



BERKELEY LAB

Bringing Science Solutions to the World



U.S. DEPARTMENT OF
ENERGY

Office of Science

ADVANCED LIGHT SOURCE

Presenter: Ina Reichel, Accelerator Technology and Applied Physics Division

#bestviewfromalab



Chemical mapping



Better batteries



3D imaging



Sustainable agriculture



Ne RSC

Functional materials

Power-efficient computing



Nanocatalysis

Precision chemistry




Structural biology

Targeted medicine



Quantum materials

Advanced transportation



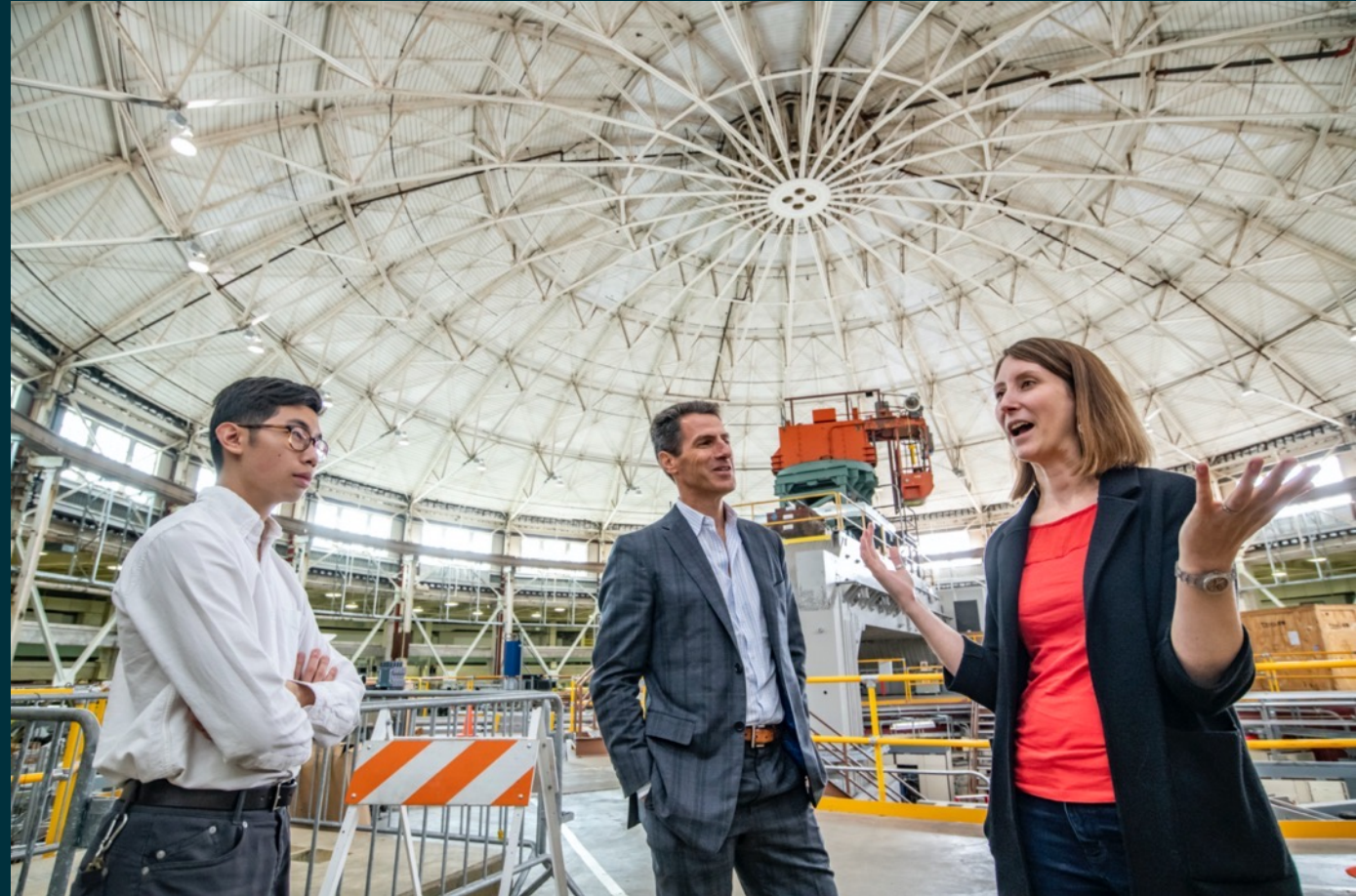


999W

Advanced Light Source

Today's Questions

1. What is a synchrotron light source?
2. How do researchers use the ALS?
3. What discoveries have come out of the ALS?



Advanced Light Source

Today's Stops

1. Accelerator



Advanced Light Source

Today's Stops 2. Beamlines



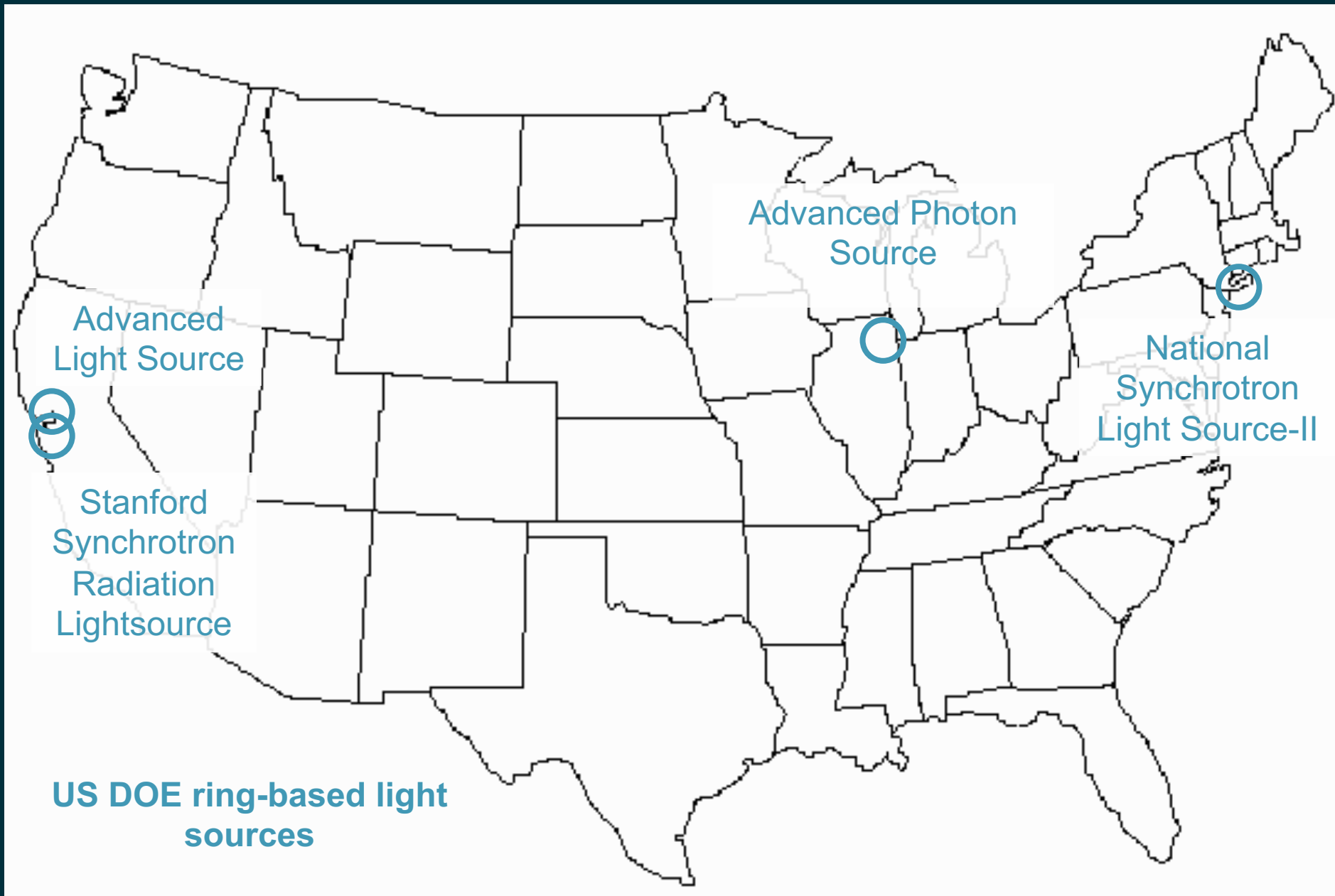
What is a synchrotron light source?

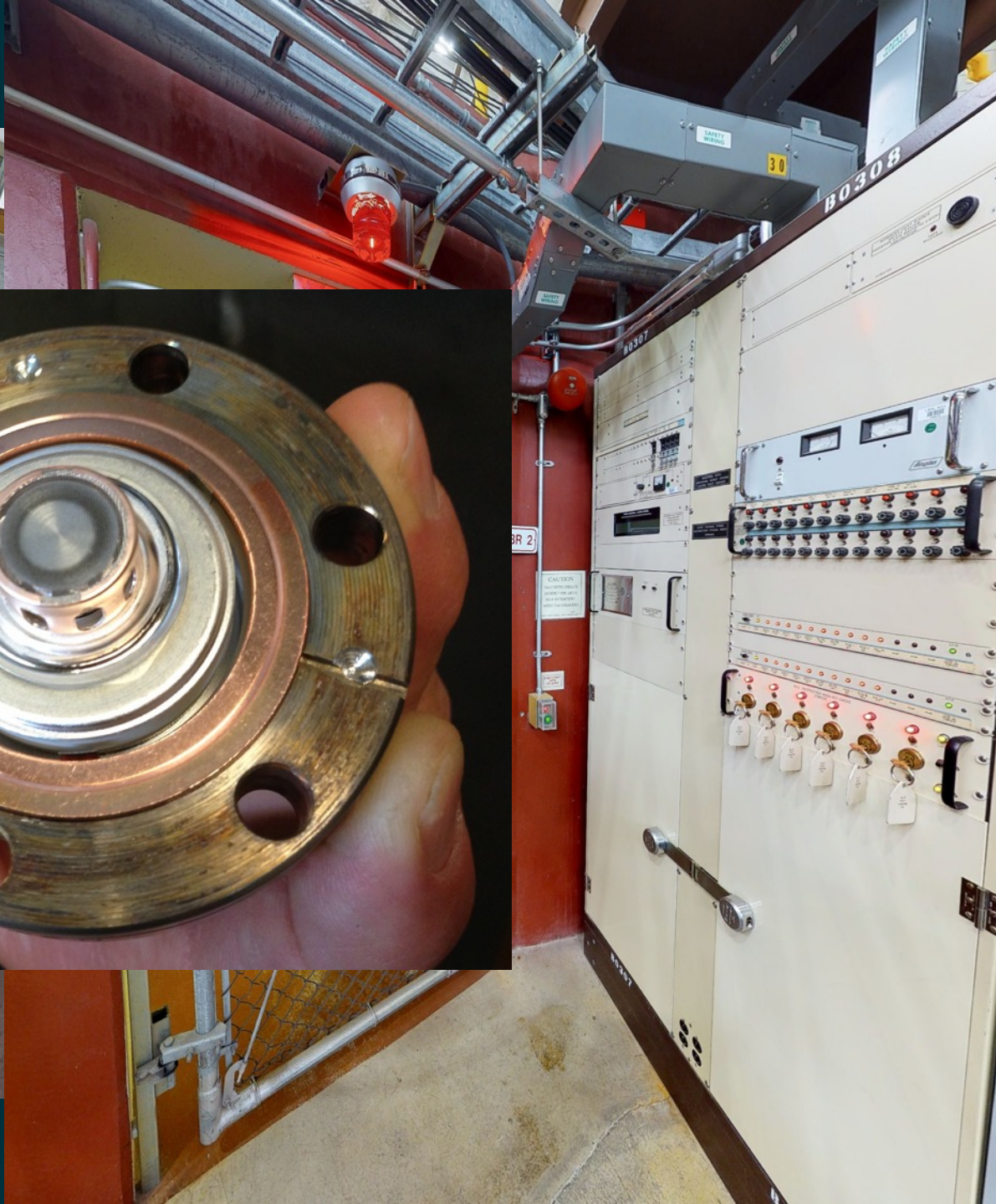
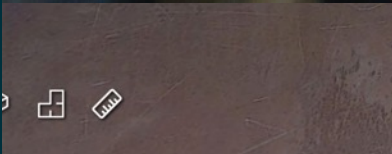
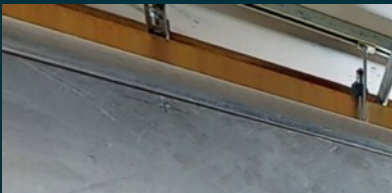
1940s - cyclotron



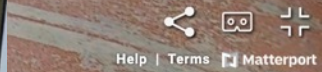
2020 - synchrotron







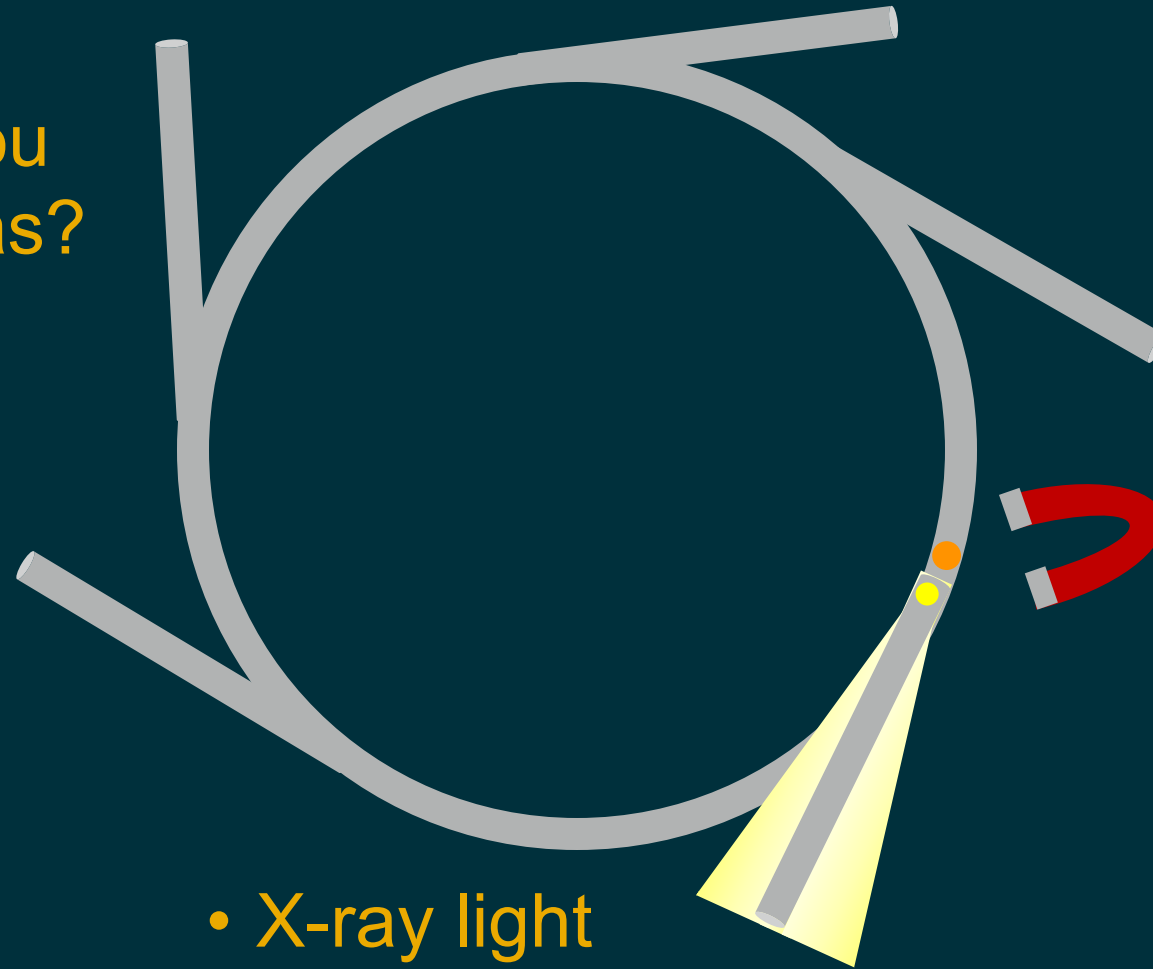
Sheet View



What is a synchrotron light source?

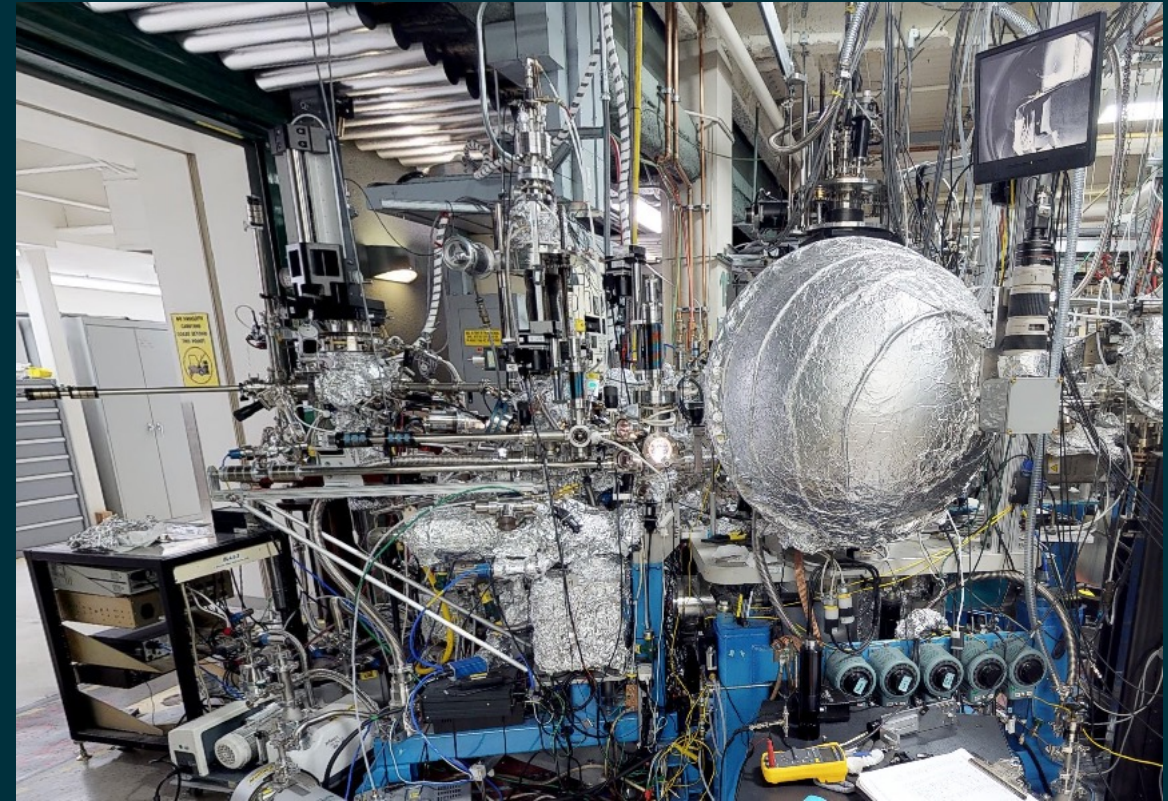
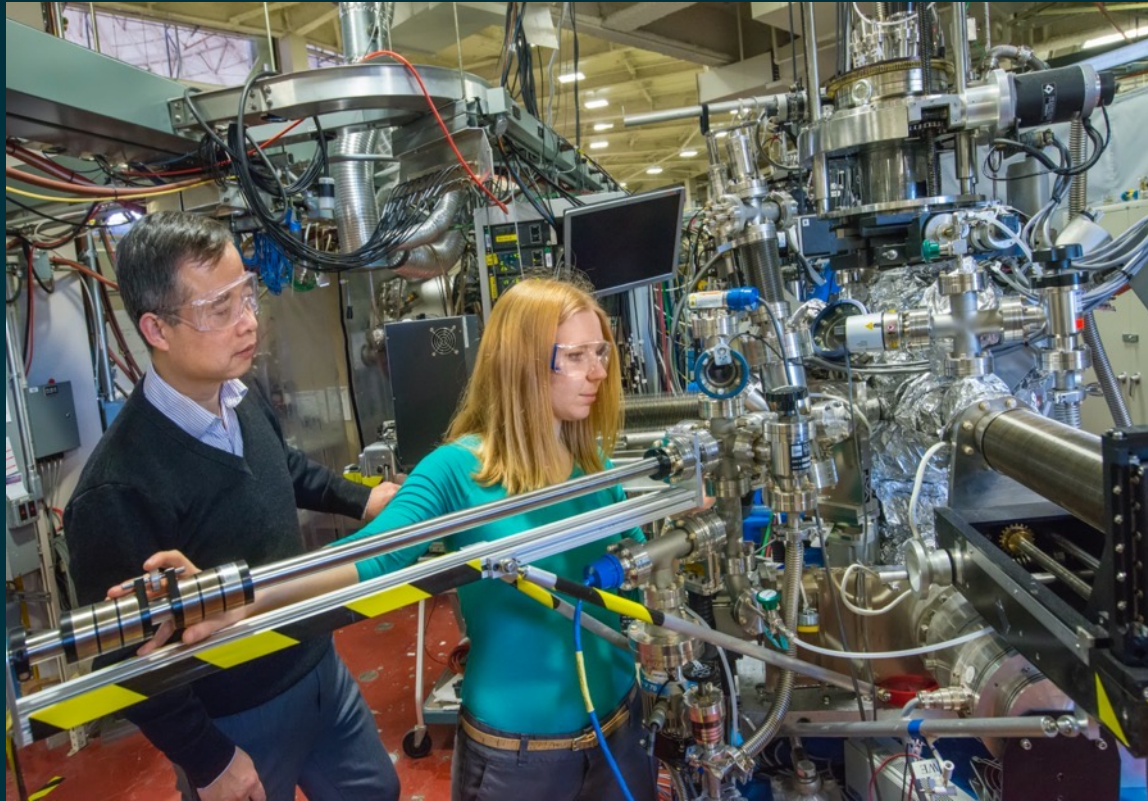
How many beamlines do you think the ALS has?

- 10
- 15
- 20
- 30
- 40
- 60
- 80



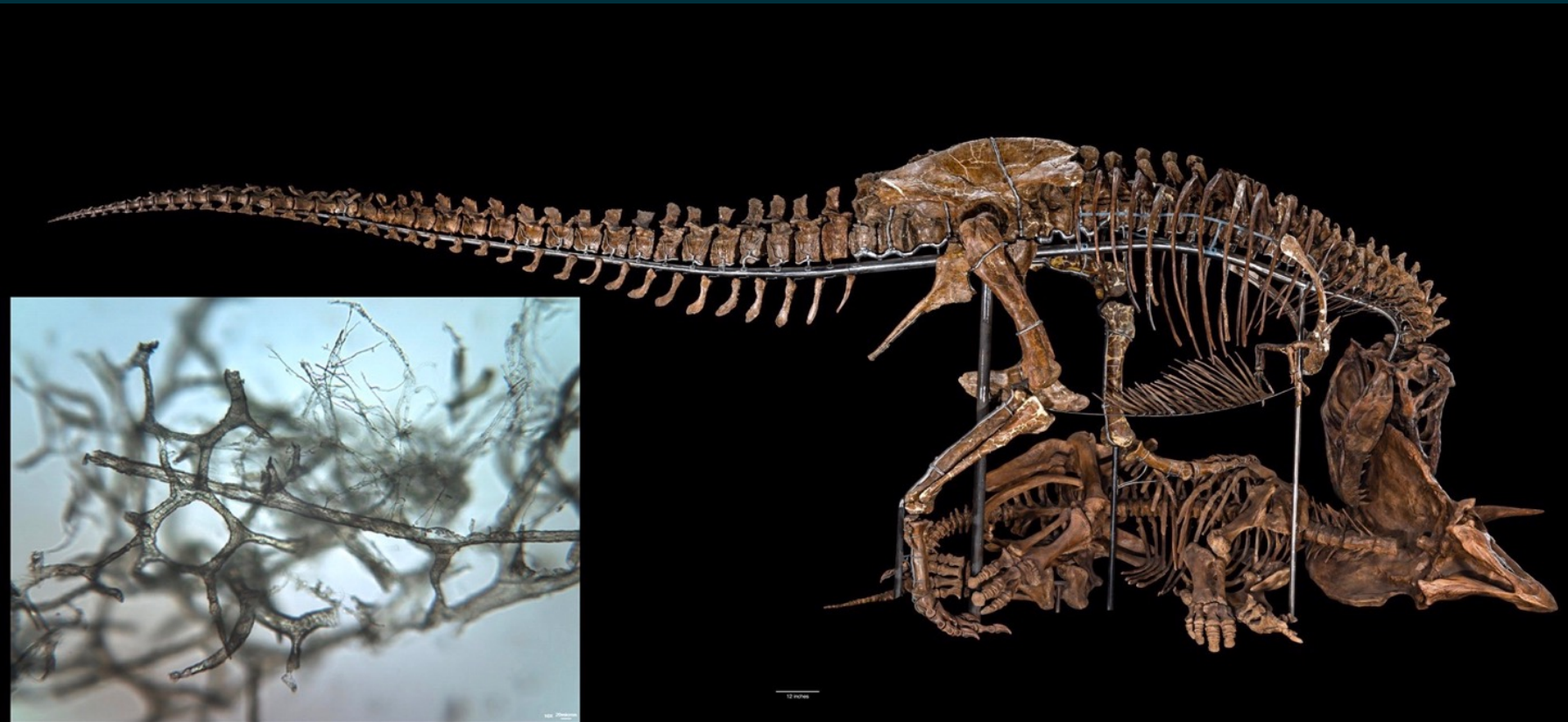
- X-ray light
- Infrared light
- Ultraviolet light

What is a synchrotron light source?



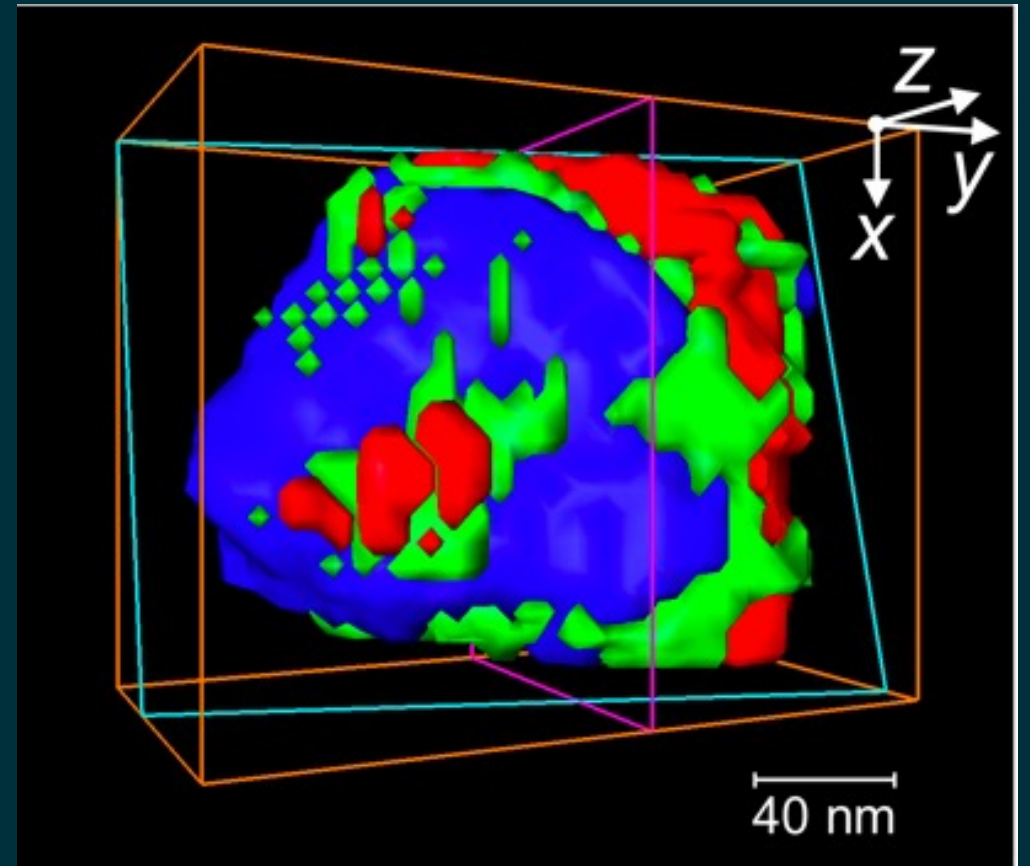
How do researchers use the ALS?

- What elements are in these dinosaur bones?



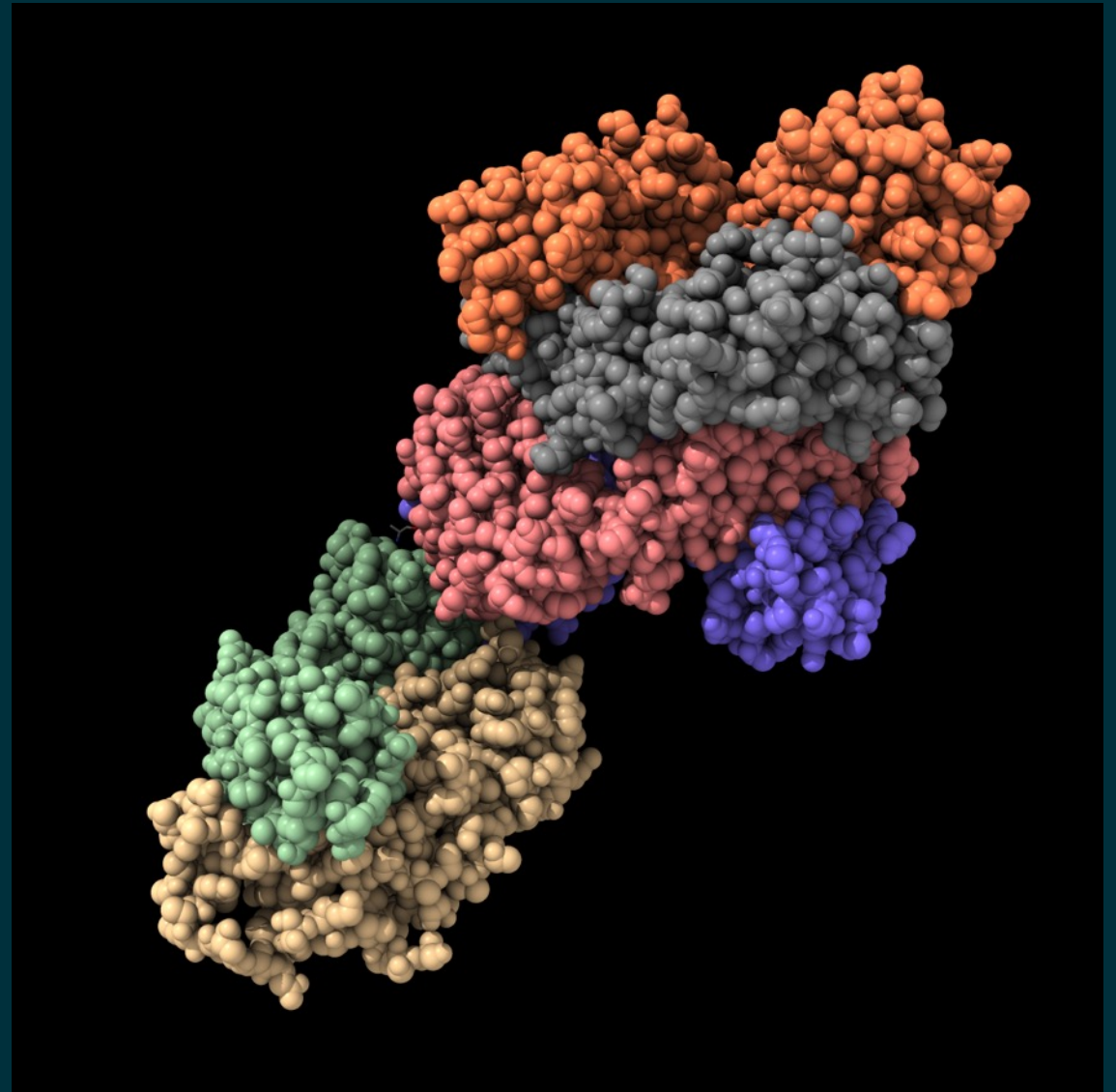
How do researchers use the ALS?

- What elements are in these dinosaur bones?
- What are the lithium ions doing in my battery?



How do researchers use the ALS?

- What elements are in these dinosaur bones?
- What are the lithium ions doing in my battery?
- What's the shape of this mystery protein?



How do researchers use the ALS?

- What elements are in these dinosaur bones?
- What are the lithium ions doing in my battery?
- What's the shape of this mystery protein?
- What's the best design for the tiny chip in my smartphone?



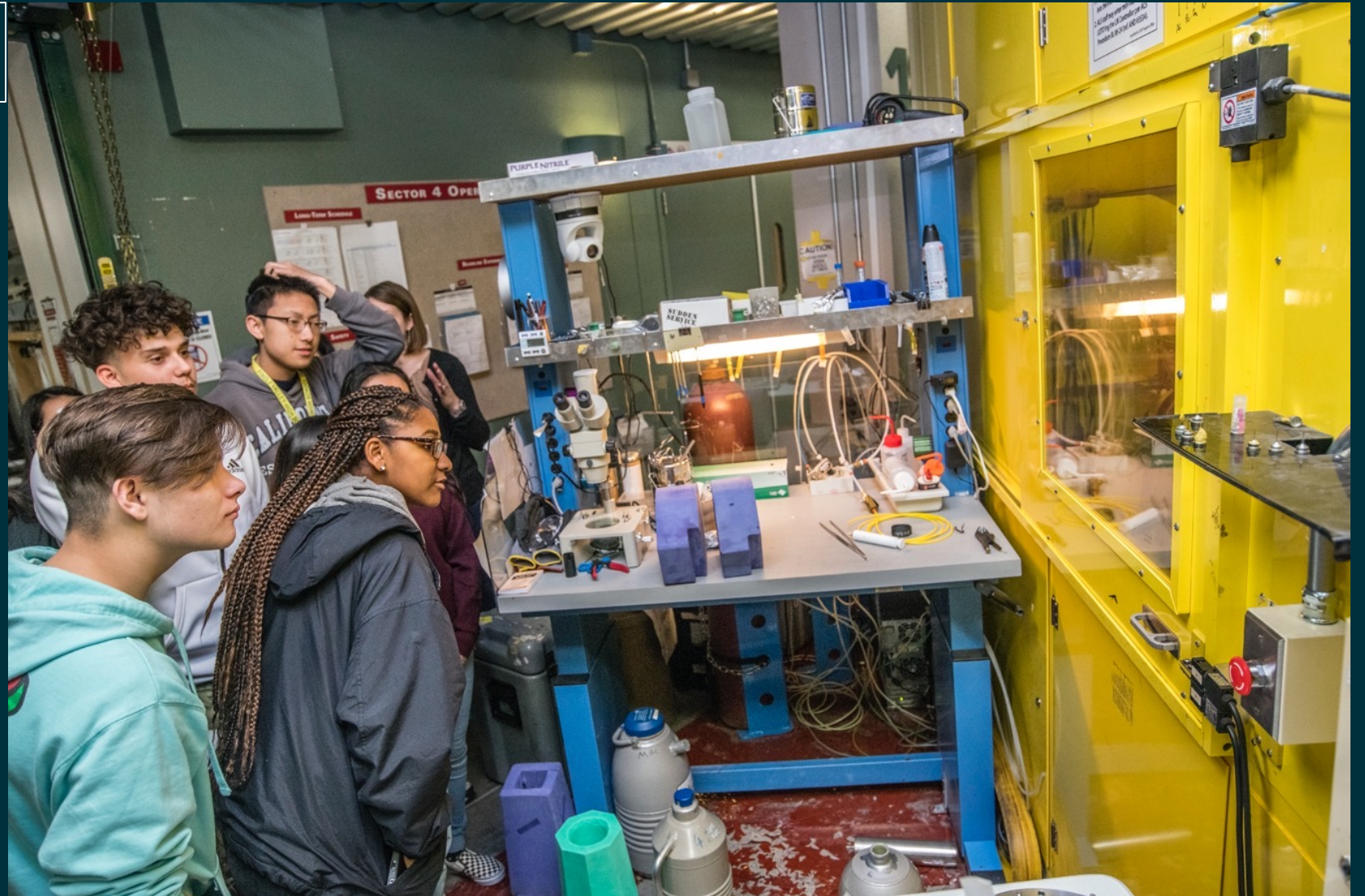
How do researchers use the ALS?

Beamline 4.0.3

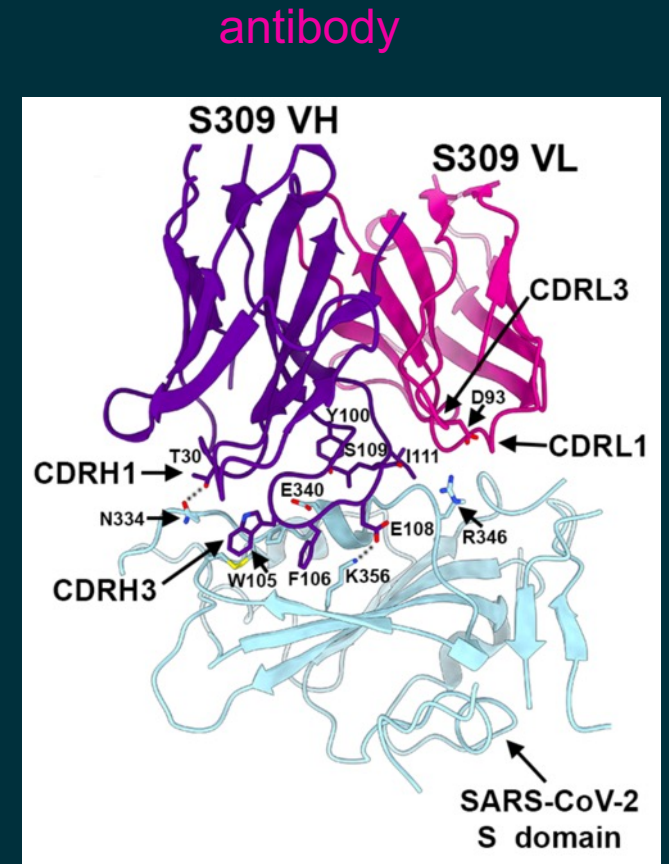
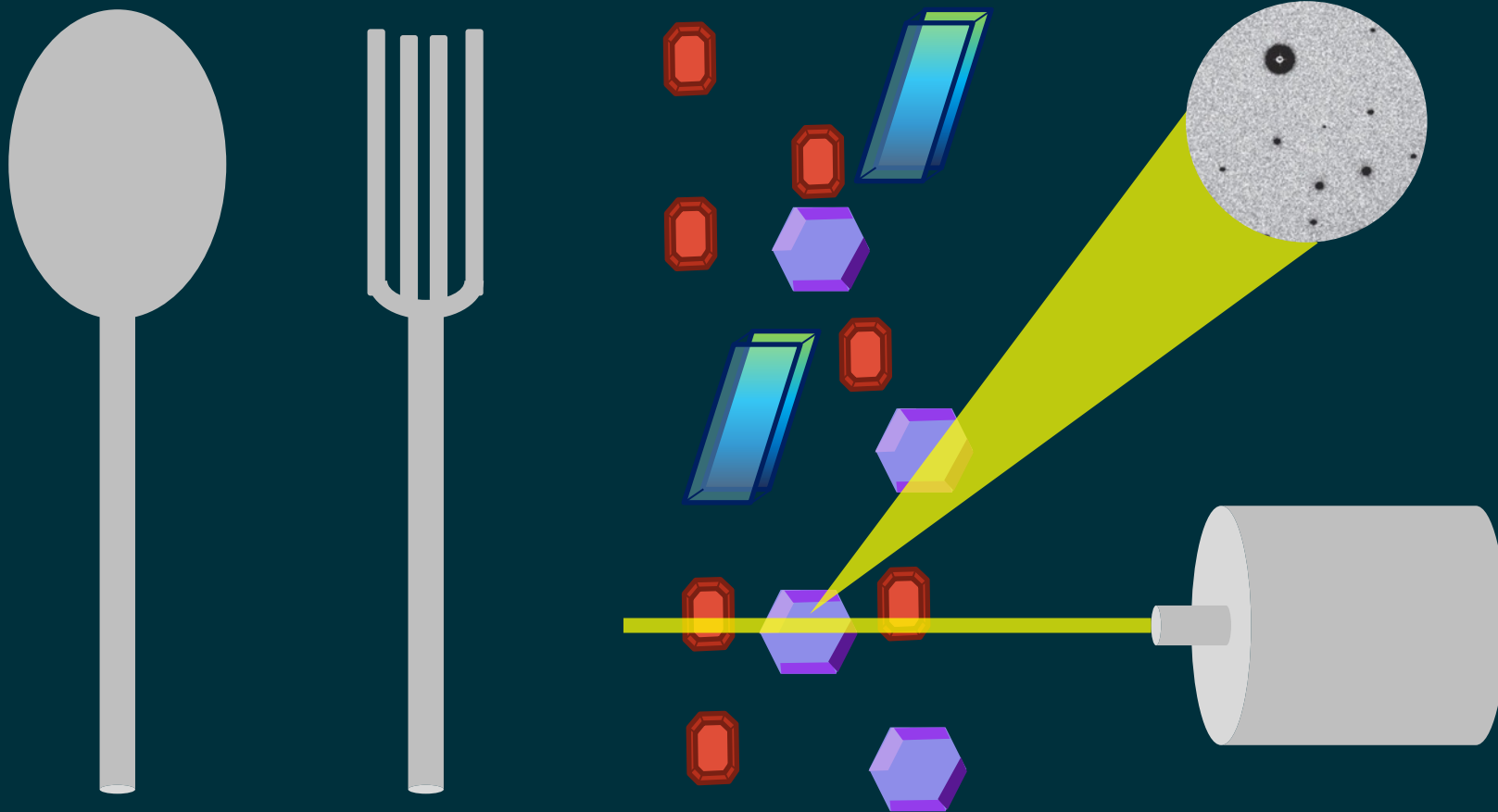


How do researchers use the ALS?

Beamline 4.2.2



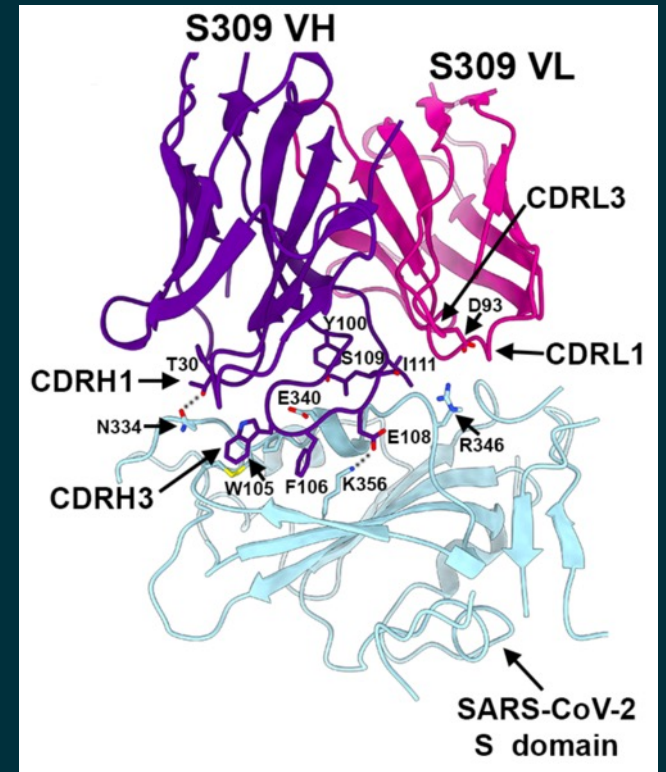
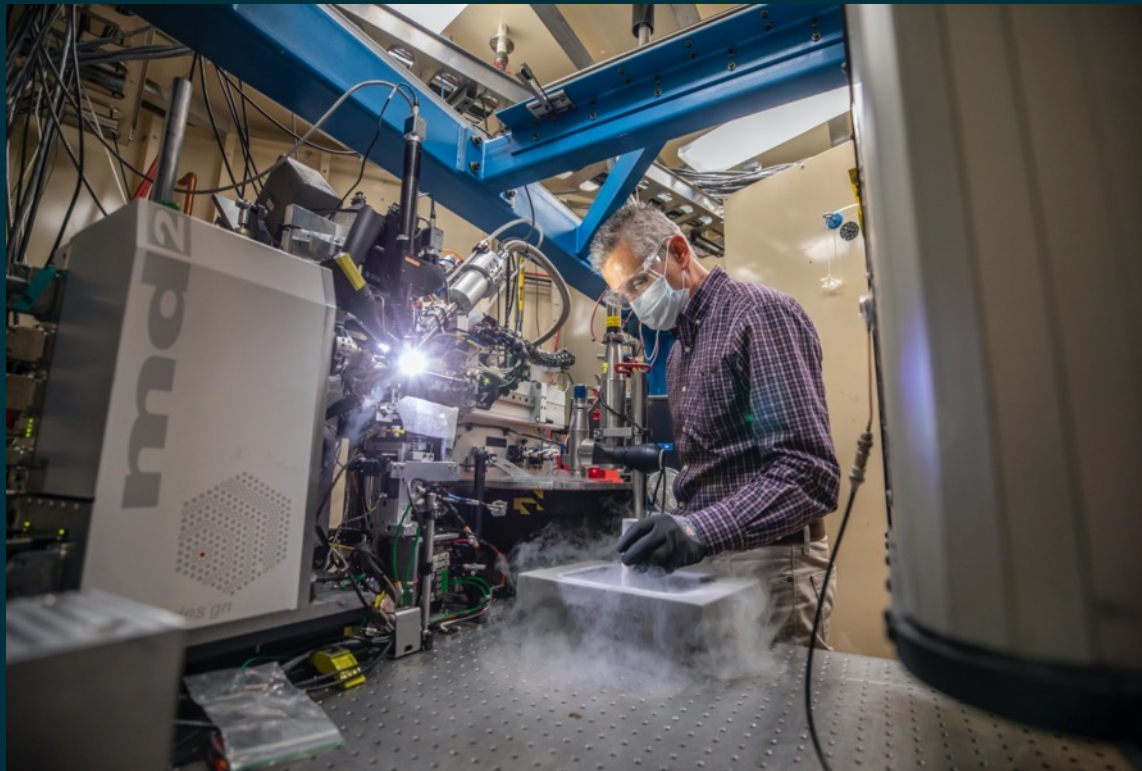
Structural biology in the fight against COVID



virus

Structural biology in the fight against COVID

2003: SARS-CoV
2019: SARS-CoV-2



antibody

virus

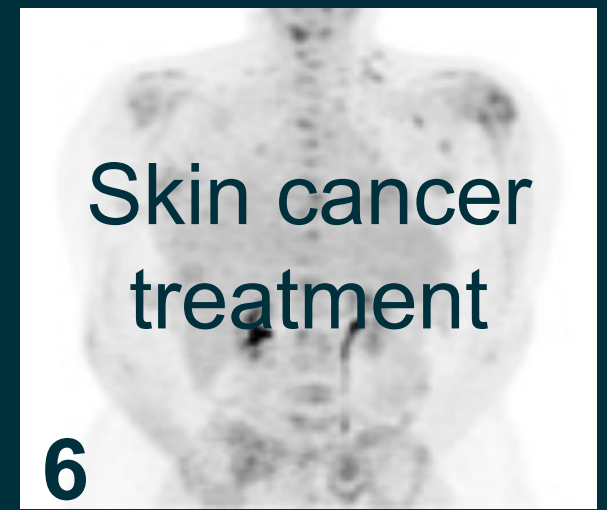
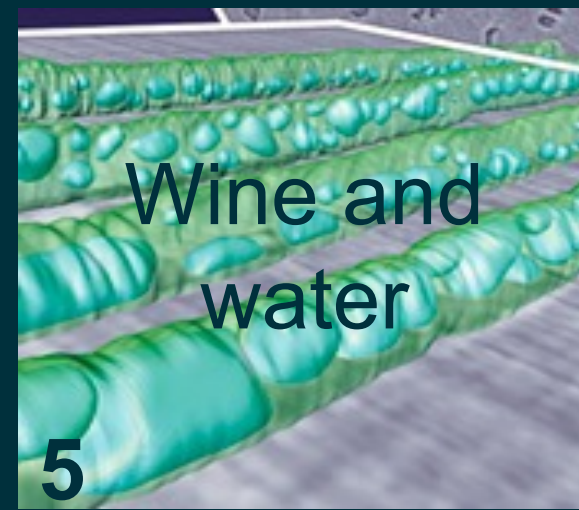
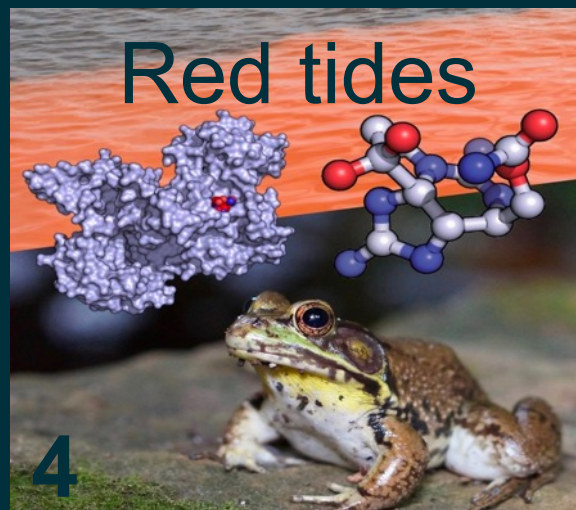
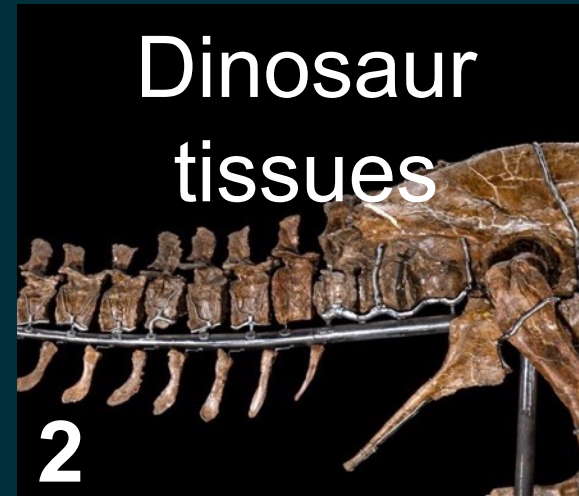
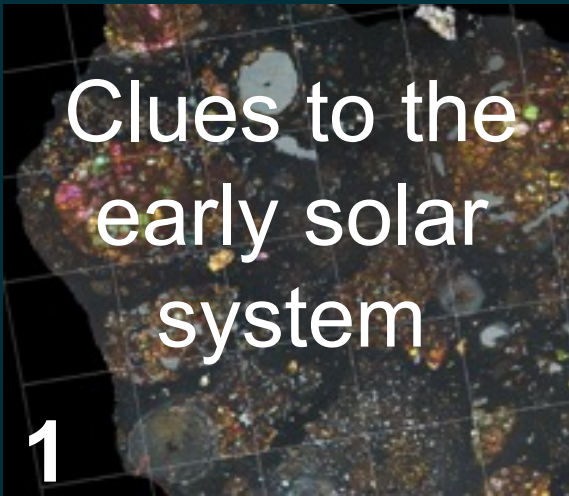
How do researchers Use the ALS?

Beamline 11.3.2

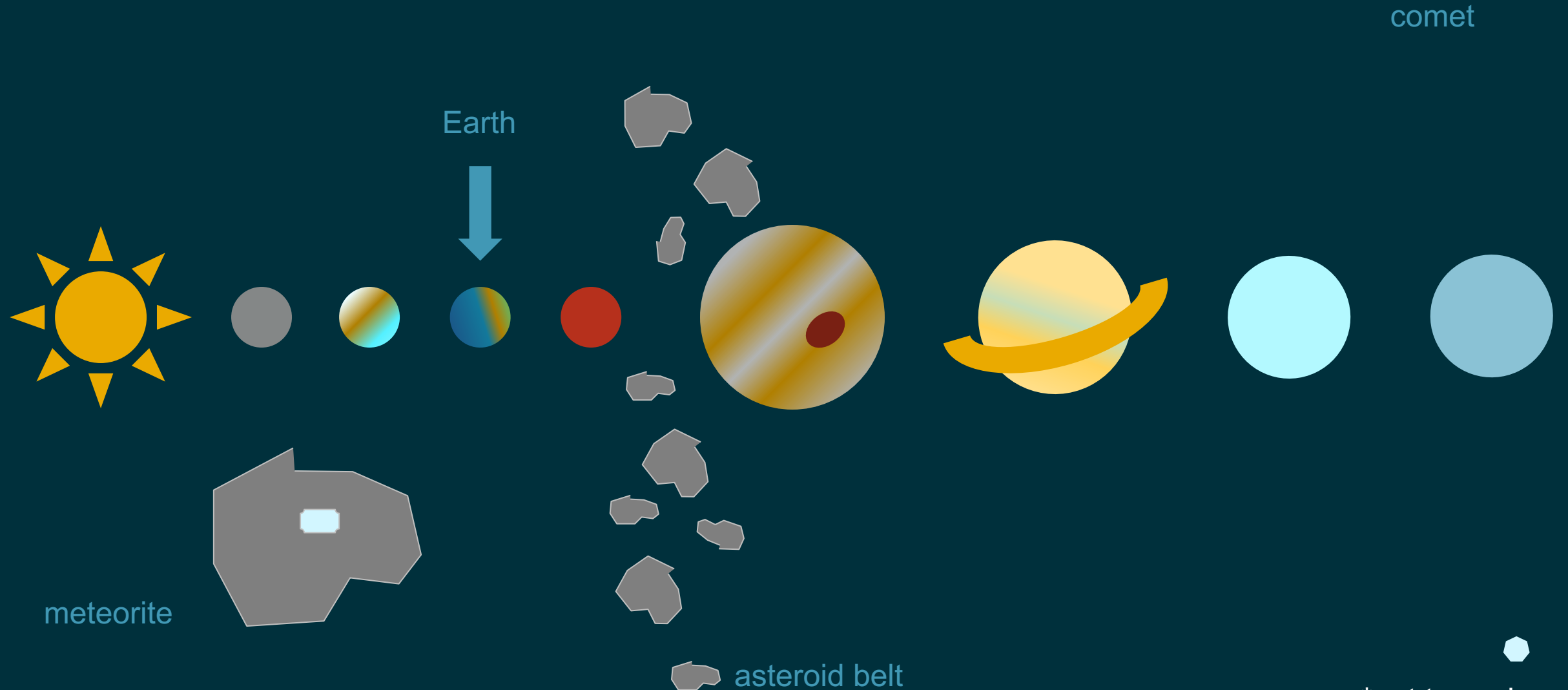


What discoveries have come out of the ALS?

What do you want to learn about?

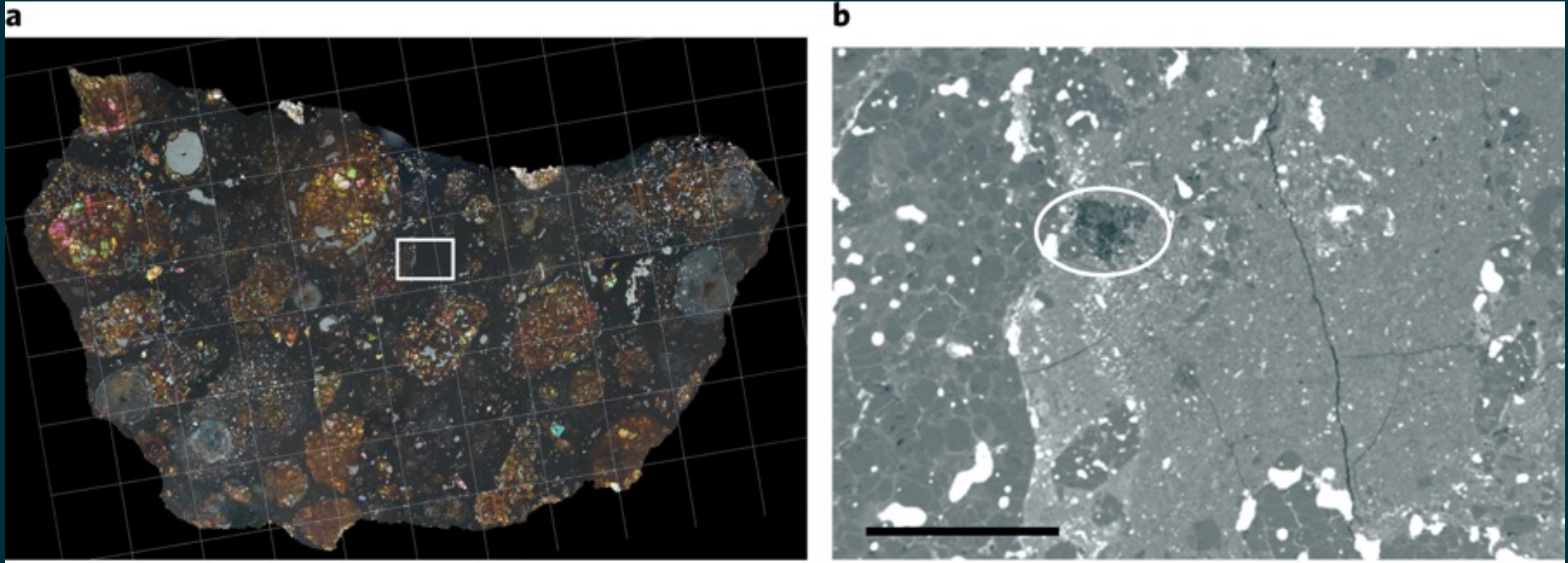


Clues to the early solar system preserved in a meteorite

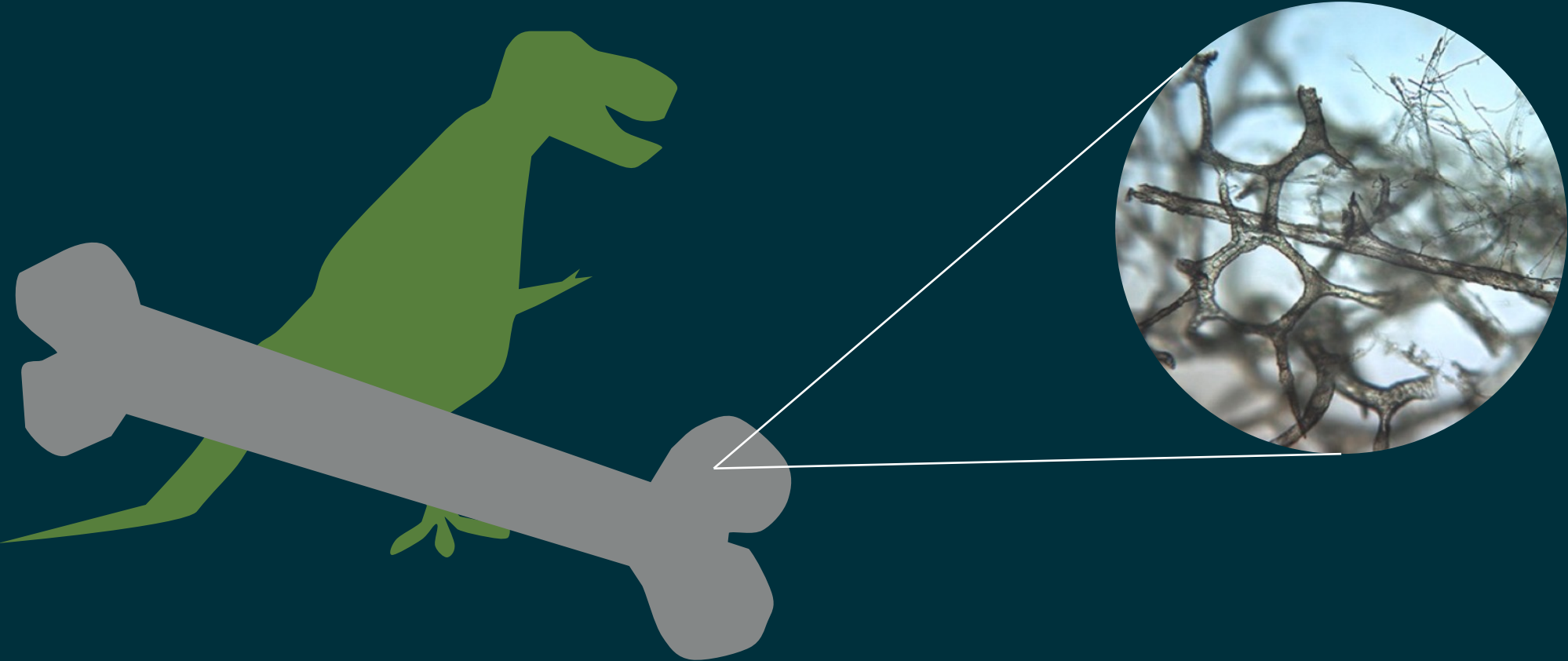


*not to scale

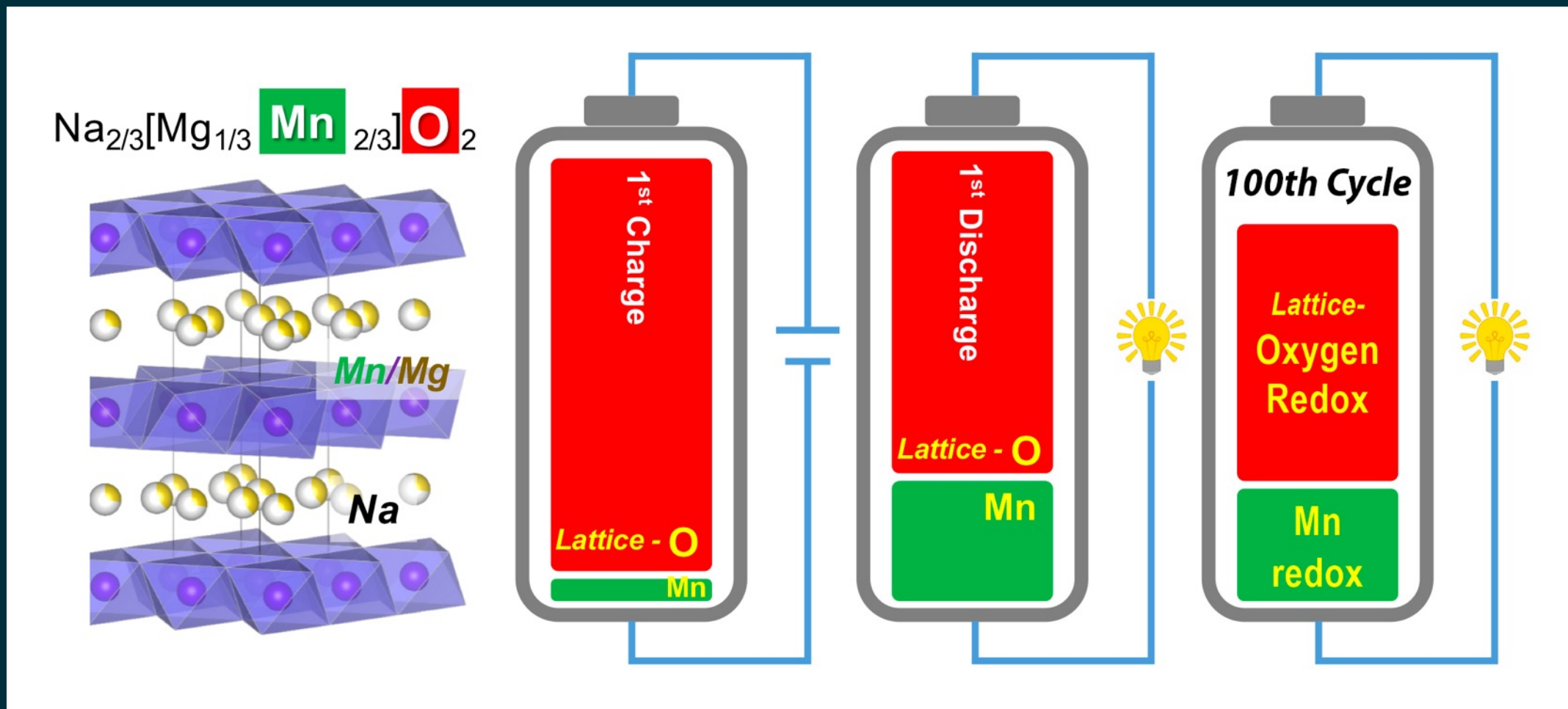
Clues to the early solar system preserved in a meteorite



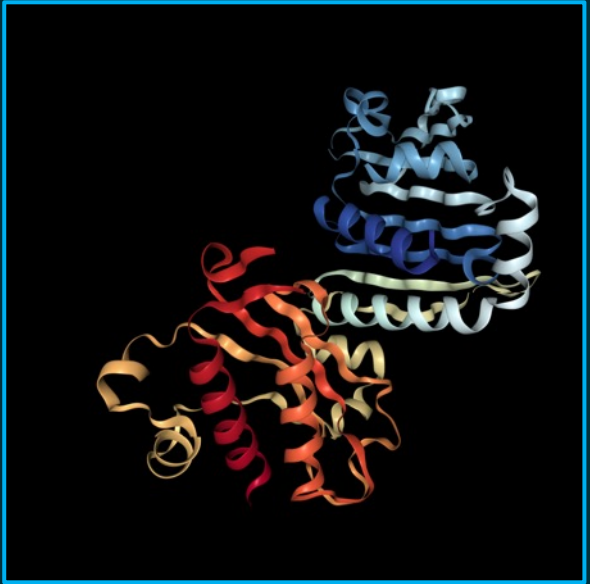
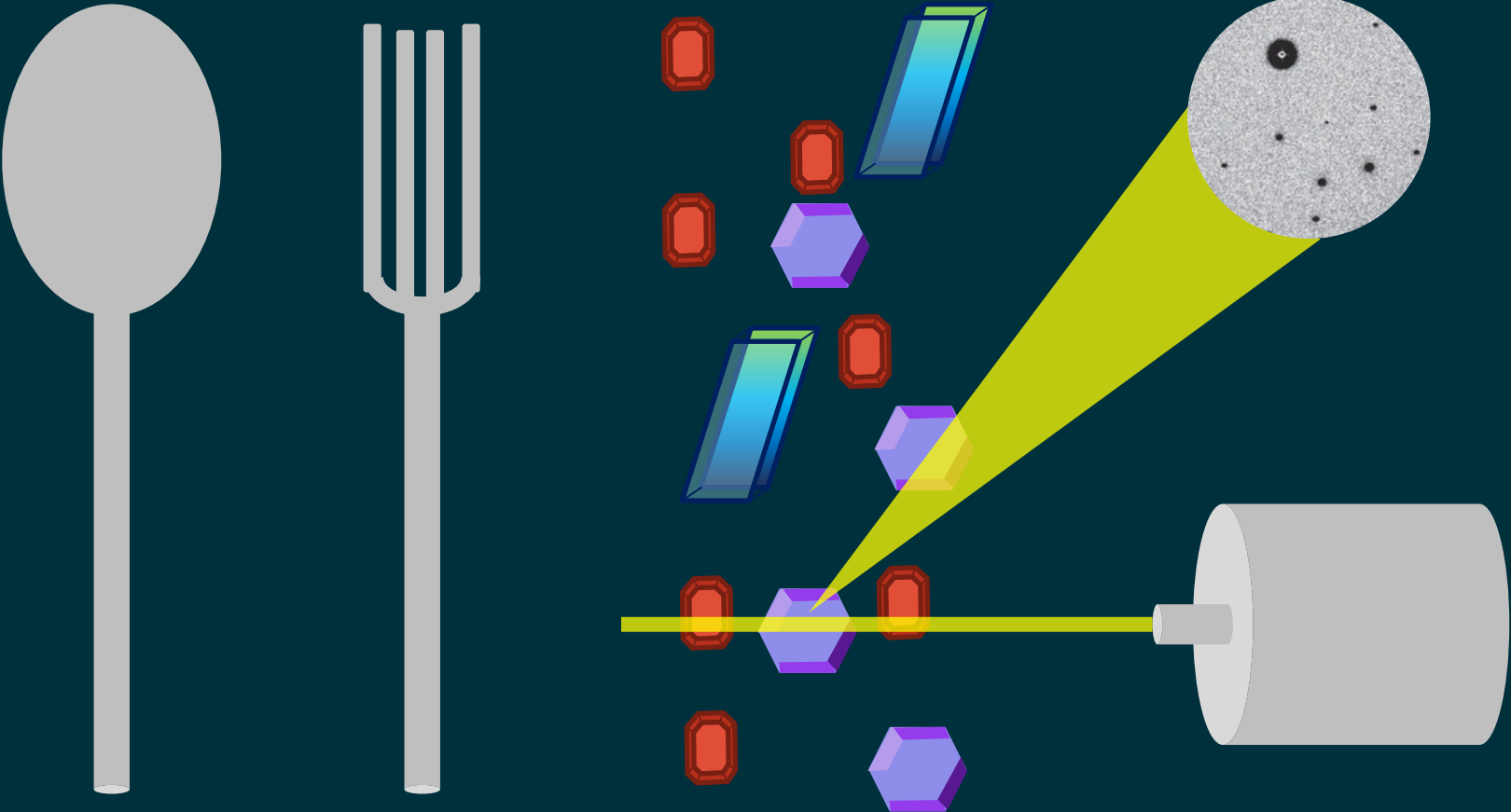
Soft tissue preserved in *T. rex* bone



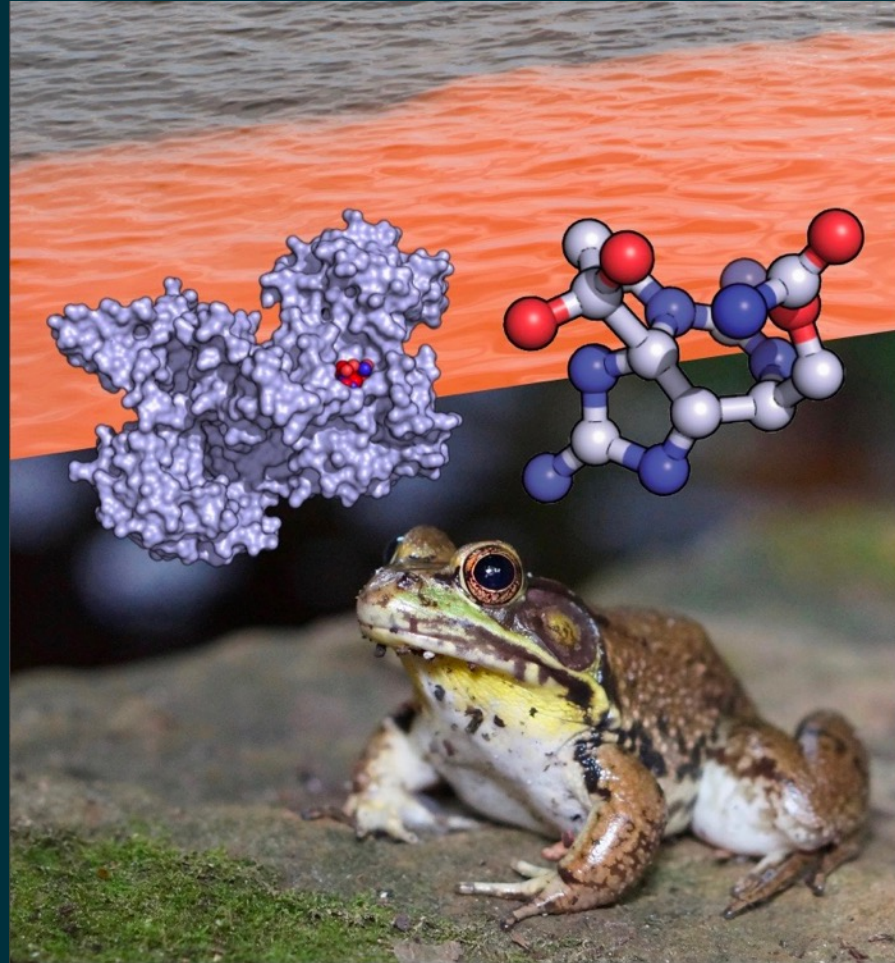
Higher-energy, lower-cost batteries



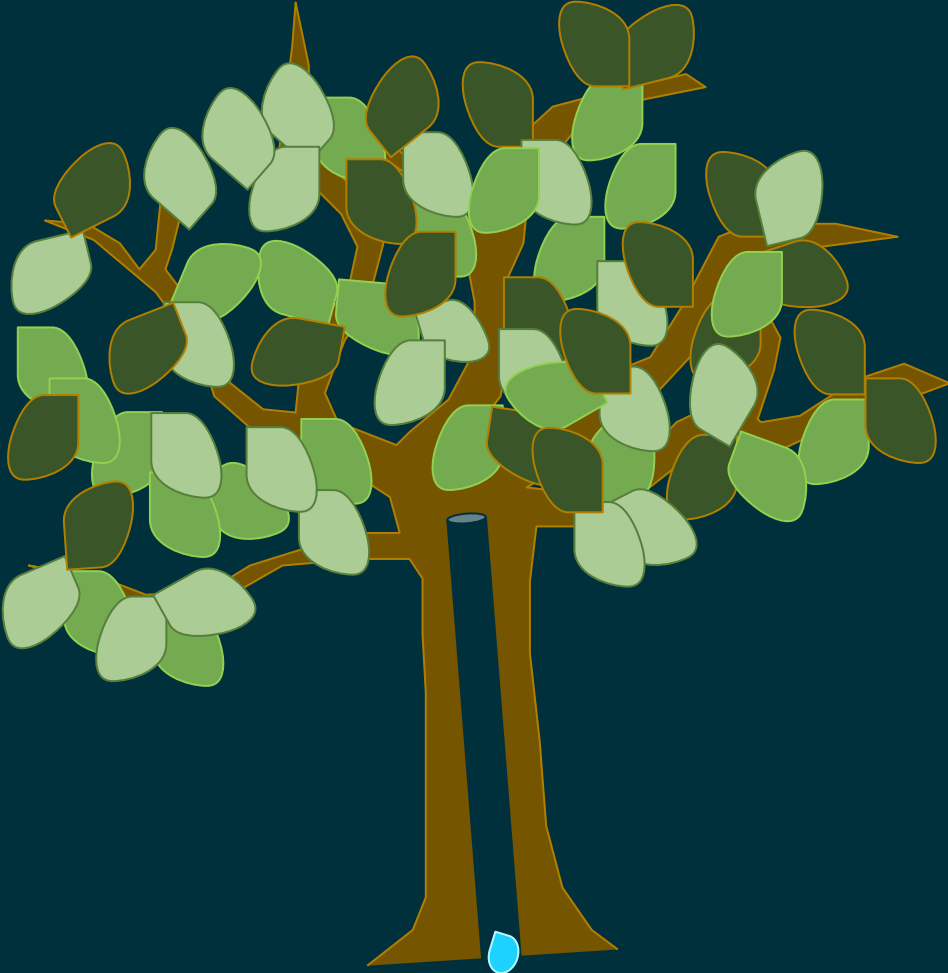
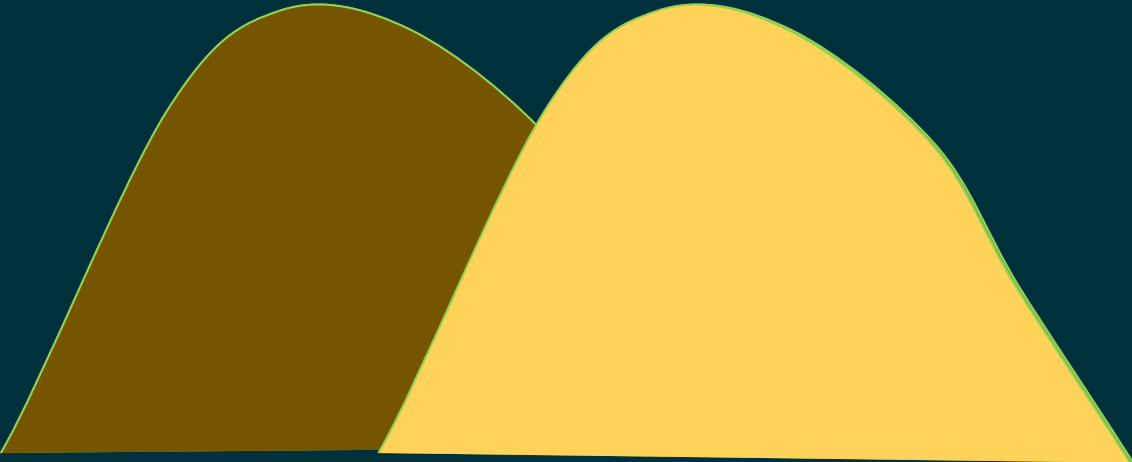
A bullfrog's defense against toxic red tides



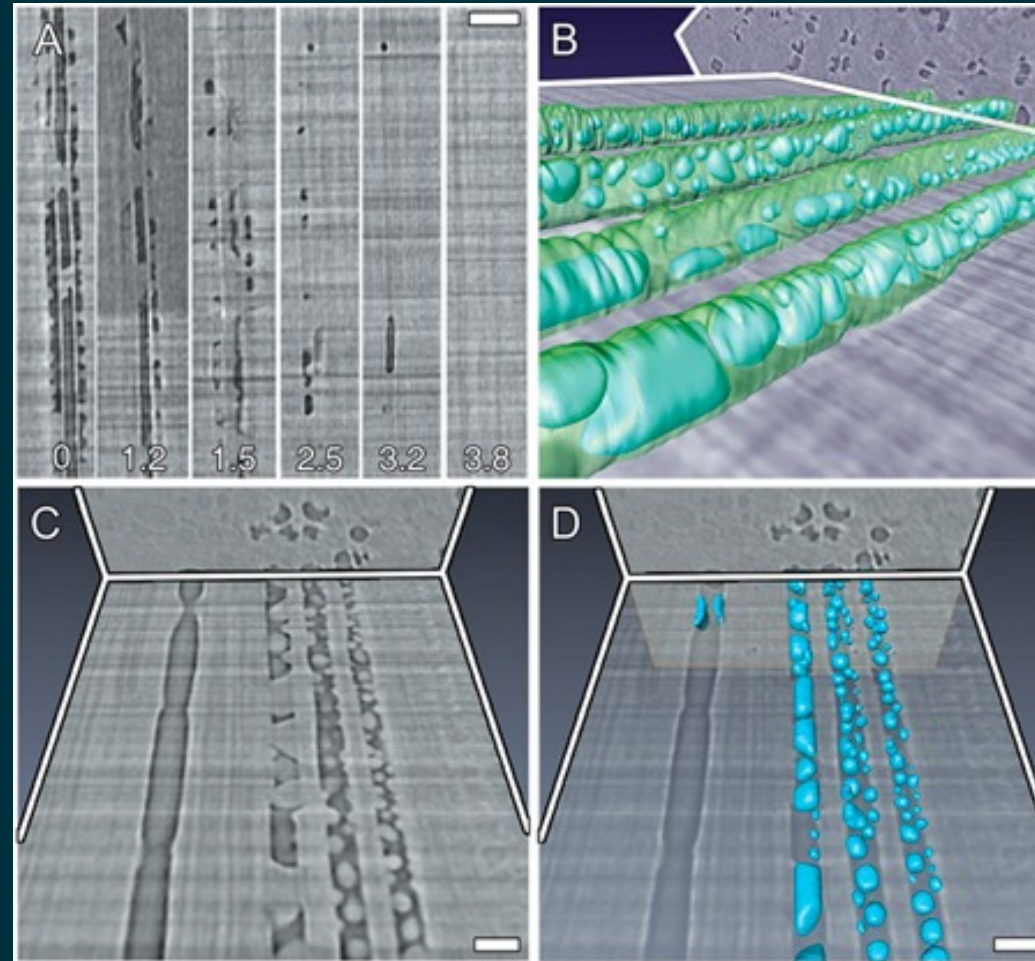
A bullfrog's defense against toxic red tides



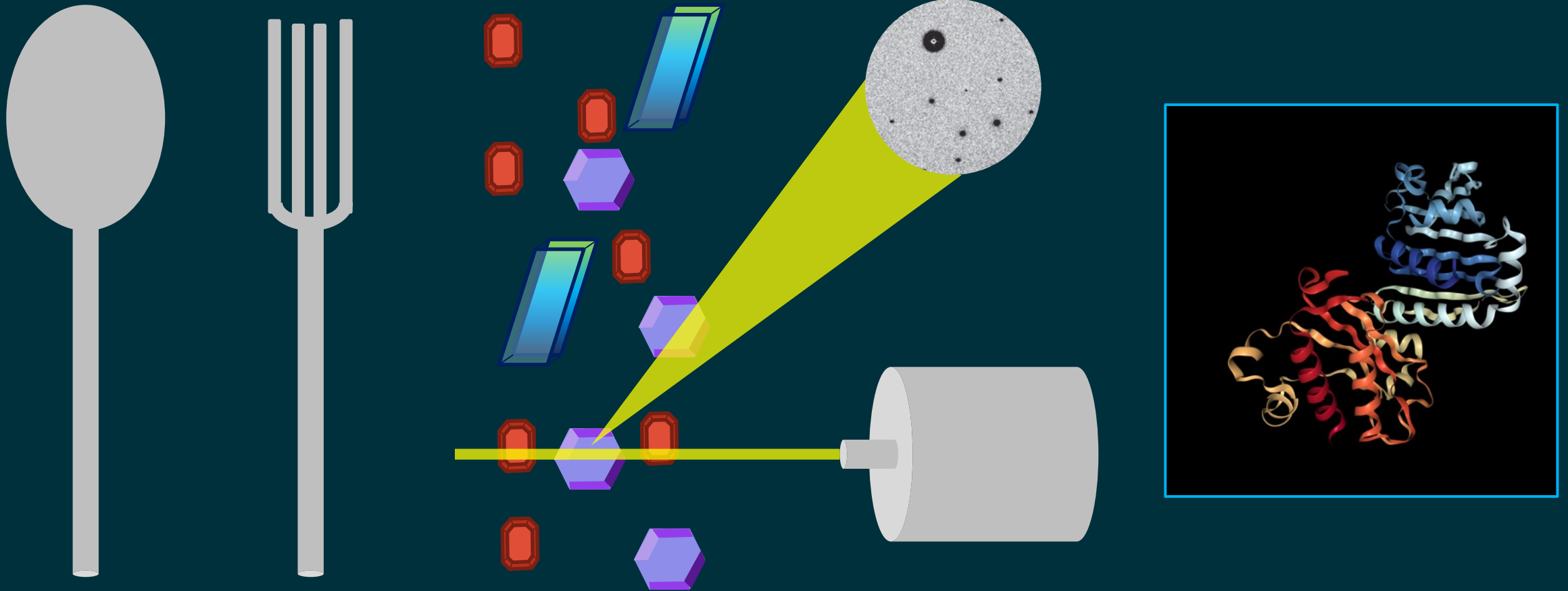
Wine, water, and x-ray tomography



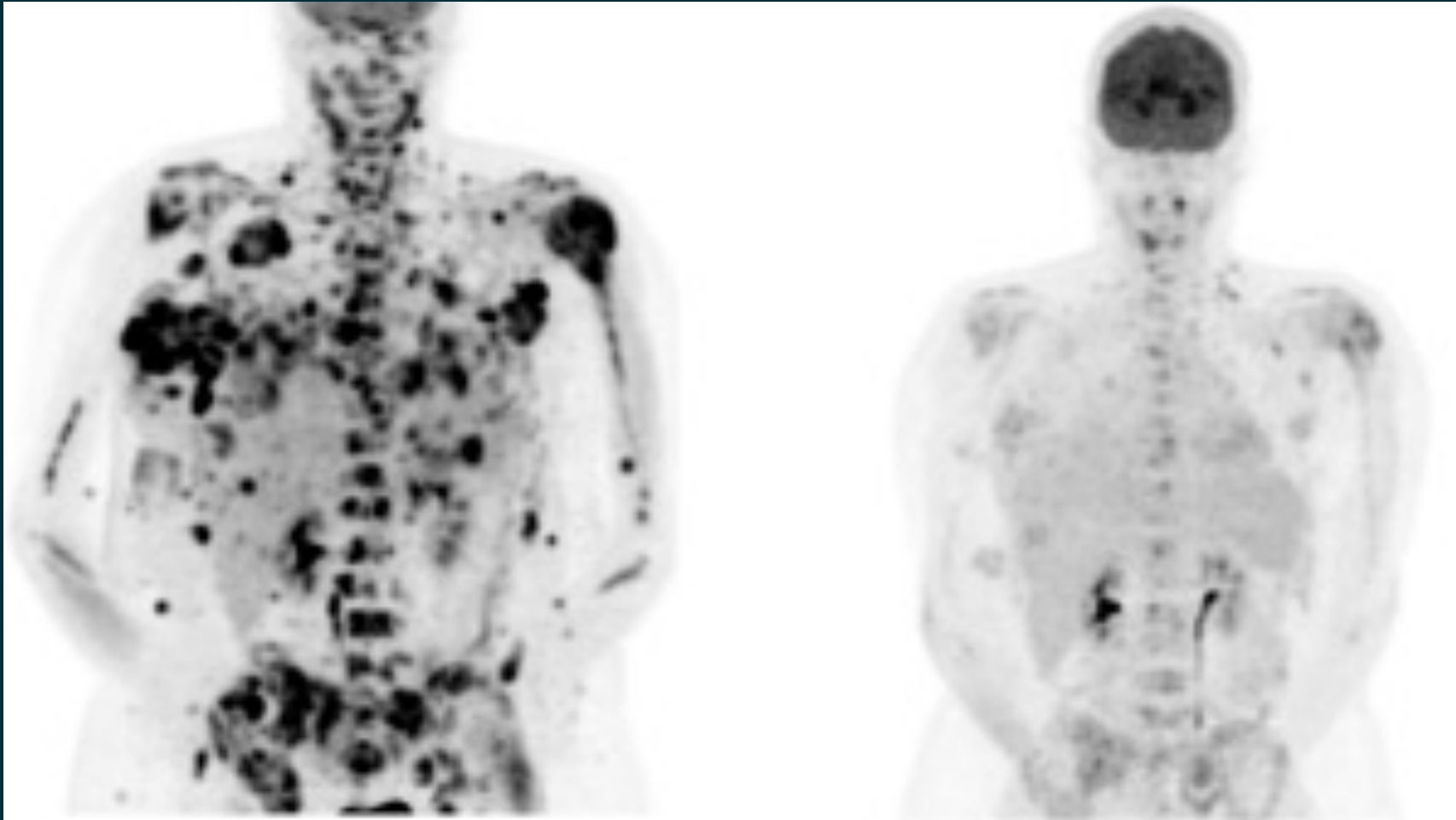
Wine, water, and x-ray tomography



Drug development to stop malignant melanoma



Drug development to stop malignant melanoma



Team science



See for yourself: als.lbl.gov