Abstract Submitted
for the CUWIP22 Meeting of
The American Physical Society

X-Ray Diffraction and Structural Analysis of Shark Vertebrae[1]
KATHRYN GRIGGS, GABRIELA GONZALEZ, DePaul University, S.R. STOCK, R. FREE AND KAREN DEROCHER, L.J. NATANSON AND K.C. JAMES TEAM[2] — Just like how rings correspond to the growth record of trees, some mineralized tissues of mammals contain temporal sequences of tissue development. Shark vertebrae consist of cartilage mineralized with hydroxyapatite (HA). A recent study of vertebrae of seven shark species found that this tissue material stiffness and strength are similar to those of mammalian trabecular bone. The periodic array of atoms in the HA nanocrystals in shark vertebrae produce peaks of diffracted intensity. The present project studied thousands of x-ray diffraction patterns of shark vertebrae collected at the Advanced Photon Source (APS) at Argonne National Laboratory. The only crystalline phase found was HA, and HA lattice parameters varied periodically in a spatial pattern consistent with growth bands observed optically.

[1]Kathryn Griggs was funded by the College of Science and Health, Undergraduate Summer Research Program at DePaul University. This research used resources of the Advanced Photon Source, a U.S. Department of Energy (DOE) Office of Science User Facility operated for the DOE Office of Science by Argonne National Laboratory under Contract No. DE-AC02-06CH11357.
[2]The diffraction patterns were collected at 34-ID-E, APS, by a team consisting of S.R. Stock, R. Free and Karen DeRocher (Northwestern Univ.), L.J. Natanson and K.C. James (National Marine Fisheries Service, NOAA, La Jolla CA).

Kathryn Griggs
DePaul University

Date submitted: 11 Jan 2022 Electronic form version 1.4