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# Wild Bird Forensic

[Wildlife forensic science](#) is an analysis technique used in many different animal studies. For this type of analysis, the samples are often delicate and actively deteriorating, making it challenging to perform characterizations. To preserve the samples, they are often kept in frozen condition, but once they are removed from the freezer to undergo any examination, it is always a race against the clock to obtain the most information before they defrost.

X-ray CT ([computed tomography](#)) is a powerful tool that allows researchers to look inside samples in a non-destructive way, and obtain 3D spatial information with varying image clarity depending on the scan time. This provides an understanding of the internal structural of samples before performing any irreversible, destructive forensic examinations.



## About the sample: wild bird

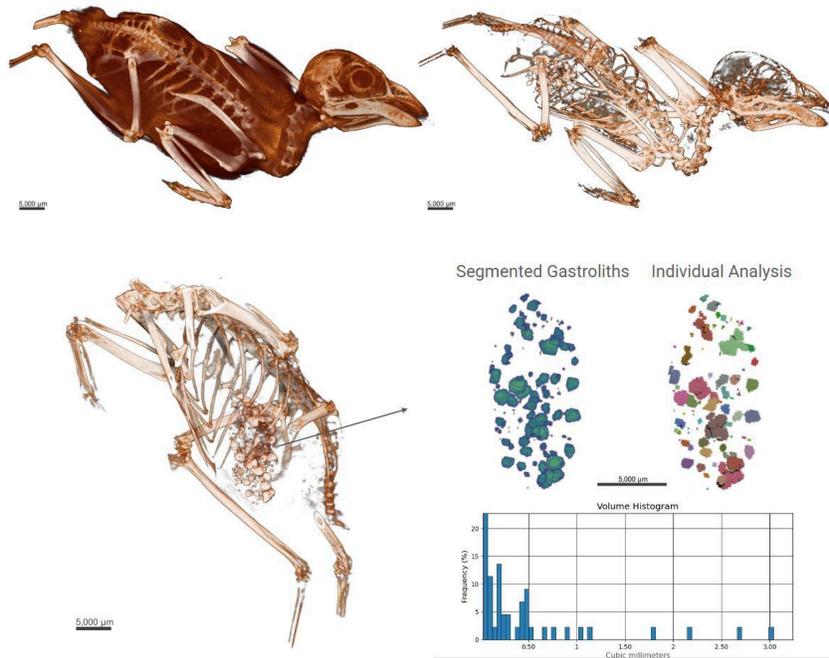
This experiment shows the use of X-ray CT on a deceased wild bird to examine internal organs and bones, identifying potential signs of sustained injury.

### Analysis procedure

1. In this example, a frozen wild bird was scanned using a micro-CT scanner, [CT Lab HX](#). Scan time was limited to less than an hour with resolution of 104.8  $\mu\text{m}$ , balancing between minimizing specimen defrosting and adequate image quality suitable for a comprehensive characterization.
1. CT images were used to look at the full bird body. Potential signs of damage and areas of interest were inspected.
1. Zoomed-in CT scans with higher resolution of 14.3  $\mu\text{m}$  for the skull and spine area were examined closely, with the spine [segmented](#) and a thickness mesh calculated to investigate spine joint condition.

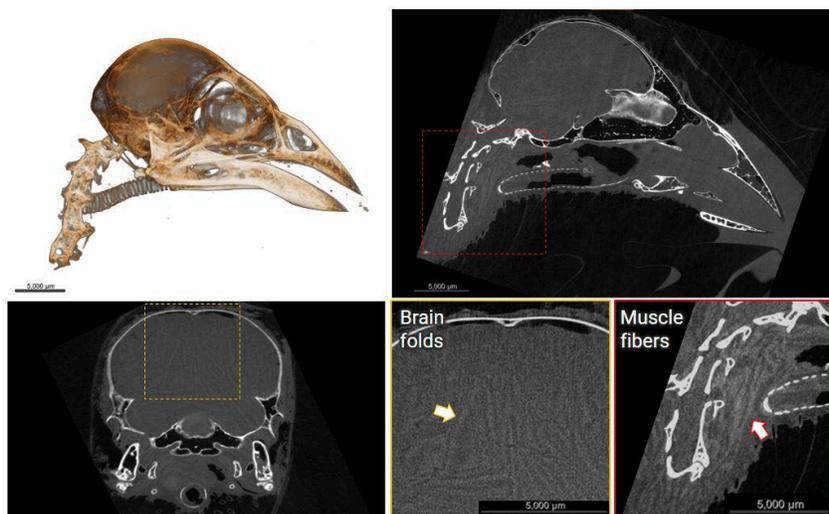
### 1. CT scan

A 3D view of the wild bird is shown in the figure below. The histogram contrast of the grayscale image was adjusted to highlight various areas. The figure on the left has softer tissues like muscle and throat pipe visible, while the figure on the right focuses only on denser materials, like bones. The [gastrolith](#) within the [gizzard](#) is also visible, which can potentially be analyzed for information like diet habits and to determine if foreign pollutants were ingested by the wild bird. No clear signs of damage were spotted from the CT scan.



## 2. Skull inspection

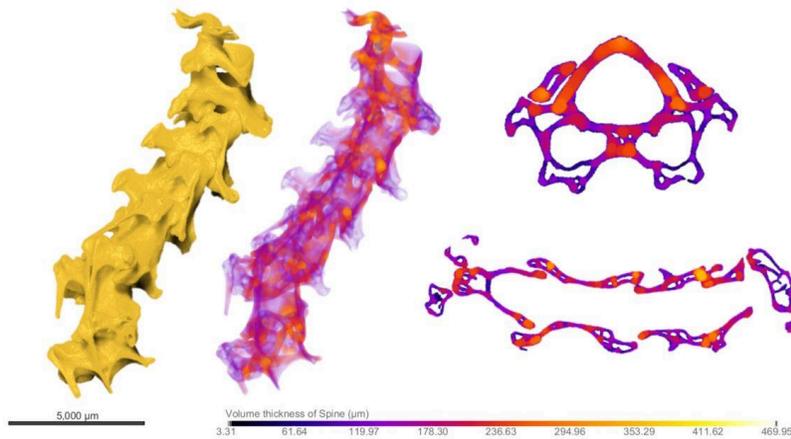
2D cross-sections for the skull area of the wild bird are shown in the figure below. Bone structures are shown clearly as the brightest parts in the grayscale image. Softer tissues such as muscle fibers and brain folds are shown in gray tones with less contrast. No visible damage to the bone or soft tissue were identified in either the full CT scan of the bird (104.8  $\mu\text{m}$  voxel size) or the higher resolution CT scan 14.3  $\mu\text{m}$  voxel size).



A 3D volume rendering of the 14.3  $\mu\text{m}$  resolution CT scan highlighting the skull and neck area is shown in the video below.

### 3. Spine segmentation

Because bone material has really good contrast making them appear brightest, [segmentation](#) of spine area close to the skull was able to be performed simply by selecting the brightest section of grayscale histogram on the CT images. The segmented 3D spine is shown in yellow. A thickness mesh, shown in both 3D and 2D cross section, was calculated for the segmented spine with violet color representing thinner bone and orange color representing thicker bone.



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## Related products



### CT Lab HX

High-resolution benchtop microtomography of large samples