Art in Science & Science in Art

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nowadays, we think of "The Arts" as two pretty separate fields and "The Sciences".
but this was not always the case...

before

telescopy 1608

microscopy 1609

photography 1826

scientists often had to be artists too
before telescopes

- 1st telescopic drawing of the moon: Galileo 1600s
- 1st photograph of the Moon: J. W. Draper 1840

after telescopes

- Composite of 1000s of satellite photos: Andrew McCarthy 2020
before microscopy

disease in the Middle Ages

after microscopy

1st drawings of cells under a microscope

Antonie van Leeuwenhoek
1680s

early micrograph of blood cells

Richard Hill Norris
1850s

electron micrograph of the coronavirus

Fred Murphy
2020
before & after photography

silkworm life cycle
Maria Sibylla Merian 1600s

artist unknown 1670s

National Geographic

“composite” taxidermy specimen of the extinct dodo

1st platypus illustration shared with the world
John Lewin 1808

National Geographic
artist’s interpretations were important for communication about the natural world
how are Art and Science coming together again?

plastic bottles
new scientific methods allow researchers to collect more **data** than ever before but we still need art to help us “see” these **data**

climate change  disease  genetics
in my own research I use **art** to help communicate **science**

I’m a **biologist** studying **ECOLOGY** and **EVOLUTION**

I study lizard adaptation to a unique white sand habitat in the New Mexico desert

I study fish adaptation to climate change in California estuaries & streams
in New Mexico, I compare how 3 different lizard species have adapted to white sands

White Sands is like a big sandbox in the middle of the desert
lizards are camouflaged in each habitat

on the brown soil, lizards are dark in color

on the white sand, lizards are white in color

Lesser Earless Lizard
Southwestern Fence Lizard
Little Striped Whiptail Lizard
what do the lizards look like at the border or “ecotone” between White Sands and the dark soil desert?

even though the ecotone has white sand... lizard color is really variable
surprisingly, on the ecotone lizards that are more white do not survive any better than lizards that are more dark

why?
in California, I look at how stickleback fish have adapted to climate change
stickleback that live estuaries with fast water (more river-like) have more bony plates

stickleback that live estuaries with slow water have fewer bony plates
there is a relationship between number of plates and how “river-like” or “pond-like” an estuary is

if there is **less rain**, would estuaries be more river-like or pond-like?

would fish have more or fewer plates?
in southern California, drier weather means estuaries are more pond-like, so stickleback have fewer plates
if climate change is making weather drier everywhere, how are the estuaries changing?

how are stickleback adapting?
you may have noticed that I use a lot of artwork in my research

I have also started to use a lot of my scientific understanding in my artwork

this is really similar to early artists, who also had to be scientists
early artists also had to be scientists

before
Prussian Blue 1704
Chrome Yellow 1820
Alyzarin Red 1868
before Prussian Blue
blue was made by simple chemistry

Egyptian Blue was a **synthetic pigment** created 5000 years ago by mixing copper with a calcium, silica sand and potash (a strong base)

before Yellow Oxide
yellow was made by grinding rocks

Yellow ochre was an **earth (mineral) pigment** used in some of the first known art by humans in ancient caves

before Alizarin Red
red was collected from insects and plants

Crimson Lake was an **organic pigment** collected from kermes insects; Madder Lake was from roots of the madder plant.
we can use an understanding of science to create art from nature

making our own pigments...

is fun!
is sustainable
connects us with nature

indigo I collected in Costa Rica
ochre workshop in California
making pigments from flowers
many organic pigments are very sensitive to pH changes!

look at how the color of Oregon grape berries change with lemon (acidic) and BAKING SODA (basic)
the moral of my story: you don’t have to choose between art and science!

you can be both an artist and a scientist.

but don’t be surprised when your art seeps into your science and vice versa!