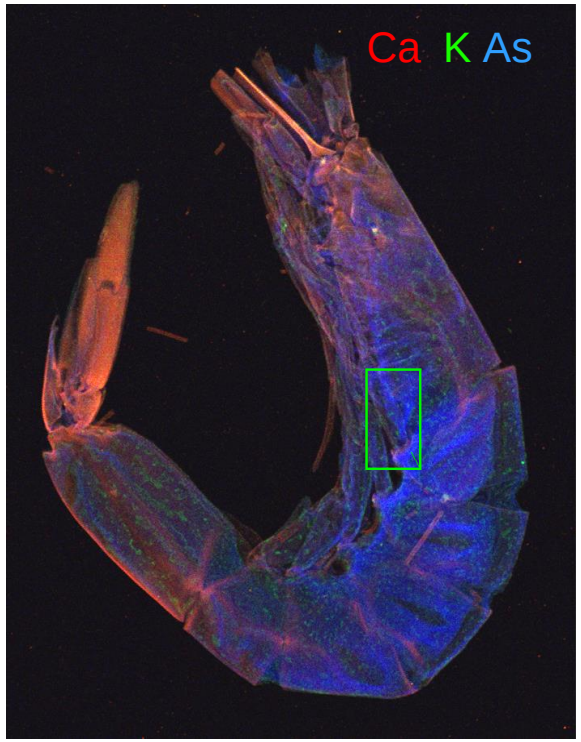
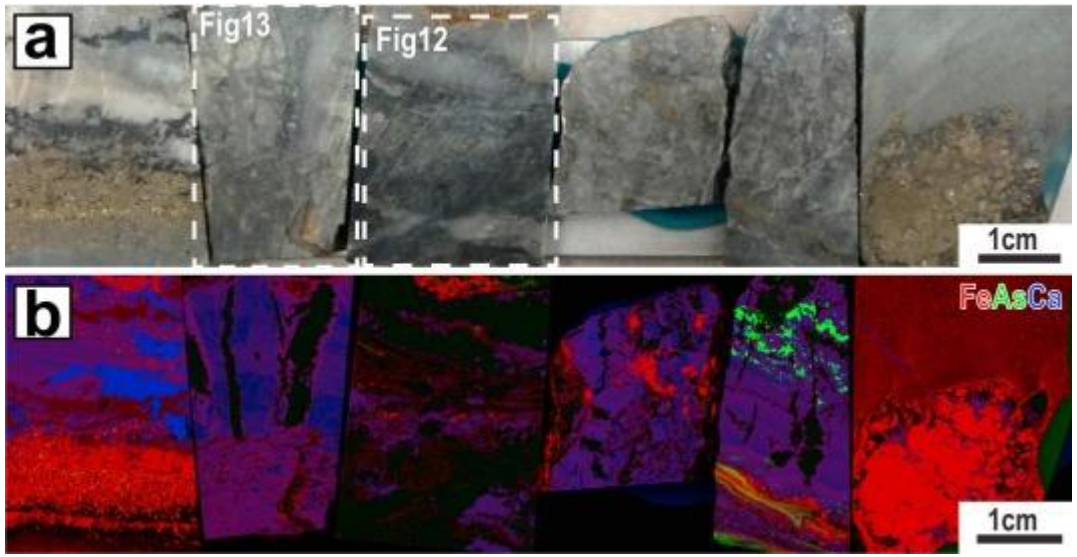
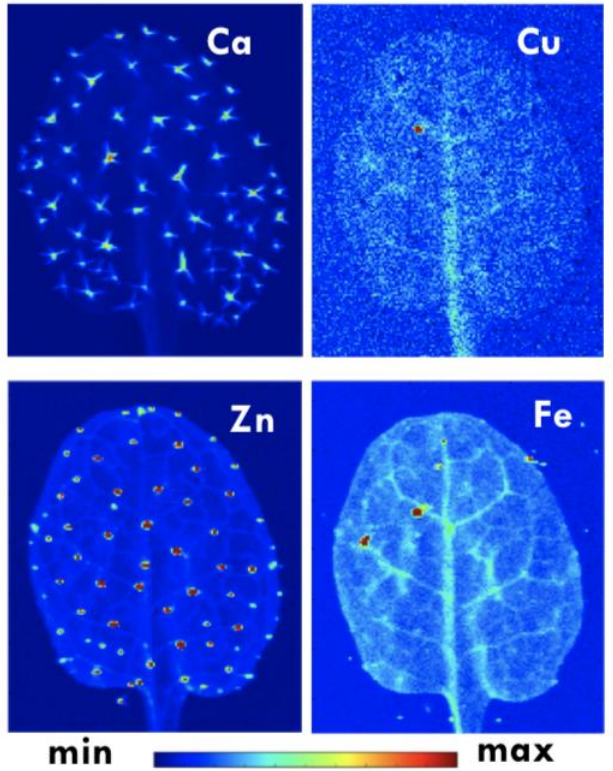
X-LEAP: X-ray imaging for Life sciences, Earth Sciences, the Arts, and Plant Sciences



Arsenic in dried baby shrimp.
Guimares *et al.* JAAS 33 (2018) 1616-1630.

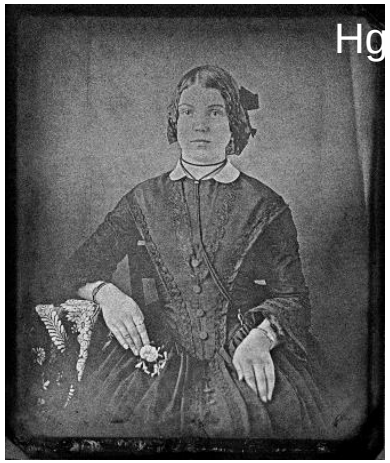


Seeking trace element associations with gold deposits.
Stromberg *et al.* Ore Geology Reviews, 104 (2019) 589-602.



Kumar et al., **2017**, *Plant Phys*, *175(3):1254-1268*

X-ray imaging generates elemental maps that provides important information in many fields of research with one experimental setup.



Recovering images from degraded daguerreotypes.
Kozachuk *et al.*
Scientific Reports, 8 (2018) 9565.

CHESS Funding Model

Until August 2019: NSF Stewardship of CHESS
Since September 2019: Partner Funding Model

In essence, partners fund specific beamlines optimized for their research area(s) and an appropriate share of core operations cost.

Current partners:
NSF | CHEXS;
AFRL | MSN-C;
NIH, NYSTAR | MacCHESS

X-ray Operations

X-ray operations covers the costs of operating, maintaining, and administering the CHESS facility: X-ray technical operations, X-ray experimental support, the CHESS User Office, and CHESS administration. Each beamline supports 1/10th of these costs.

Photon Subscription

The photon subscription covers the full annual costs of the accelerator facility that creates and delivers X-rays to the X-ray beamlines. It includes, but is not limited to personnel providing safety; IT support of the network and software infrastructure, and web services; technical support and maintenance of infrastructure such as the cryo-plant, cooling towers, water pumps, electrical distribution for research equipment; technical support, maintenance and operation of the linear accelerator, synchrotron, and storage ring; technical support and maintenance of RF power systems, magnet power supplies, vacuum systems, cryo systems, control and feedback systems; and experimental electrical power.

Each partner beamline supports 1/10th of the total annual costs. In return, partners receive 125 days of X-ray user beamtime annually.

These costs were developed by using 7 years of historical as-spent data to determine the true costs (in terms of both personnel hours, consumables, and equipment maintenance, repair, and replacement) of operating and maintaining the facility. Upgrades are not included.

Operating Cost per beamline:
~$2.5M/ year:

+ Photon Subscription and X-ray operations

+ Scientific staff

+ Investments for beamline and station upgrades

+ Beamline specific materials and supplies

X-LEAP Workshop : Charge

CHARGE:

Can we form a consortium of interested researchers and seek & secure operations funding for a dedicated X-ray imaging beamline at CHESS?

What are the most important scientific questions, problems, themes in your area of research?

How can X-ray imaging and elemental maps obtained at X-LEAP, address these research question?

Are there critical capabilities that combined with X-ray imaging will generate breakthroughs ?

X-LEAP: Agenda

Tuesday, June 9

Time	Session	Presenter
1:00 - 1:15	Welcome and charge to participants	Elke Arenholz (Associate Director, CHESS) Louisa Smieska (Staff scientist, CHESS)
1:15 - 1:45	X-ray imaging methods at X-LEAP	Louisa Smieska, Staff scientist, CHESS
1:45 - 2:00	Break	
2:00 - 2:45	Using synchrotron X-ray fluorescence (SXRF) to study of genes involved in mineral nutrient transport in plants	Olena Vatamaniuk, Soil and Crop Sciences, Cornell
2:45 - 3:00	Break	
3:00 - 3:45	Fish otoliths as environmental monitoring tools: climate change and more	Karin Limburg, Environmental and Forest Biology, SUNY ESF
3:45 - 4:00	Break	
4:00	User Meeting poster session	

X-LEAP: Agenda

Wednesday, June 10

Time	Session	Presenter
9:00 - 9:45	Geological and mineral resources opportunities based on other methods	Karin Olson Hoal, Wold Family Professor in Environmental Balance and Human Sustainability, Earth and Atmospheric Sciences, Cornell
9:45 - 10:00	Break	
10:00 - 10:45	Synchrotron applications and potentials in dendrochronology, archaeology, and climate-environment studies	Sturt Manning, Goldwin Smith Professor of Classical Archaeology, Cornell
10:45 - 11:00	Break	
11:00 - 11:45	CHESS and the Johnson Museum: Partners Past, Present, and Future	Jessica Levin Martinez, The Richard J. Schwartz Director, Herbert F. Johnson Museum of Art; Andrew Weislogel, The Symour R. Askin, Jr. '47 Curator, Earlier European and American Art, Herbert F. Johnson Museum of Art; Brittany Rubin, Print Room Curatorial Assistant, Herbert F. Johnson Museum of Art
11:45 - 2:00	Break for lunch	
2:00 - 3:00	Desired beamline characteristics, other potential projects	Open discussion - all participants welcome. Please let us know how you would use X-LEAP in your research by taking our survey.