CT-scanning of Vertebrate Fluid Specimens
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GE v\text{tome}|x m 180 kV/240 kV dual-tube with 16-inch detector plate
Broader Impacts of CT-scanning

Distribute images and 3D volumes

Creative 3D printing
Benefits of CT-scanning

- Non-destructive Dissection
  - Qualitative Morphology
  - Quantitative Morphology: Volumes, Surface Areas, Densities...
  - Precise Measurements of Internal and External Anatomy
  - Conservation of Unique Specimens
  - Comparable Data for Extant and Paleo Collections

- Digitally Record of Whole Specimen
  - Create Digital Specimens with High Resolution (2–100 microns)
  - Share Results Easily with Peers and Public

- Fast, Accurate Results
  - Preparation is Simple
  - Same Results As Cutting/Dissecting

- Relatively Easy
  - Can ‘image’ through a low-density container
Limits of CT-scanning

- Depends on Availability of a CT-Scanner
  - Rates vary for internal and external users!
  - Need to reserve time on busy machines
- Can be Costly
  - Most academic institutions charge internal rates of < $60/hr
  - Reconstruction workstations and licensed software can be expensive
  - Need lots of data storage
- Samples must not move!
Basics of microCT-scanning

- X-ray tube creates cone beam
- Sample between source and detector
- Detector is X-ray sensitive
- Magnification based on proximity of sample to source

http://serc.carleton.edu/research_education/geochemsheets/techniques/CT.html
CT Imaging vs. ‘normal’ X-ray Imaging

- Computed Tomography Algorithm
- 3D Density map
  - 2D Slice = 3D Cross Section
  - Object Termed “Volume” or “Reconstruction”
- 2D Pixel → 3D “Voxel”
Diversity of *Xenopus* (African Clawed Frogs)
Incorporating CT-scanning into Collections Digitization

- Imaging a specimen at 50–100 micron resolution
  - 1–2 hours of scanning time
  - ~1 TB storage

- Create high-impact collections of digital specimens for:
  - Systematics
  - Morphological Diversity
  - Paleontology
  - Public engagement
  - and more...
Incorporating CT-scanning into Collections Digitization

- In addition to ‘traditional’ images of specimens

- Priorities @ UF Herpetology
  - Name-bearing type specimens
  - Florida amphibians and reptiles
  - Frogs of the World
  - Resources for teaching herpetology courses

- Grow Global Impact of Collections