

Hila Tzipora Chase

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OBJECTIVE

I am interested in evolutionary biomechanics and skeletal biology, particularly in vertebrates and flight systems. I aim to apply skeletal biology at various hierarchical levels to questions in paleontology and evolution, ecology, biomechanics, and biologically inspired design. My current research focuses on using functional morphology to investigate bird flight biomechanically, evolutionarily, and ecologically. Additionally, I combine my arts background with my scientific research to give presentations, exhibitions and performances to increase creative scientific communication and education. My long-term goals include studying comparative flight systems, developing new methods in evolutionary functional morphology and encouraging interdisciplinarity in academia and the arts. I also intend to help increase minority presence in scientific research and help create reform in various relevant educational, political and social systems- especially those that contribute to our current ecological crisis and the mistreatment of Indigenous peoples.

EDUCATION

Currently in PhD program at the University of Montana, OBEE department, Tobalske lab (Flight Lab).

Missoula, MT

Graduate Coursework: Genetics and Evolution

Bachelor of Arts, Magna Cum Laude. (May 2015)

Major 1: Thomas Hunter Honors Interdisciplinary program - Paleontology, Zooarchaeology, and Evolutionary Biology Major

Major 2: Biology

Hunter College, City University of New York

New York, NY

GPA: 3.832

Undergraduate Coursework highlights: Developmental biology, Molecular Genetics, Evolutionary studies, Art and Anatomy, Calculus 1&2, Organic Chemistry 1&2, Physics 1&2, , Independent studies in Zooarchaeology and in Paleontology, Human Skeletal Biology, Geology 2, The Evolution of Scientific Thought and the Problem of Reality, Choreographing Genomics (served as TA and helped design the first experimental course), Studio Art.

Additional Audited Coursework at the graduate level (Weizmann Institute): Matlab Programming, Differential Eqns&Linear Algebra, Biomaterials and Mechanics, Philosophy of Science.

RESEARCH EXPERIENCE AND SKILLS ACQUIRED

University of Montana, Missoula, MT

PhD Student in Bret Tobalske's lab, Organismal Biology, Ecology & Evolution, Sept 2016 – present.

I have just started a 5-year PhD program with Bret Tobalske, and will be combining my previous research experience with new biomechanics and functional morphology methods to study bird flight and the evolution of bird flight.

Weizmann Institute of Science, Rehovot, Israel

Full-time researcher (paid position) in Dr. Stephen Weiner's lab, Structural Biology, Oct 2015-June 2016.

I was at Weizmann last year, continuing a trabecular bone structure project with others that I helped develop previously with them, and heading my own project in micro-biomechanical testing as a continuation of that research. I also helped optimize the Inter-Trabecular Angle (ITA) analysis program we wrote so it can be published as an open-source program.

- ✦ Using a minipig model as well as modern human samples, dissection and preparation of bone material for a range of experiments including: MicroCT scanning, FIB-SEM, mechanical loading
- ✦ 3D processing and analysis using Avizo, Fiji, and our recently developed ITA software
- ✦ Optimizing the ITA program in Matlab before developing in Java for publication as a Fiji plug-in
- ✦ Investigating comparative trabecular structure topologically and mechanically; tracking changes in 3D under applied load, interpreting and developing new parameters to link structural properties to behavior in an evolutionary context as well as for biomaterial applications

Weizmann Institute of Science, Rehovot, Israel

Undergraduate summer research in the Kupcinet-Getz program with Dr. Stephen Weiner, June-August 2014.

I co-developed a project analyzing trabecular bone structure in the human proximal femur. We developed a new parameter for topologically analyzing trabecular bone. I presented at a mini symposium on this research while at Weizmann, and continued to work on the project and related research from NYC while finishing my BA, resulting in a full-time research position at Weizmann for a year in the same lab post-graduation.

- ✦ MicroCT scanning: Familiarity with Xradia400 and proficiency in using Skyscanner
- ✦ 3D processing and analysis using Avizo software and Fiji software
- ✦ Creating visually engaging animation using Avizo, exploring bone microstructure
- ✦ Mathematical and statistical analysis using excel and PeakFit software
- ✦ Developed a code for the ITA (Intertrabecular Angle) analysis with Matthew Singer, collaborating from Northeastern University in Boston.

American Museum of Natural History, New York, NY

Undergraduate research with Prof. Will Harcourt-Smith, Vertebrate Palaeontology, September 2012-present.

Paleoanthropological research on terrestrial locomotion.

- ✦ 3D laser-scanning and processing using NextEngine scanner and software and GeoMagic software, comparative morphometric analysis of bones
- ✦ Skeletal midshaft measurements of humeri and femurs for a large comparative study of primate locomotion and evolution (over 1000 specimens processed).
- ✦ Ongoing functional morphology project in collaboration with Columbia University Bioengineering lab: MicroCT scanning and processing using VGstudio software, analysis of trabecular bone using new ITS software to isolate plates and rods in the trabecular matrix, along with new ITA analysis I helped develop at Weizmann.

Weill Cornell Medical College, Developmental Biology, New York, NY

Undergraduate Research in Dr. Licia Selliri's lab, August 2013-July 2014

Characterizing the developmental causes behind Cleft Lip in genetically modified mouse models, exploring the role of Epithelial Mesenchymal Transition (EMT), limb development.

- ✦ Handling mice, cross-mating, harvesting embryos, skinning/dissecting when appropriate
- ✦ PCR, Gel electrophoresis- genotyping embryos

- ✦ Embedding and sectioning embryos using a Cryostat for various staining methods
- ✦ Xgal staining on Rosa/Cre embryos and Immunofluorescence using Ecadherin, Ncadherin, Vimentin, Golgi, Caspase, and DAPI antibodies
- ✦ Skeletal preparation with Alcian Blue and Alizarian Red on genetically modified mouse embryos to visualize bone ossification and development
- ✦ Microscopy and figure-quality photography of immunofluorescence, Xgal staining, and skeletal preparations

Zooarchaeology lab of Hunter College, New York, NY

Undergraduate Research under Prof. Tom McGovern, Spring of 2012. Independent study, Spring 2014.

Zooarchaeological remains analysis.

- ✦ Fragment identification and sorting of bone and other materials
- ✦ Reconstruction of bone fragments
- ✦ Independent study in Spring 2014: analyzing and photographing remains, and creating a comparative identification guide for North Atlantic seal species crania with nearly 100 specimens (over 400 photographs)

Other lab skills: Microbial cell culture, DNA ligation, cloning (using E. coli plasmid), sequence analysis, lipid-related wetlab experience.

FIELD EXPERIENCE

- ✦ Archaeological Fieldwork in Sde Boker, Israel, October 2015
- ✦ Excavation in Bighorn Basin, Montana - Paleontology Field School, late Cretaceous, July 2015
- ✦ Archaeological Fieldwork and Field School in Orkney, Scotland, July-August of 2012 and 2013
- ✦ Archaeological Fieldwork in Tel Es Safi, Israel, Summer 2012

AWARDS AND SCHOLARSHIPS

2016:

- ✦ Drollinger-Dial Award at UMontana for PhD study

2015:

- ✦ Departmental Honors in Biological Sciences
- ✦ The Else Seringhaus Award for Excellence in Research in Biological Sciences (monetary award)
- ✦ Graduated with Magna Cum Laude
- ✦ Funded by Weizmann Institute for a year-long project there under Dr. Stephen Weiner (2015-2016)

2014:

- ✦ SIROCS travel award for Israel (Kupcinet-Getz program)
- ✦ The Leader Family Fund Jewish Achievement Award for CUNY College Students
- ✦ JFEW (Jewish Foundation for Education of Women) scholarship for 2014-2015

2013:

- ✦ MARC (Minority Access to Research Careers) program, Hunter College
- ✦ Mother's Day Scholarship

2012:

- ✦ Anthropology Departmental research grant for Field school
- ✦ Thomas Hunter Honors program

2011:

- ✦ Muse/Yalow full tuition scholarship, class of 2015, Hunter College
(<http://www.hunter.cuny.edu/ugprospects/freshmen-scholars-programs/hila-chase-yalow-scholar>)
- ✦ Dean's list at Hunter College (earned every semester for GPA)

PRESENTATIONS GIVEN AND CONFERENCES ATTENDED

- ✦ TEDxCUNY 2015, November 2015. **“Re-Enchanting Science: The Mystery and Interconnectedness of the Natural World.”** TEDx talk (<http://tedxtalks.ted.com/video/The-Mystery-and-Interconnectedn>)
- ✦ TEDxCUNYSalon at Hunter College, April 2015. **“Roots, not Bridges! Recognizing Interdisciplinarity as a Necessary Paradigm.”** TEDx talk. (<https://prezi.com/ss2-j4quu7ip/roots-not-bridges-recognizing-interdisciplinarity-as-a-nec/>)
- ✦ **“The Matrix: Revealing a 3-dimensional structural motif in trabecular bone.”** Given at:
 - Science 200, a course for undergraduates interested in STEM research careers (invited as a guest speaker five times over the past two years, giving the oral presentation and then holding a Q&A, as part of being a student-mentor in the MARC program)
 - Hunter College Anthropology Research Conference. Hunter College, New York, NY, April 2015 (Oral)
 - Hunter College Undergraduate Research Conference. Hunter College, New York, NY, March 2015 (Oral)
 - Annual Biomedical Research Conference for Minority Students, San Antonio, TX, November 2014 (Poster)
 - Kupcinet-Getz mini-symposium, August 2014 (Oral)
- ✦ **“Pbx-directed control of cellular behaviors that drive face morphogenesis.”** Given at:
 - 27th annual international symposium at Hunter College, Bioinformatics: Medical Applications. Hunter College, New York, NY, May 2014 (Poster)
 - Hunter College Undergraduate Research Conference. Hunter College, New York, NY, March 2014 (Poster)
- ✦ **Conferences Attended without presenting:**
 - The Batsheva de Rothschild Seminar on Biomineralization: Mineral Formation by Organisms, Weizmann Institute of Science, Rehovot, Israel, February 2016 (week-long, presentations in Sde Boker and Eilat too).
 - Annual Biomedical Research Conference for Minority Students, Nashville, TN, November 2013
 - 26th Annual International Symposium for Stem Cells: Biology and Applications. Hunter College, New York, NY, June 2013

PUBLICATIONS

- ✦ Walk This Way: Comparative Analysis of Trabecular Bone in the Proximal First Metatarsal Across Hominids. Chase HT, Hu Y, Harcourt-Smith WEH. (In progress)
- ✦ Inter-trabecular angle: A parameter of trabecular bone architecture in the human proximal femur that reveals underlying topological motifs. Reznikov N, Chase H, Ben-Zvi Y, Tarle Y, Singer M, Brumfeld V, Shahar R, and Weiner S. Acta Biomaterialia. 2016 Oct 15;44:65-72. doi: 10.1016/j.actbio.2016.08.040.
- ✦ The 3D structure of the collagen fibril network in human trabecular bone: Relation to trabecular organization. Reznikov N, Chase H, Brumfeld V, Shahar R, Weiner S. Bone. 2015 Feb;71:189-95. doi: 10.1016/j.bone.2014.10.017.
- ✦ Analysis of Trabecular Bone 3D Fabric by Means of a New Topological Parameter: The Inter-Trabecular Angle. Ben-Zvi Y, Reznikov N, Chase H, Tarle Y, Singer M, Brumfeld V, Shahar R, and Weiner S. (In progress)
- ✦ The ITA code I helped develop will be published and made available for use by researchers this year as a Fiji (ImageJ) plug-in. It is currently published as a Matlab GUI at: http://www.weizmann.ac.il/Structural_Biology/Weiner/biomineralization/recent-studies

- ✦ Zooarchaeology comparative manual for North Atlantic seal species (2014)

TEACHING EXPERIENCE

- ✦ Teaching Assistant (Lab Instructor) for two sections of Bio161: Principles of Living Systems, UMontana
- ✦ Teaching Assistant for Bio175: Choreographing Genomics, Hunter College
- ✦ Yalow and MARC mentoring program- mentor to younger students in the sciences at Hunter College
- ✦ Independent biology tutoring at Hunter and for grade-school children in Yad Binyamin, Israel
- ✦ Circus arts instructor at Hunter College for Circus Club meetings and events
- ✦ Assistant teacher at Bardak Circus for children and adult classes. Jerusalem, Israel (two years)
- ✦ Martial arts instruction and women's self-defense workshops in both Israel and New York
- ✦ Children's improv teacher in Yad Binyamin, Israel

RESEARCH INTERESTS

- ✦ Flight biomechanics, Dinosaur-Avian evolution, comparative flight systems, Pterosaurian flight
- ✦ Ecomorphology, Functional Morphology, functional versatility within flight styles and behaviors in birds
- ✦ Skeletal development, evolutionary adaptation and pattern formation throughout the skeleton, biomineralization
- ✦ Paleontological fieldwork and analysis, fossilization process, microstructure preservation
- ✦ Biologically Inspired Design (including bionics)
- ✦ Exploration of how developmental and other molecular level biology can be used to better analyze organic remains, particularly osteological, and how more understanding may be attained by furthering methodologies this way in Palaeontology and Zooarchaeology
- ✦ Scientific illustration, paleontological reconstruction, 3D art and exhibit design/preparation
- ✦ Science communication, using visual and performing arts to aid science education and awareness
- ✦ Interdisciplinary efforts and collaborations between fields to further the discovery of the natural world and help assuage current environmental (and social) crises

EXTRACURRICULAR ACCOMPLISHMENTS

- ✦ Exhibited interdisciplinary pieces of art at TEDxCUNY 2015: Homonculus Biodiversus (multimedia sculpture) and Skeletal Reverie (an interactive performance art piece with a video and educational component)
- ✦ Co-founder of Outward Mind, a movement and organization based on ecology, interconnectedness, systems theory, improvisational theater, play and the imagination. <http://www.outwardmind.org> (In progress)
- ✦ Organized trips to the AMNH for student groups and others, giving tours and encouraging interest in the natural sciences (2012-2016)
- ✦ Founder and President of the Circus Club of Hunter College (organized all events and budgets, taught circus arts, and raised awareness/facilitated involvement in Social Circus) (2012-2014)
- ✦ Brought Hunter students to contribute to and perform for a Social Circus charity event by ZipZap Circus at a Cirque du Soleil show in New York (2013, 2014)
- ✦ Wrote, directed, and performed in a circus show at Hunter College in May 2013
- ✦ Involved in the Queer Student Union and Hunter Hillel (2011-2015)
- ✦ Started a custom design costume and prop business, creating multimedia pieces often out of re-used materials, metals, and carefully sourced leather (2008-current)
- ✦ Martial arts (13 years) first que brown-belt in Tora Dojo system (2003-current)