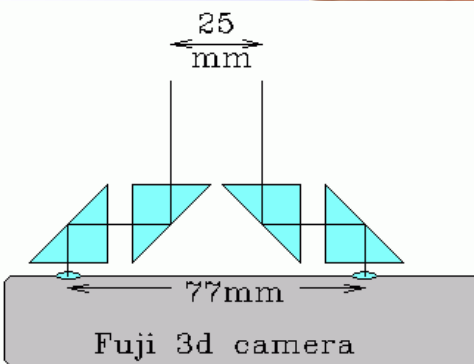
Lumix 3D1 inside inexpensive underwater case



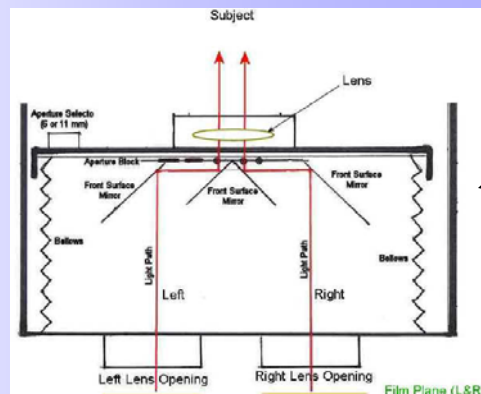
# 4. 3D Camera & Attachment



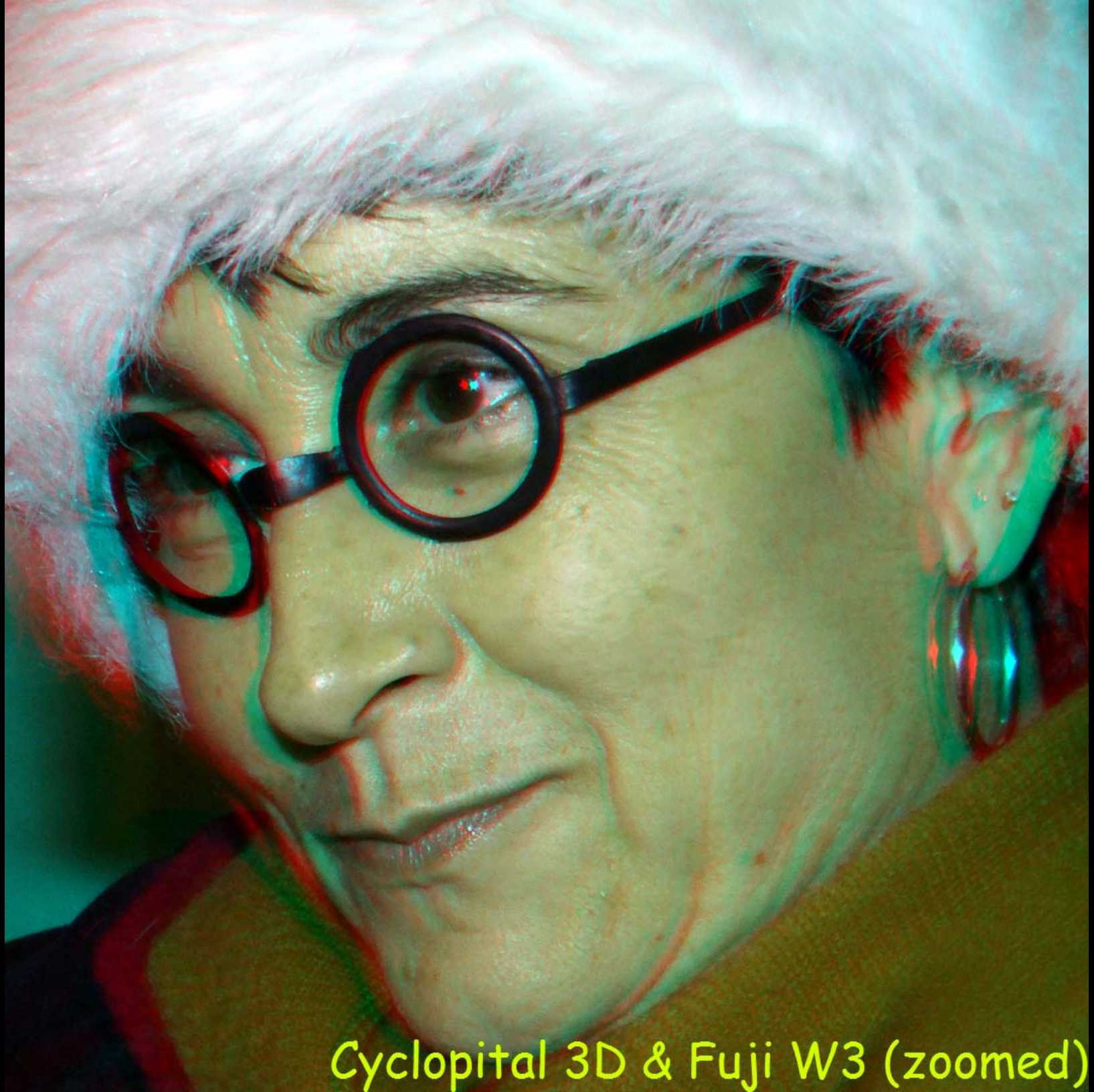
- Use mirrors or prisms
- Redirect light & effectively reduce the spacing of the lenses



**Cycloptial 3D attachment**  
for the Fuji 3D camera



**RBT macro attachment**  
for RBT cameras



Cyclopital 3D & Fuji W3 (zoomed)

RBT macro  
by Dale Yingst



D ~ 1/40

# 5. 2D camera & 3D Lens

**One camera lens with two lenses, records side-by-side stereo images that share the same film / sensor area**



Kindar/Hyponar Lens



DeWijs Lens



<https://www.dewijs-3d.com/>



Panasonic 3D Lens



Loreo 3D Macro Lens



Custom lens by Oktay Akdeniz



# Panasonic 3D Lens

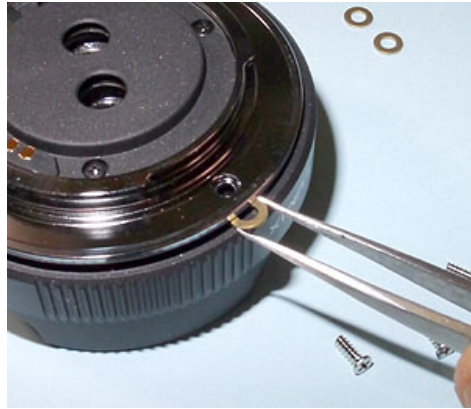


- **Micro 4/3 mount lens**  
Produces a 3d (MPO) file in certain (all recent) micro 4/3 cameras by Panasonic and Olympus
- **Two lenses, 10mm apart**
- 12.5mm FL, f12 fixed aperture, **fixed focus**  
(Range: 0.6m-INF, estimated focus at 0.9m)
- **Not good for general 3D photography**  
( $D = B/l = 1/90$ , extremely weak depth)
- Good for macros  
**but needs to be modified to focus closer**

# Panasonic 3D Lens Modification

## *Modifications to focus closer (increase magnification)*

### **Extension**



### **Close-up Lenses**



# Panasonic 3D Lens & CU lenses



How to Attach:  
**Velcro**  
**Special attachment**

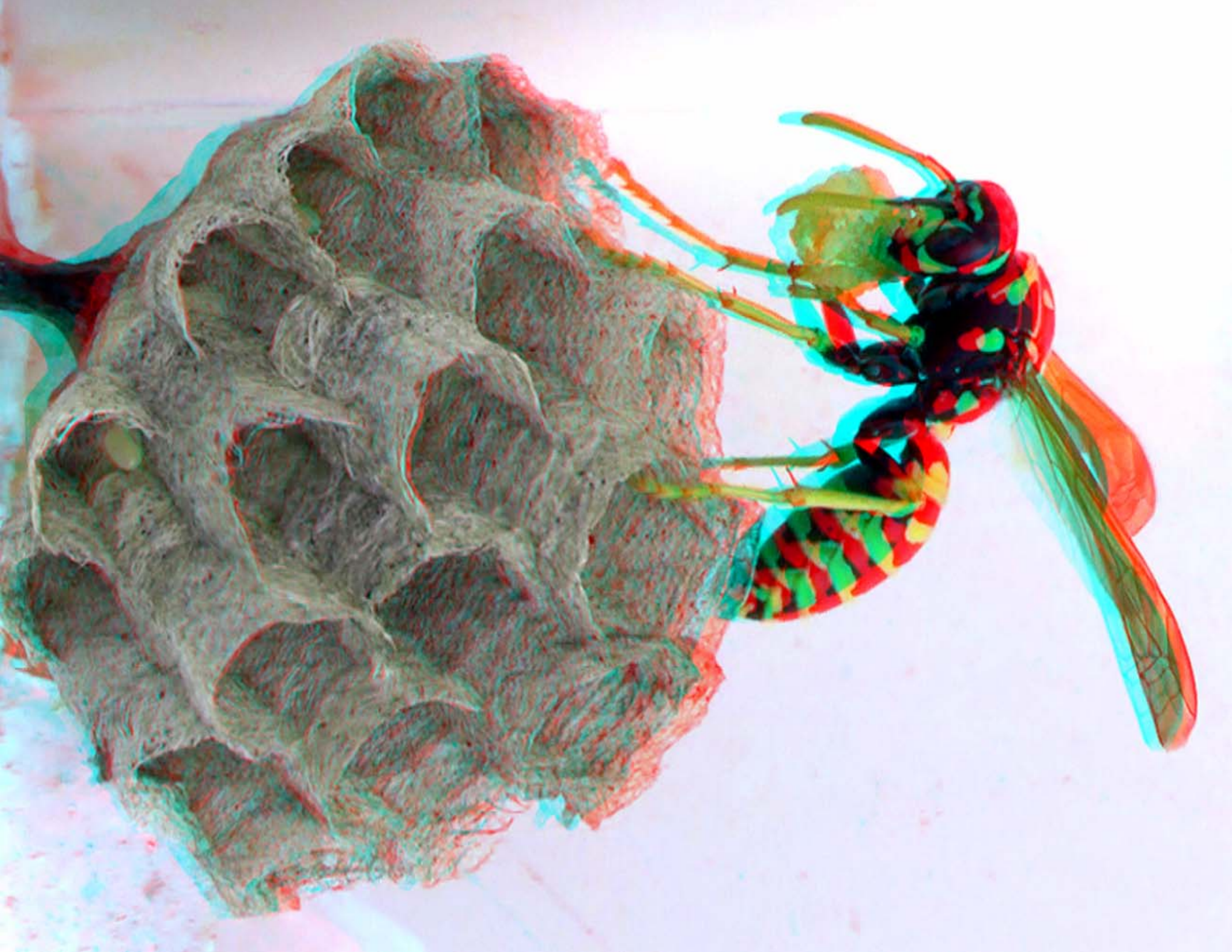
Strength of CU lens: (+1, +2, +4)

**Diopter = 1000mm/FL**



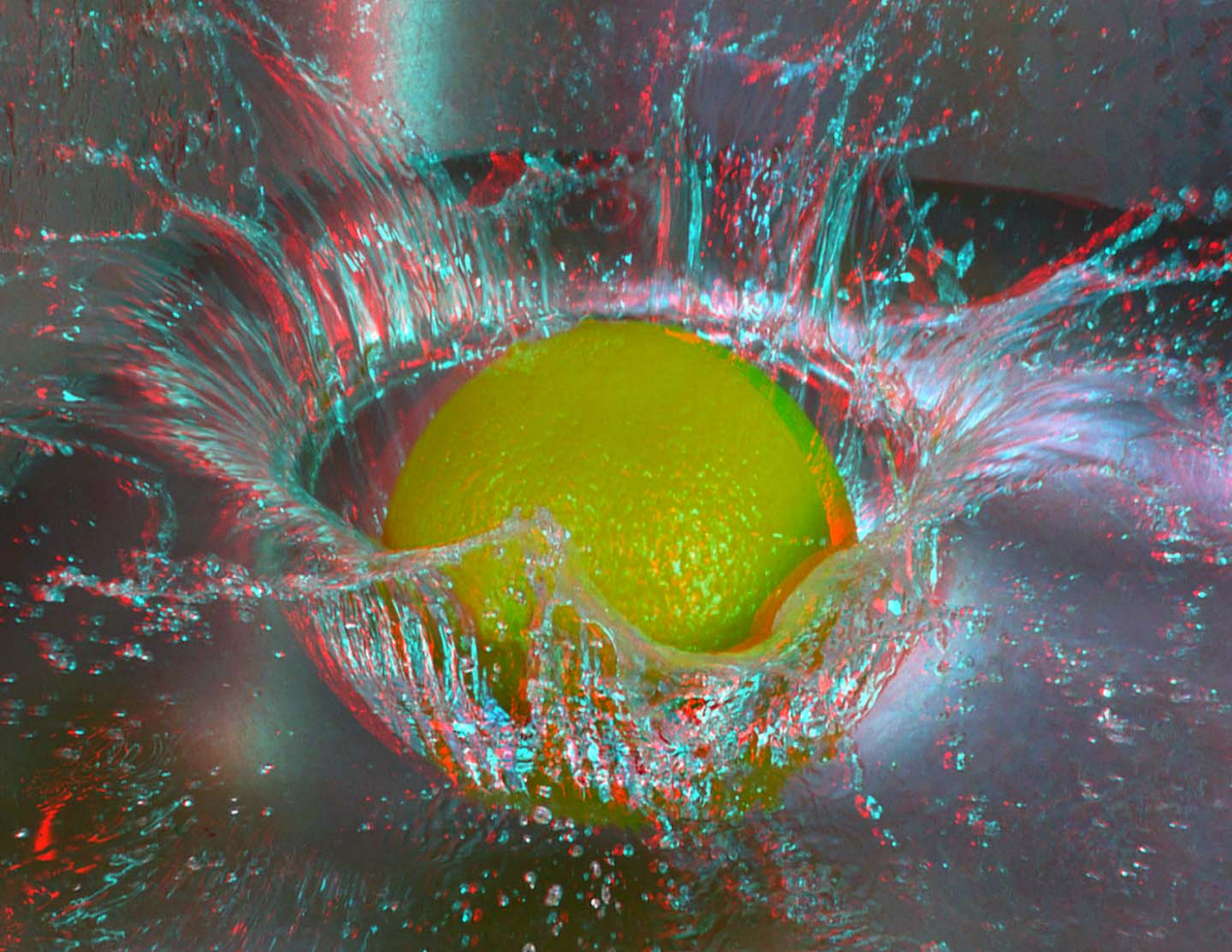
Achromatic CU lenses (+3, +5, +10)

**Recommended for anything higher than +1**



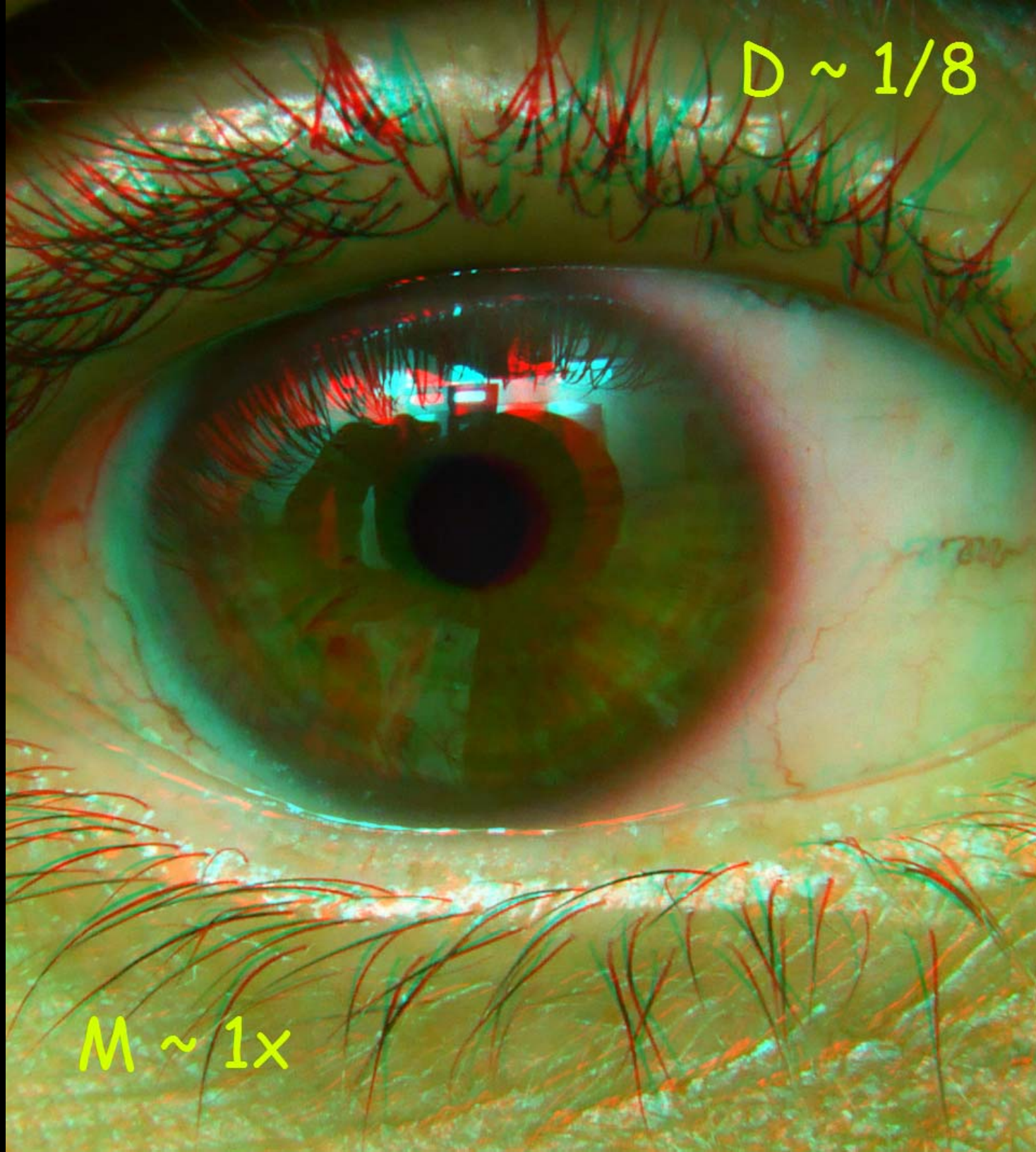
1mm ext (D = 1/15)



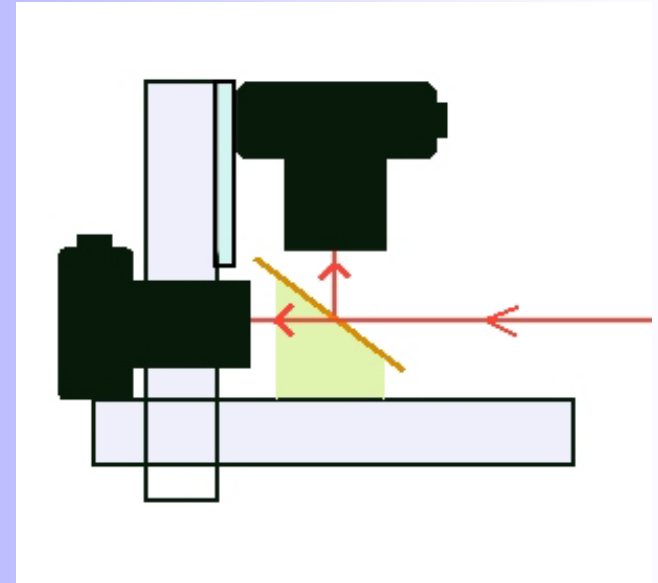
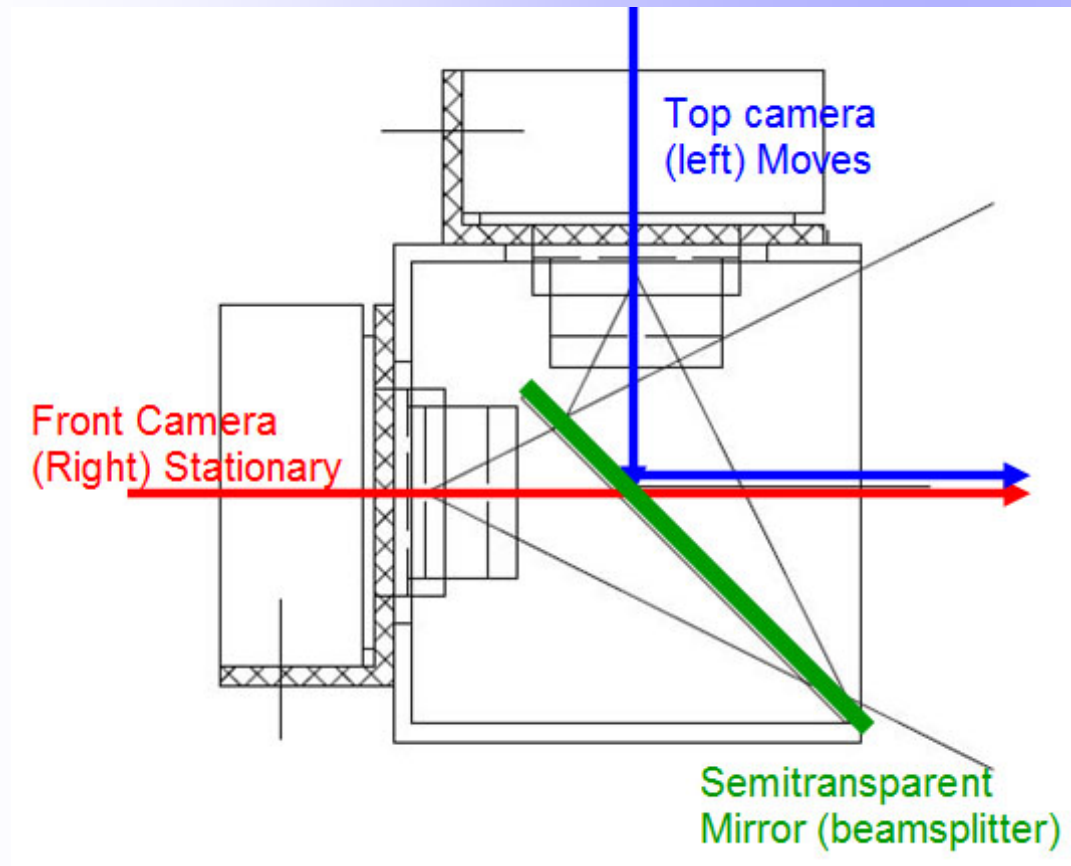


$D \sim 1/8$

$M \sim 1\times$



# 6. Two cameras & mirror

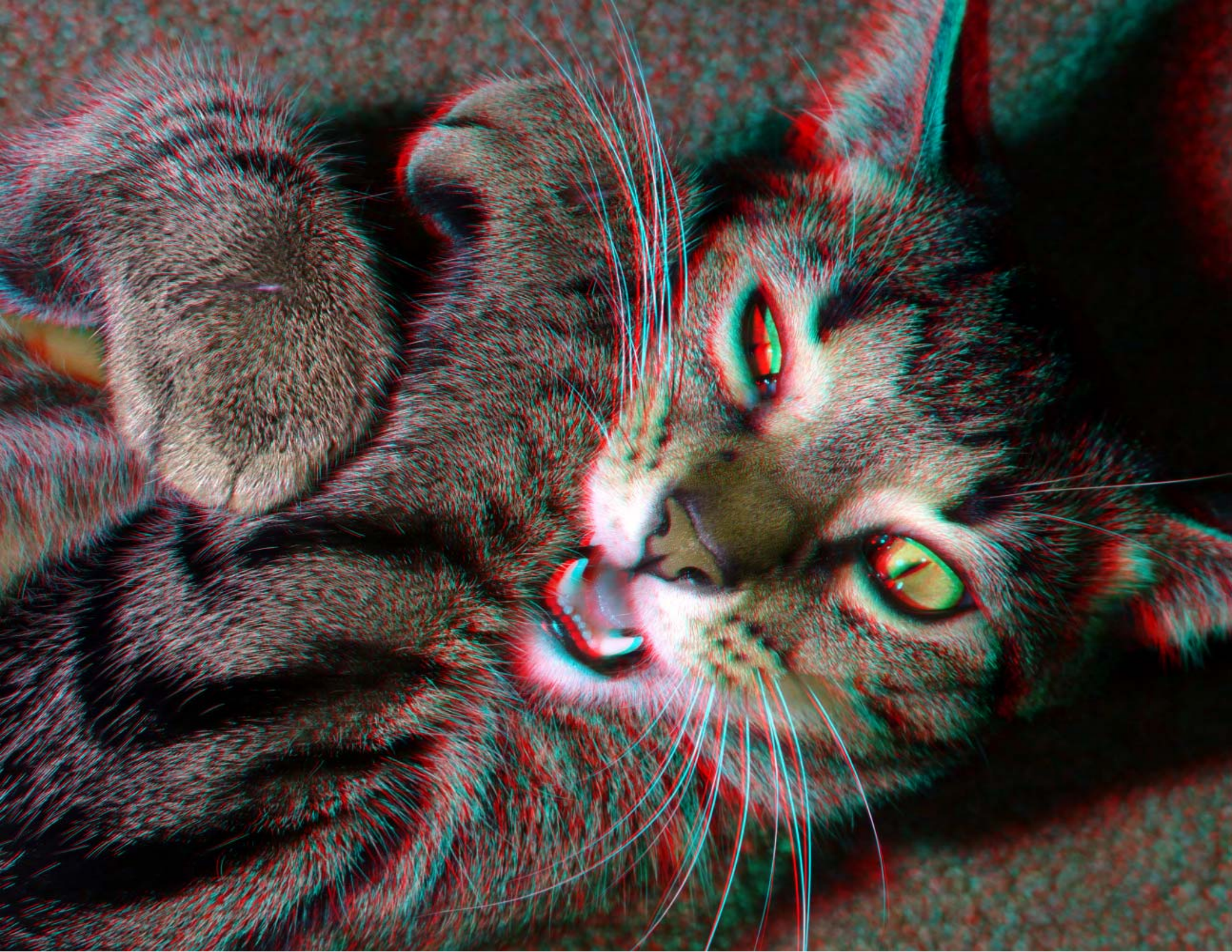


## Macrobox for Canon SDM cameras—Features:

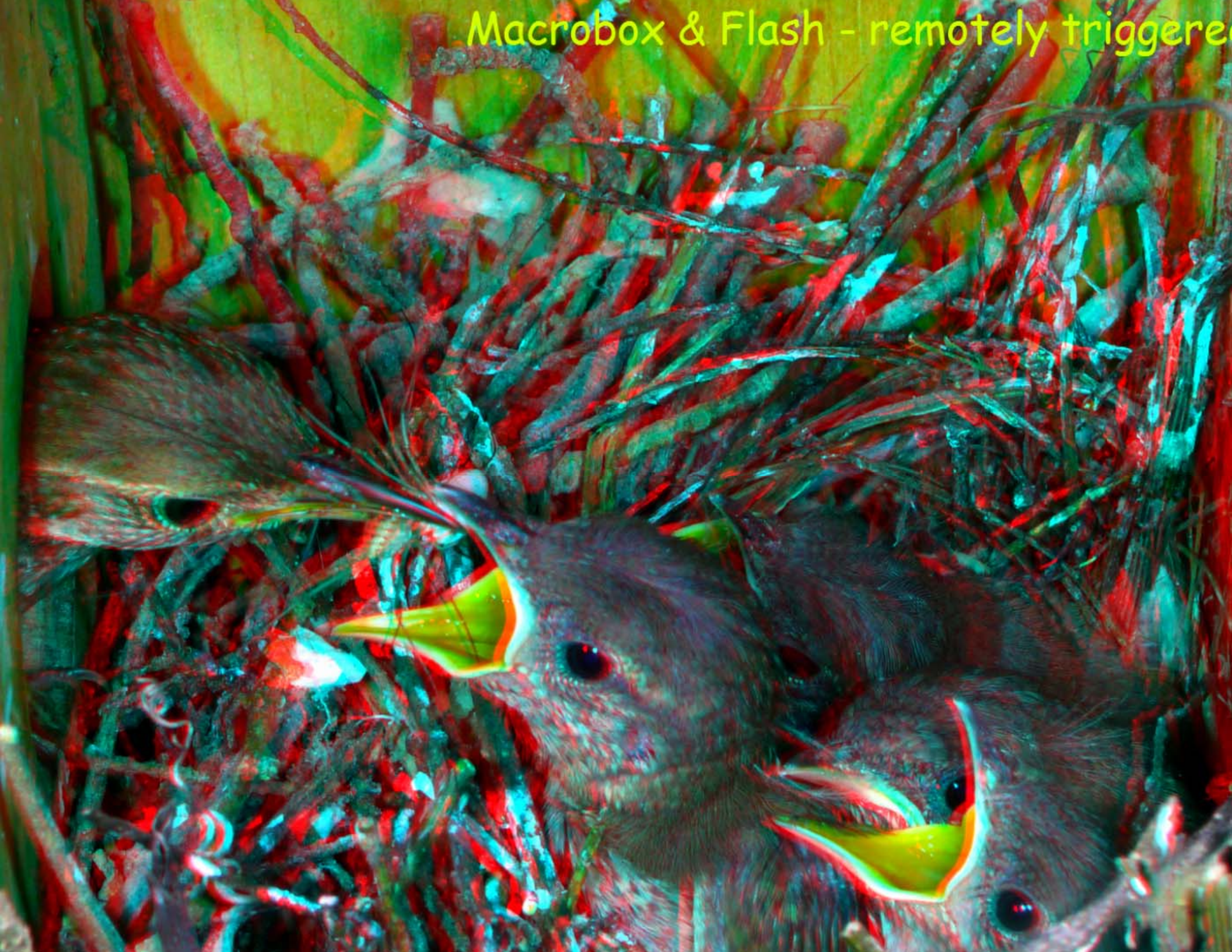
- Adjustable stereo base from 0mm to 50mm
- Filter threads in cover allows to use filters
- High-quality half mirror w/ anti reflex coating
- Made out of lightweight but stable plastic
- Cost ~ 450 Euros

<http://www.digi-dat.de/>





Macrobox & Flash - remotely triggered



# 7. Twin cameras & Long lenses



**Panasonic bottom-to-bottom  
w/ Olympus lenses 75mm lenses**



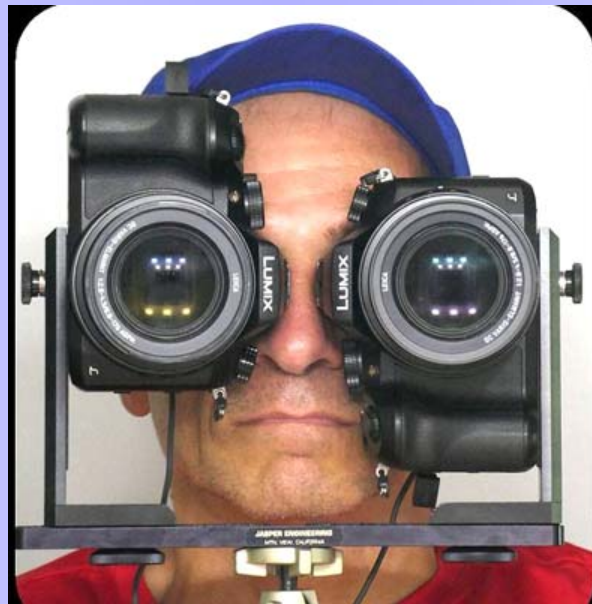
**Samsung side-by-side  
w/ 500mm mirror lenses**



**Panasonic TZ80 (24-720mm) side-by-side**



**Panasonic FZ2500 (24-480mm) bottom to bottom (left) and top-to-top (right)**



**Canon 6D with 100-400mm lenses  
top-to-top**

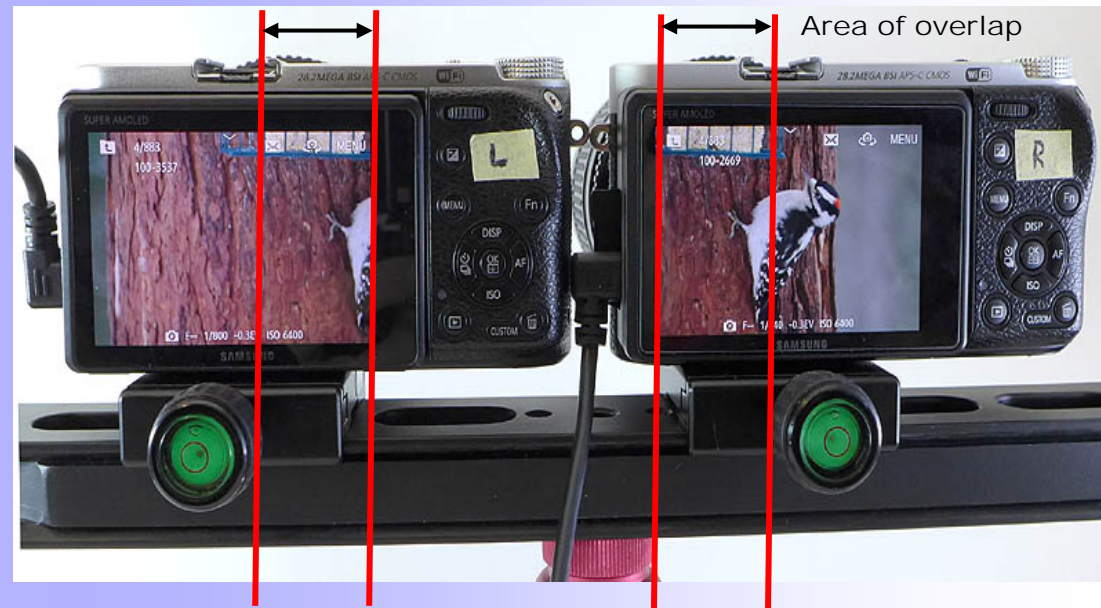
# Issues when using Twin Cameras w/Long FL Lenses

## Alignment - Focus - Synch

### Vertical Alignment



### Horizontal Alignment



If the cameras are pointed parallel, there will be partial Image Loss (=  $M \times B$ ) **The lenses must converge!**

# Different Camera Mounting Configurations

## 1. Horizontal (side-by-side)

- Works ok for smaller cameras
- Flexible stereo base for hypers
- Not easy to use w/ large cameras on the field



## 2. Vertical

- **Portable** - can be held with a grip or monopod
- **Easier Vertical Alignment**
- **Easy to convergence**
- **Smaller stereo base**
- **Top-to-top: Use VF for 3D viewing**
- Vertical orientation not best for 3D



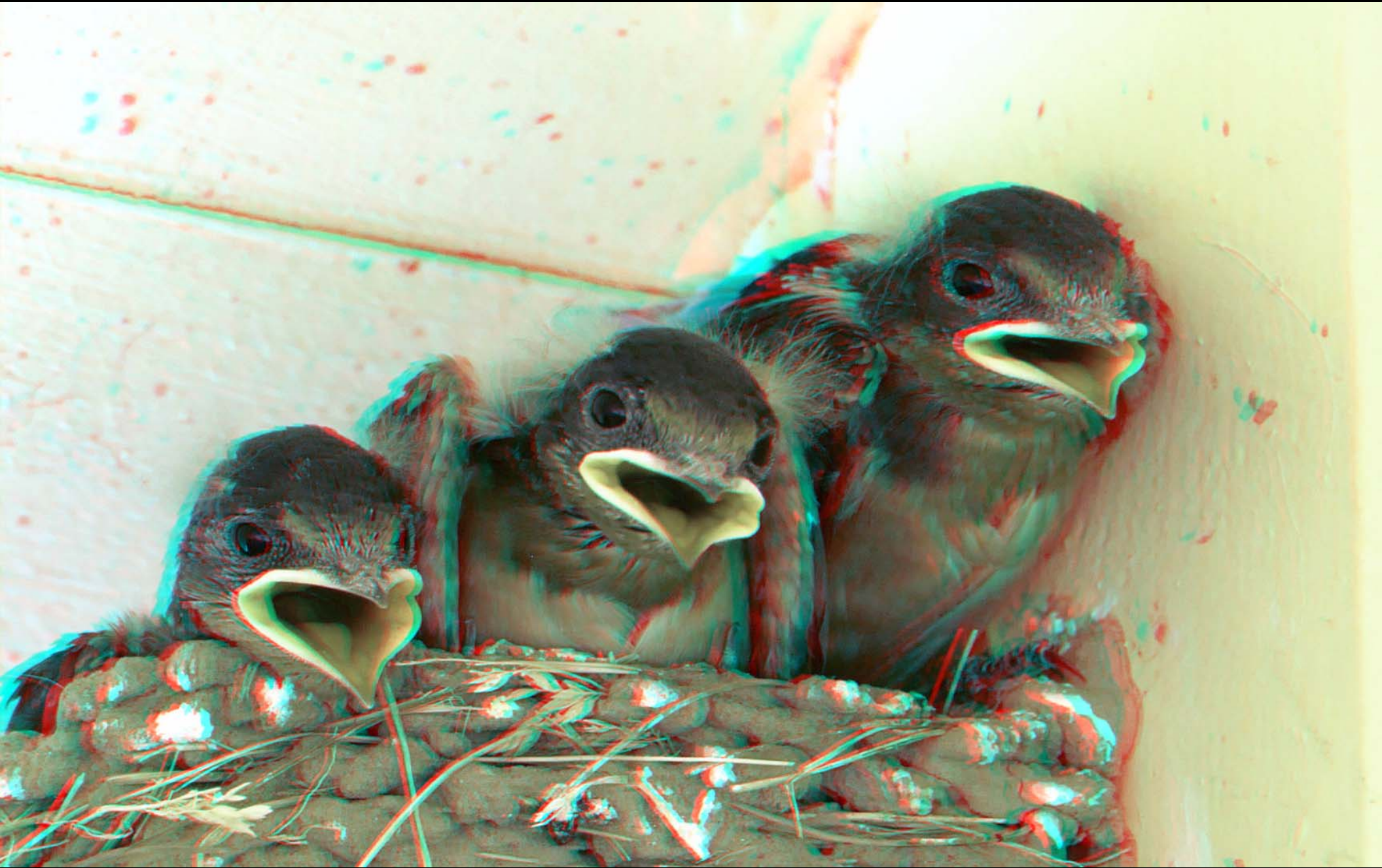
Jasper Vertical Mount



Panasonic GX7 & 300mm



*Twin Sony RX10*

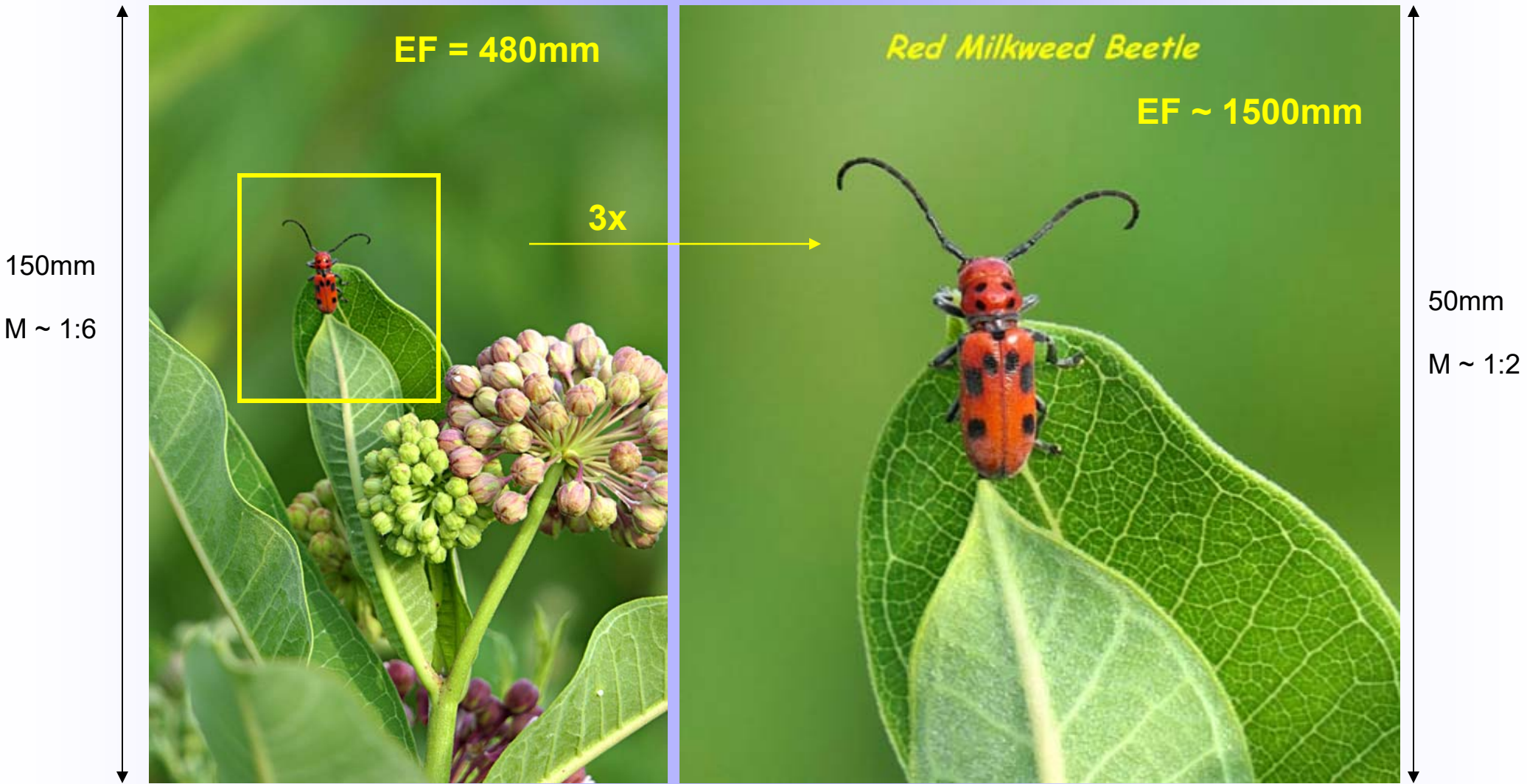








# Panasonic FZ2500



Distance ~ 2m (D ~ 1/15)

# Summary of Equipment for Close-Up

## 1. Single 2D camera

Shift

3D lens



## 2. Stereo camera

As is or shift too (Fuji A3D mode)

Close-up 3D camera

Attachment for 3D camera



## 3. Pair of 2D cameras

As is w/normal lenses (if B is small)

Mirror/prisms (Macrobox, etc.)

Long lenses (& large B)



# Similarity Principle

You can take a close-up with:

- Normal/wide lenses by getting closer (I, II)
- Longer lenses from a longer distance (III)

Pictures that have:

- Same **magnification** ( $M = F/l$ )
- Same **depth ratio** ( $D = B/l$ )

**Look surprisingly similar \***

**if the background is blocked**

if the background is blocked

if the background is blocked

if the background is blocked

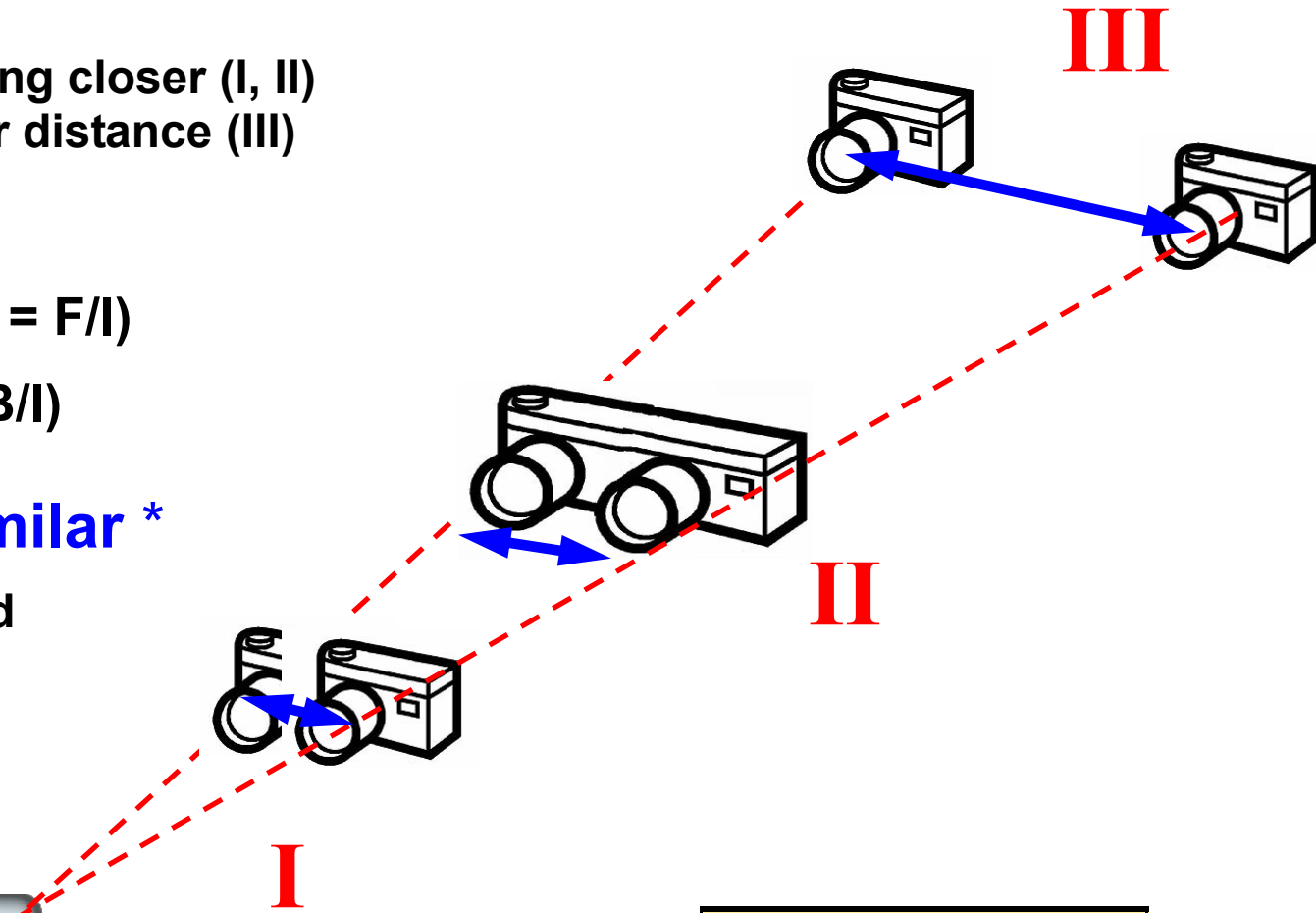
if the background is blocked

if the background is blocked

If the background is blocked

If the background is blocked

\* **Similar** = same size, same stereoscopic deviation but different perspective (ratio of size of near to far object)



<i>Recommended <math>D = B/l</math></i>
<b>~ 1/20</b>

# Summary

- Close-ups are very **effective** in 3D
- **2D Challenge**: Achieve the magnification
- **3D Challenge**: Control the deviation
- Recommendation: **Stereo Base / Distance ~ 1/20**

## Equipment:

- For starters use a **single camera**  
or a **stereo camera** (stay back and zoom in)
- The **Panasonic 3D1** (B=30mm) is good close-up stereo camera
- The **Panasonic 3D lens** (B=10mm) is a good way to experiment with close ups.