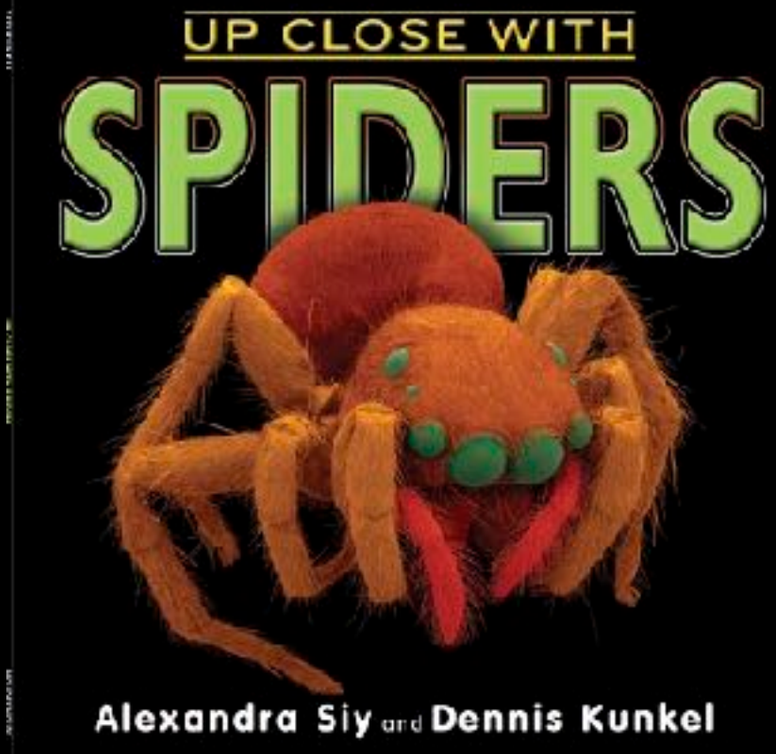
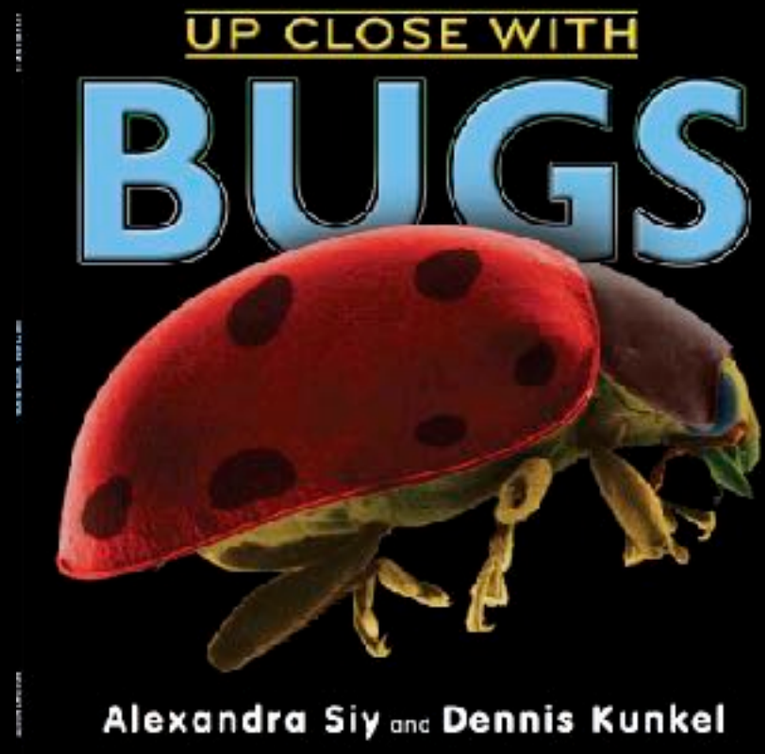
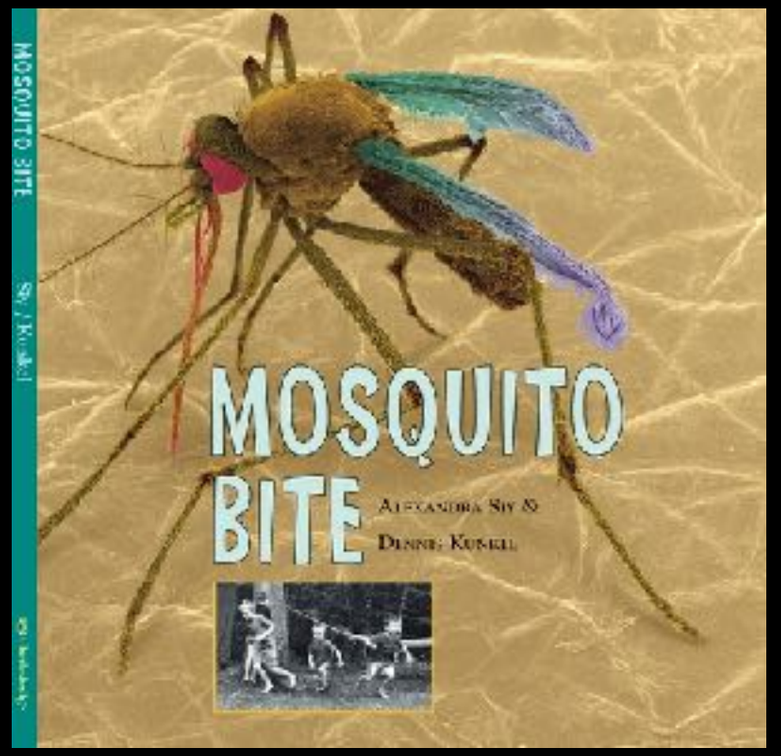
Magnification:
The Science-Literature Connection

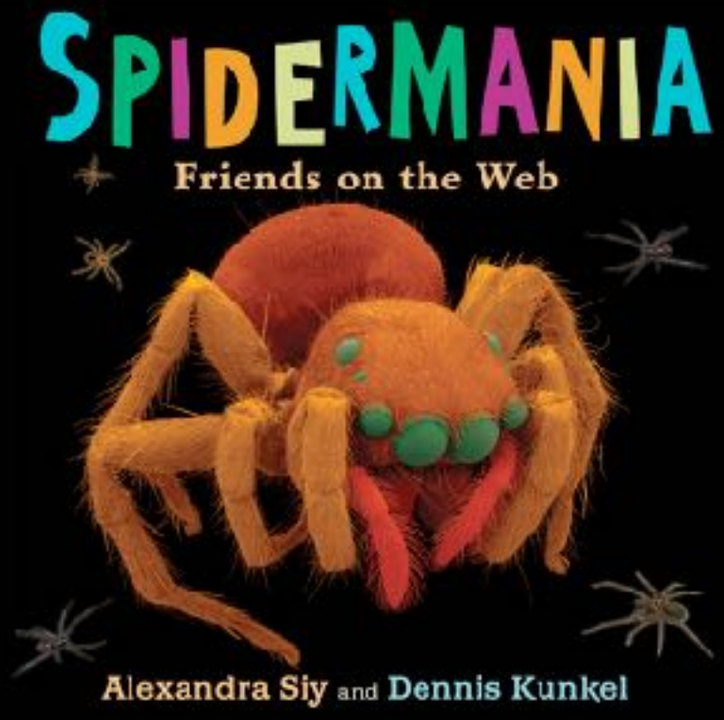
with

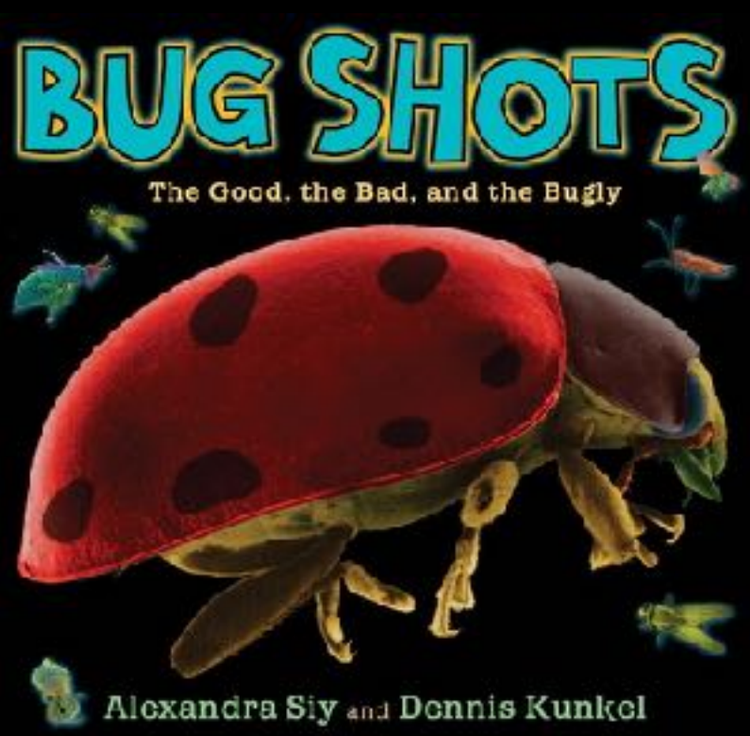
Author Alexandra Siy

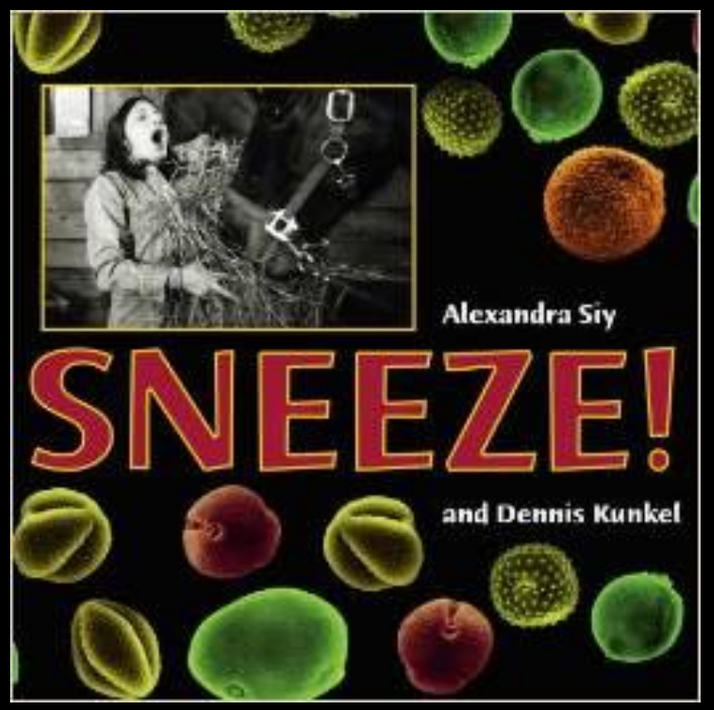

UP CLOSE WITH
SPIDERS
Alexandra Siy and Dennis Kunkel


UP CLOSE WITH
BUGS
Alexandra Siy and Dennis Kunkel


MOSQUITO BITE
MOSQUITO BITE
Alexandra Siy &
Dennis Kunkel


SPIDERMANIA
Friends on the Web
Alexandra Siy and Dennis Kunkel


BUG SHOTS
The Good, the Bad, and the Bugly
Alexandra Siy and Dennis Kunkel


Alexandra Siy
SNEEZE!
and Dennis Kunkel

Read a book!

Study the pictures.

Ask questions.

Now, let’s magnify!

MAGNIFICATION

MAGNIFICATION

x3

MAGNIFICATION

x5

x1
MAGNIFICATION

x3
MAGNIFICATION

x5
MAGNIFICATION

CHANGE OF SCALE:

x1

small

x2

to

x4

BIG

How can you calculate the size of an object if you know the magnification?

$$\text{magnification} = \frac{\text{image size}}{\text{actual size}}$$

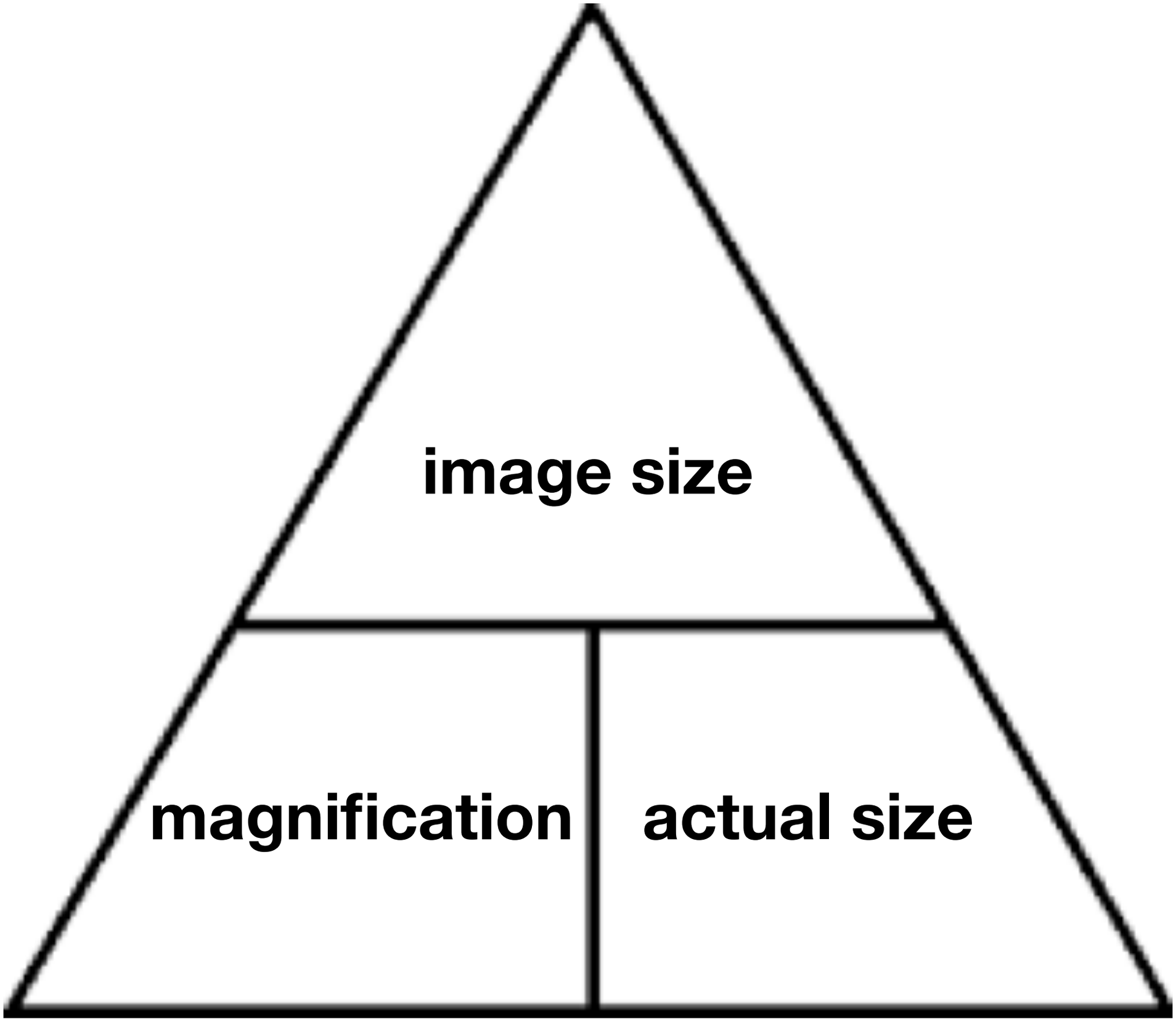


image size
magnification
actual size

Calculating Specimen Size using Magnification

1. Measure the length of the specimen. The bedbug is 7.6 cm across.

2. Convert to millimeters or micrometers. The bedbug is 76 mm across.

3. Divide the length of the specimen by the magnification. The magnification is x22.

76 mm / 22 = 3.45 mm

A bedbug is a flat, oval-shaped, reddish brown bug about the same size across as a pencil eraser. (x22)

Check your answer!
Is there information in the caption that will help you know if your answer is correct?

A bedbug is a flat, oval-shaped, reddish brown bug about the same size across as a pencil eraser. (x22)

Yes, the eraser is close to the same size as the bedbug!

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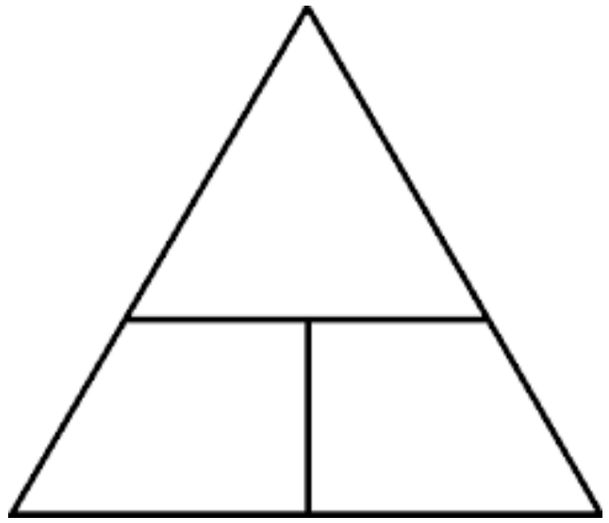
Use the information in the slide show to complete these notes.



MAGNIFICATION = _____

The micrometer (μm), is a unit of measurement used in microscopy. There are one million micrometers in a meter, and one thousand micrometers in a millimeter.

1 mm = _____μm

Calculating Specimen Size Using Magnification

1. Measure_____
2. Convert_____
3. Divide_____

Vocabulary:
compound light microscope: tool that uses more than one lens and a light source to magnify.
electron microscope: tool that uses electromagnetic lenses (circular magnets) and electrons to magnify producing greater detail and higher magnification.
magnification: ability of microscope to make objects appear larger; magnification is the ratio of the size of the image to the size of the object
metric ruler: tool used to measure length of an object
micrometer: a unit of length equal to one millionth of a meter; 1 mm = 1,000 μm
microscope: tool that enhances our sense of sight.
resolving power: ability to distinguish between two objects.
stereoscope: microscope that uses two eyepieces and a light source to magnify; also called a dissecting microscope.

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Titles:
Up Close with Bugs; Up Close with Spiders, Mosquito Bite, Sneeze!

Calculating specimen size using magnification

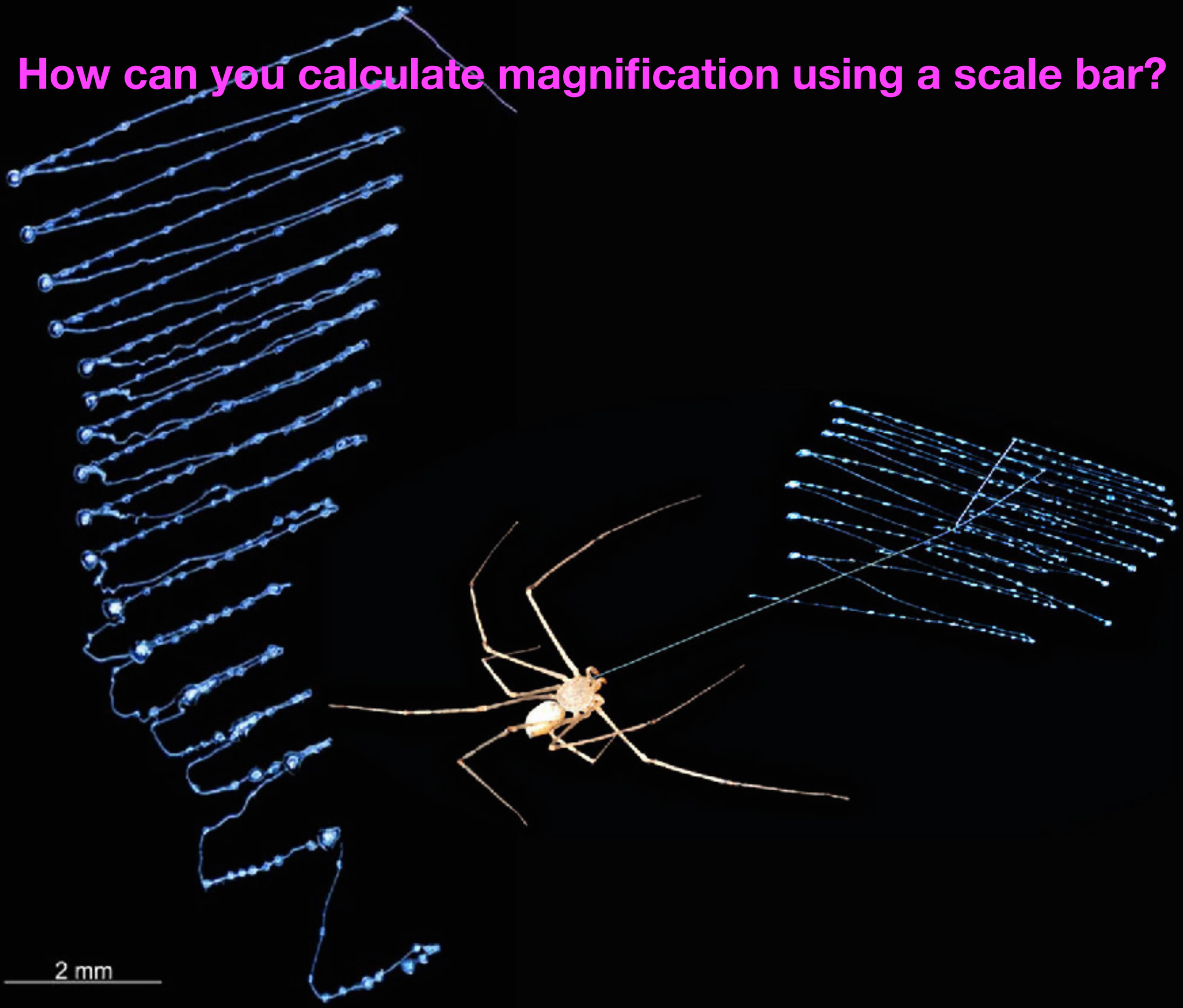
Directions:

1. Choose a title from books featuring electron micrographs.
2. Choose an image that you like. Read the caption and magnification.
3. Choose a structure within the image to measure. Use the plastic metric ruler to measure the structure in mm.
4. Calculate the size of the structure in micrometers using the formula.
5. Record your work in the box below.
6. Trade books with your partner and measure the structure they chose. Record work in the second box.
7. Compare results with your partner.

Title of book:
Page number:
Description of image:
Magnification:
Structure being measured:
Length of structure in mm:
Length of structure in µm:
Actual size of structure in µm (show work):

Title of book:
Page number:
Description of image:
Magnification:
Structure being measured:
Length of structure in mm:
Length of structure in µm:
Actual size of structure in µm (show work):

How can you calculate magnification using a scale bar?



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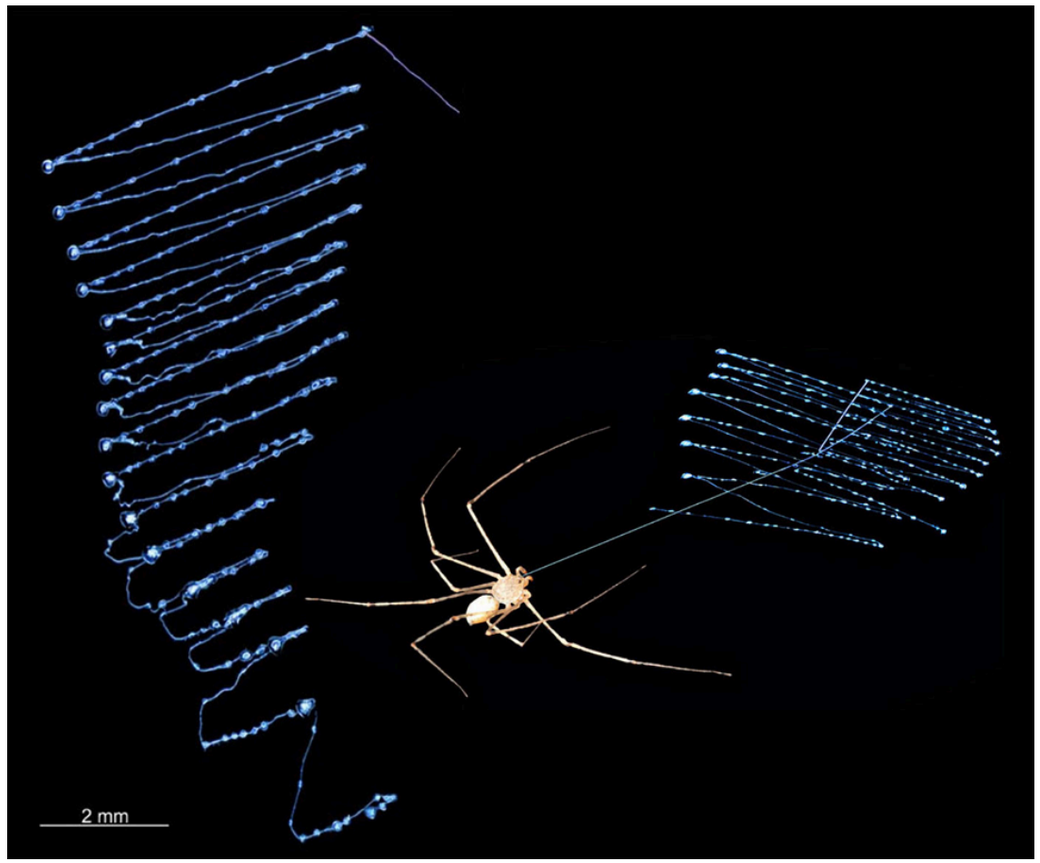
A Magnification Challenge:
Photographs and diagrams often have scale bars (see lower left of image) to show the degree of magnification. How could you use the scale bar in the image below to determine the magnification? Hint: use the equation triangle.
How large is the spitting spider?



Spitting Spider with spit pattern photographed on glass slide. ©Charles E. Griswold, Ph.D.
(This image is featured on the title page of Spidermania: Friends on the Web by Alexandra Siy