




Ramon Nagesan, M.Sc., H.B.Sc.

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I have a Master of Sciences degree specializing in vertebrate paleontology. Since 2008 I have worked with and around museum specimens and collections. My research expertise is in 3D anatomical visualizations of extant and extinct zoological species, focusing on morphology, biomechanics, and micro-CT scanning. I have a wealth of experience in laboratory management, having overseen the micro-CT laboratory at the University of Michigan Museum of Zoology. I have mentored undergraduate and graduate students in research and lab best practices. I have engaged in a full scope of museum activities including specimen collection and curation, exhibit design, and public engagement and outreach.

Experience

JANUARY 2019 – PRESENT

Micro-CT Laboratory Technician – Research Laboratory Specialist Associate, University of Michigan, Museum of Zoology, Ann Arbor, MI.

I manage and operate the day-to-day functions of the micro-CT scanning facility in the University of Michigan Museum of Zoology. I operate and maintain a Nikon XT H 225 ST micro-CT scanner, 3D visualization computer lab, specimen staining center, and manage all data workflows. To accomplish my role I conduct CT scanning, data reconstruction and visualization, and aid in CT data analysis. I have helped establish the micro-CT lab as a core facility, handling CT scans for users both from and outside of the University of Michigan. The core lab requires budgeting and invoicing tasks. I also actively engage in student supervision and training. New graduate and undergraduate students are trained by me to operate the scanner, understand what CT data is, how it can be used, and learn how to work in a museum environment employing best practices.

SEPTEMBER 2017 – DECEMBER 2018

Paleontological and Historical Resource Consultant, Sandstone Consulting, Calgary, AB, Canada

I worked with partners in industries such as oil and gas, development, and construction to ensure that they're practices fall within the guidelines of the Alberta Historical Resources act. I conducted field surveys of future developments to assess if they are clear of and properly mitigating damage to fossil resources. Following field surveys I prepared reports for the Alberta government that would include our assessment of the proposed projects impact on the fossil resources of the area.

MAY 2017 – SEPTEMBER 2017

Research Assistant, University of Calgary, Calgary, Alberta, Canada.

I maintained and operated the preparation lab, fossil collection, conducted fossil preparation, and specimen accessioning. I also engaged in volunteer management and training, including organizing when they came to the lab and supervising their various preparation projects. Also training of new graduate students in preparation techniques and 3D paleontology interpretation.

MARCH 2016 – AUGUST 2017

Education and Preparation Lab Liaison, Royal Tyrrell Museum of Paleontology, Drumheller, Alberta, Canada.

I was tasked with coordinating fossil preparation both mechanical and virtual maintained between the fossil preparation lab and the education department of the museum. My goal was to ensure that the specimens we were preparing and digitizing could be used for exhibits and public programming and education. I updated scientific programs, directed field survey of fossils in the vicinity of the RTMP; taught a weekly science break lesson to groups of visitors at the museum; 3D modeled of CT scanned fossils; conducted photogrammetry (including: RTMP exploded *Daspletosaurus* skull); wrote permitting report of new fossil localities and their potential use for educational purposes.

MAY 2012 – AUGUST 2013

Field and Preparation Lab Technician, Royal Tyrrell Museum of Paleontology, Drumheller, Alberta, Canada.

Duties: fossil preparation (both macro and micro), consolidation and reconstruction of fossils, interpretation of fossil material, casting and molding of fossils, prospecting and collection of new fossil material. Field experience: prospecting for new specimens, quarrying at microsites, and a two-week excavation of a Tyrannosaur from the Milk River (southern Alberta), as well as multiple others listed in the “Field experience” section. Skills: preparation techniques such as the handling of fossils and use of tools including air scribes, hammers, awls, jack hammering (in the field), proper construction of support jackets and plastering of specimens (in lab and field). Critical thinking was necessary in order to make informed decisions regarding the best way to prepare a specimen so as to maintain stability of the fossil, and get the most amount of scientific information.

AUGUST 2010 – MAY 2012

Resident Life and Student Housing Don, University of Toronto, Mississauga, Ontario, Canada.

I planned and ran social programming, acted as a mentor and counselor, conducted cleanliness checks of student units, and was tasked with duty rounds of the residence to check for safety. To do this job I needed interpersonal skills to deal with student issues such as roommate conflicts; creativity, and teamwork thinking was needed for coming up with new and entertaining programs for students to get involved. Leadership was an important skill in all aspects of this position, from organizing events, to engaging in disciplinary action toward students.

Education

2014 - 2017

Masters of Sciences; Specializations: Biology and Paleontology, University of Calgary, Calgary, Alberta, Canada.

Dissertation title: Neck Mobility of the Plesiosaur *Nichollasaur borealis*

Supervisor: Dr. Jason Anderson; Committee Members: Dr. Jessica Theodor, Dr. Donald Henderson, Dr. John Bertram; External: Dr. Heather Jamniczky; Chair: Dr. Anthony Russell.

2008 - 2012

Bachelors of Sciences with Honours; Majors: Biology and Paleontology, Minor: Earth Sciences, University of Toronto, Toronto, Ontario, Canada.

Dissertation title: Jaw “handedness” in the 294 year old Permian reptile *Captorhinus aguti*

Supervisor: Dr. Robert Reisz.

Skills

Laboratory & Museum: Micro-CT scanning and imaging optimization • Operation and maintenance of Nikon XT H 225 ST micro-CT scanner • CT data reconstruction • CT data 3D visualization and analysis • CT data management • Database management • Data curation • Specimen handling best practices and curation • Fossil preparation and collection • Loan packaging • Database aggregator / repository creation • Photogrammetry • Fieldwork permit applications/holder • Core facility management • Safety training record keeping.

Research: CT data segmentation across platforms • Linear & 3D morphometric analysis • 3D biomechanical modelling and simulation • Specimen identification • Scientific article writing & publishing • Technical report writing • Figure preparation • Scientific conference talks.

Mentorship: Undergraduate student training & supervision • Online CT data training module development • In person & virtual CT data analysis workshop design and delivery • Project management and consultant.

Outreach and Engagement: Public Speaking • Exhibit Design • Programing activity design • Museum tour to undergraduate classes & general public • 3D printing • Social media engagement • Scientific graphic design for general public.

Software: Volume Graphics • ORS Dragonfly • Amira/Avizo • Blender • MeshLab • Sketchfab • CT Pro 3D • Inspect X • Microsoft Office Suit • Google Suite • Adobe Photoshop & Illustrator • SAS • Windows & Mac • Autodesk Maya • Agisoft Photogrammetry

Teaching & Mentorship

SEPTEMBER 2019 – PRESENT

Undergraduate Research Opportunity (UROP) Mentor, University of Michigan, Ann Arbor Michigan

I have formally served as a mentored four undergraduate research students studying mammalian biology. I helped on-board the students in the micro-CT lab, helped formulate their research questions, collect data, trained them to analyze the data, complete their final presentations, and prepare publications. Three of these students have graduated to date.

Co-mentor: Dr. Cody Thompson

SEPTEMBER 2019 – PRESENT

Undergraduate Mentorship and Supervision, University of Michigan, Ann Arbor Michigan

I have informally mentored six undergraduate research students in the Davis Rabosky lab who were conducting herpetological research. I helped on-board the students in the micro-CT lab, helped formulate their research questions, collect data, trained them to analyze the data, complete their final presentations, and prepare publications. Two of these students have graduated to date.

Supervisor: Dr. Alison Davis Rabosky & Gregory Schneider

JANUARY 2014 – MAY 2017

Graduate Teaching Assistant, University of Calgary, Calgary, Alberta, Canada.

Courses: Introductory Biology (two semesters); Comparative Anatomy (one semester); Human Gross Anatomy (two lectures).

I prepared lesson plans, created dissection guides, marked assignments weekly, answered student

questions in tutorial, gave partial lectures, facilitated discussions, and helped conduct examinations and tests.

JANUARY 2012 – APRIL 2012

Undergraduate Teaching Assistant, University of Toronto, Mississauga, Ontario, Canada.

Courses: Introductory Geology.

Duties: weekly marking of assignments, attending to student questions in tutorial, giving partial lectures, and helping conduct examinations and tests.

Publications

Crowell H.L., Thompson C.W., **Nagesan R.S.**, Martinez-Fonseca J.G., Holmes I.A., Hofman E.P., & Fernandez-Mena M. (*in review*). Diet of *Metlapilcoatlus indomitus*. *Herpetological Review*

Kolmann M.A., **Nagesan R.S.**, Andrews J.V., Borstein S.R., Figueroa R.T., Singer R.A., Friedman M., & López-Fernández H. (2023). DiceCT for fishes: recommendations for pairing iodine contrast agents with μ CT to visualize soft tissues in fishes. *J Fish Biol.* 102(4):893-903. 10.1111/jfb.15320.

Crow-Riddell J.M., Callahan S., **Nagesan R.S.**, Gray J., & Davis-Rabosky A.R. (2021). A guide for optimal iodine staining and high-throughput dice-CT scanning in snakes. *Ecology and Evolution.* 11 (17), 11587-11603. 10.1002/ece3.7467

Reisz R.R., MacDougall M., LeBlanc A., Scott D., & **Nagesan R.S.** (2020). Lateralized feeding behavior in an early Permian terrestrial reptile reflects ancient history of brain asymmetry. *Current Biology.* 10.1016/j.cub.2020.04.026

Nagesan R.S., Campbell J.A., Pardo J.D., Lennie K.I., Vavrek M.J., & Anderson J.S. (2019). An Early Cretaceous (Berriasian) fossil-bearing locality from the Rocky Mountains of Alberta, yielding the oldest dinosaur skeletal remains from western Canada. *Canadian Journal of Earth Sciences.* 10.1139/cjes-2019-0166

Nagesan R.S., Henderson D.M., & Anderson J.S. (2018). A method for deducing neck mobility in plesiosaurs, using the exceptionally preserved *Nichollssaura borealis*. *Royal Society Open Sciences.* 5(8). 10.1098/rsos.172307

Conference Presentations

Nagesan R.S., Cassidy E.R., Crowell H.L., et al (2023). How CT scanning museum specimens can facilitate student research and public engagement & outreach. International Mammalogy Conference (Oral Presentation). Anchorage, AK.

Nagesan R.S. (2023). A Natural History Perspective: Micro-CT scanning at the University of Michigan Museum of Zoology. (Oral Presentation). Dragonfly User Group Meeting. Ann Arbor, MI.

Campbell J.A., **Nagesan R.S.**, Pardo J.D., Lennie K., & Vavrek M., & Anderson J.A. (2018). The first record of a dinosaur from the Cadomin Formation (Lower Cretaceous) of Southern Alberta. Society of Vertebrate Paleontology Conference (Poster presentation). Salt Lake City, UT.

Nagesan R.S., & Anderson J.A, (2017) Mobility of the neck of *Nichollssaura borealis* from the lower Albian of N.W Alberta. Society of Vertebrate Paleontology Conference (Poster presentation). Calgary, AB.

Nagesan R.S., & Anderson J.A, (2015) Mobility of the neck of *Nichollssaura borealis* from the lower Albian of N.W Alberta. Society of Vertebrate Paleontology Conference. (Poster presentation). Dallas, TX.

Nagesan R.S., & Anderson J.A, (2015) Mobility of the neck of *Nichollssaura borealis* from the lower Albian of N.W Alberta. Canadian Society of Vertebrate Paleontology Conference. (Poster presentation). Kelowna, BC.

Szostakiwskji M., & **Nagesan, R.S.**, (2015) From Instagram to the Classroom: using photogrammetry to visualize anatomy. Canadian Society of Zoologists Conference (Joint-oral presentation). Calgary, AB.

Institutional & Invited Presentations

Nagesan R.S. (2023). 3D specimen visualization. Dragonfly Tutorial workshop. University of Michigan. (Oral presentation).

Pardo J.D., & Nagesan R., (2022). The earliest known dinosaurs from western Canada. Alberta Paleontological Society. Mount Royal University, Calgary, Alberta. (Joint-oral presentation)

Nagesan R.S. (2021). CT scanning at the University of Michigan Museum of Zoology. EEB Seminar Series, University of Michigan (Oral presentation).

Nagesan R.S. (2020). What it's like to be a Paleontologist. Leeds City Schools, U.K (Oral presentation).

Nagesan R.S. (2020) CT scanning at the University of Michigan Museum of Zoology & the impacts of Covid-19. Canadian Museum of Nature Seminar Series (Oral presentation)

Nagesan R.S. (2020). From the badlands to the Midwest. University of Michigan, Paleontology Seminar (Oral presentation).

Campbell J.A, Nagesan R.S, Pardo J.D., Lennie K. Vavrek M., & Anderson, J.A. (2019). The first record of a dinosaur from the Cadomin Formation (Lower Cretaceous) of Southern Alberta. Dinosaur Research Institute Dinner (Oral presentation, contributing author only).

Nagesan R.S, & Anderson, J.A, (2017) Mobility of the neck of *Nichollssaura borealis* from the lower Albian of N.W Alberta. Royal Tyrrell Museum Speaker Series (Oral presentation)

Nagesan R.S. (2014) Overview of the Marine Reptile Group Plesiosauroidea. Alberta Paleontological Society: Speaker Series. (Oral presentation)

Nagesan R.S, MacDougall M., Reisz R.R. (2013) Lateralization in the early Permian reptile *Captorhinus augti*. Royal Tyrrell Museum Speaker Series (Oral presentation).

Nagesan R.S., Reisz R.R. (2012) *Captorhinus augti*, a 289-million-year-old reptile from Oklahoma. University of Toronto: Mississauga Research Opportunity Poster Fair (Poster presentation)

Conference Abstracts

Blackburn D.C., Stanley E.L., Gray J.A., Crowe-Riddell J., Keefe R., **Nagesan R.S.**, Paluh D.J., Randall Z., Sansone G., Stepanova N., West T.R., & Davis Rabosky A.R. Using scientific specimens and their digital surrogates in teaching herpetology. JMIH, 27-31 July 2022. Spokane WA.

Cerda P.A., Crowe-Riddell J., Larson J.G., **Nagesan R.S.**, Callahan S., Rabosky D.L., Davis Rabosky A.R. (2020). Comparisons of Interspecific and Intraspecific Variation in Rear Fanged-Snake Venom Expression. *Interactive and comparative Biology*. (Vol. 60, pp. E33-E33). Journals Dept., 2001 Evans Rd, Cary, NC: Oxford University Press, INC.

Tanke D.H., Rothschild B.M., Borkovic B., Brown C.M., Currie P.J., Larsson H.C.E., **Nagesan R.S.**, & Wosik M. (2017). Ceratopsian dinosaur survives a broken neck. Canadian Society of Vertebrate Palaeontology 5th Annual Meeting, 15–17 May 2017, Dinosaur Provincial Park, AB, Canada.

Outreach and Engagement

MARCH 2022 - PRESENT

BIOL 173 Class Tours at the UMMZ, University of Michigan, Ann Arbor, Michigan.

Every semester we open the doors to the University of Michigan Museum of Zoology to the undergraduate introductory biology class. I will guide students through the Micro-CT scanning lab, showing them what kinds of data, we create and what kind of research we conduct. Each semester 700-900 students take part in this tour series.

MARCH 2023

Project Morph-23, University of Michigan, Ann Arbor, Michigan.

I helped to coordinate the 3D printing of approximately 20 herpetological specimens to be used as part of an upper-level outreach activity held at the University of Michigan Museum of Natural History. These prints included snake, crocodylian, and amphibian skulls, limbs, and tails. The prints were used to demonstrate a wide range of morphological, ecological, and biomechanical adaptations to the public. This event was attended by over 700 people.

OCTOBER 2022

Museum I.D Day, University of Michigan, Ann Arbor, Michigan.

I set up a table showing off 3D prints, 3D renders, and anatomical visualizations of the specimens that had been CT scanned at the UMMZ. This event was held at the University of Michigan Museum of Natural History. I also helped explain the anatomy of various mammalian skeletons that were on display. This event was attended by over 400 people.

MARCH 2022

Project Morph-22, University of Michigan, Ann Arbor, Michigan.

I helped to coordinate the projection of 3D renders of crocodylian from CT scans. The 3D renders formed part of an activity that highlighted the diversity of extant crocodylians by comparing the anatomy of their skulls. This activity was on display in the University of Michigan Museum of Natural History for 12 months.

MAY 2016 – SEPT 2016

Public Science Hour, Royal Tyrell Museum of Paleontology, Drumheller, Alberta.

Every afternoon in the summertime I would give a one-hour lecture for all ages in the outdoor auditorium of the RTMP. These talks would include lessons about the local geology, fossils, climate

change, and flora and fauna of Southern Alberta. Each session was designed to be accessible to people as young as 6 years old. On average these sessions were attended by 15-25 guests.

MAY 2012 – AUGUST 2013

Fossil Preparation Table Presenter, Royal Tyrell Museum of Paleontology, Drumheller, Alberta.

Every day in the summer, and three times a week during the winter I would set up a live fossil preparation demonstration in the gallery of the RTMP. During this time, I would engage in mechanical fossil preparation of a real specimen from southern Alberta. Guests at the museum were invited to ask me questions about fossils and my work. I also had a short slide presentation that could be delivered if enough of a crowd was present. In the summer approximately 100-150 people would join this activity, in the winter 5-10 people would partake on average.

Awards and Qualifications

- **2022:** Employee Merit Award, Ecology and Evolutionary Biology, University of Michigan.
- **2019:** Dinosaur Research Institute, non-student research grant \$1500 CAD.
- **2016:** Teaching Excellence Award nomination, University of Calgary.
- **2016:** Remote Responder First Aid CPR/AED, Rocky Mountain Adventure Medicine
- **2015:** Queen Elizabeth II Graduate Student Award, University of Calgary.
- **2014:** Instructional Skills Institute Workshop completion, University of Calgary.
- **2013:** Wilderness & Remote First Aid: CPR/AED Level C. Canadian Red Cross.
- **2012:** Gordon Cressy Student Leadership Award. University of Toronto.
- **2012:** Distinction granted on final degree status (H.B.Sc). University of Toronto.
- **2011:** Chemical and Physical Dept. Honour Roll student. University of Toronto.

Field Experience

2020 – PRESENT

Covid-19 disruption.

SUMMER 2019

Alberta Foothills Dinosaur Project, Alberta, Canada.

Three colleagues and I began a systematic survey of Jurassic-Cretaceous formations in the foothills region of Alberta to locate undocumented vertebrate fossil material. Excavations conducted in July 2019. Formation: Cadomin. E. Cretaceous.

SUMMER – FALL 2018

Paleontological Consulting, Alberta, Canada.

I conducted several projects across Alberta that assessed the impact of pipeline and wind turbine development on fossil resources. March-December 2018. Locations: Eastern Alberta, near Sedalia; Western Alberta between Rocky Mountain House, Grand Prairie, and the Brazeau dam region; and Calgary (north). Period: Cretaceous and Paleocene.

Rocky Mountain Devonian Fish Project, Alberta, Canada.

I was a founding member of a new project to prospect for and collect Devonian material from the Rocky Mountains of Southern Alberta. June, July 2018. Period: Devonian.

Alberta Foothills Dinosaur Project, Alberta, Canada.

Three colleagues and I began a systematic survey of Jurassic-Cretaceous formations in the foothills region of Alberta to locate undocumented vertebrate fossil material. Excavations conducted in August, September 2018. Formation: Cadomin. E. Cretaceous.

SUMMER – FALL 2017

Paleontological Consulting, Alberta, Canada.

The Brazeau dam development project: I was a member of a two-person crew that spent a total of nine days prospecting for and documenting the fossil resources of the Brazeau gorge in Central Alberta. September 2017.

Rocky Mountain Devonian Fish Project, Alberta, Canada.

I was a founding member of a new project to prospect for and collect Devonian material from the Rocky Mountains of Southern Alberta. June 2017. Period: Devonian.

Alberta Foothills Dinosaur Project, Alberta, Canada.

Three colleagues and I began a systematic survey of Jurassic-Cretaceous formations in the foothills region of Alberta to locate undocumented vertebrate fossil material. Excavations conducted in July and August 2017. Formation: Cadomin. E. Cretaceous.

SPRING - FALL 2016

Dinosaur Provincial Park Helicopter Lift, Alberta, Canada.

Helped with the helicopter lifts of a tyrannosaur block, and hadrosaur block. September 2016. Cretaceous.

Highwood River Bone-Bed Photogrammetry, Alberta, Canada.

Photography of a section of 60-million-year-old rocks for the purpose of 3D digitally mapping the section in photogrammetry software. May 2016. Paleocene.

SPRING - FALL 2015

Alberta Foothills Dinosaur Project, Alberta, Canada.

A systematic survey of Jurassic-Cretaceous formations in the foothills region of Alberta to locate undocumented vertebrate fossil material. Excavations conducted in July 2015. Formation: Cadomin. E. Cretaceous.

Dinosaur Provincial Park Bone Bed #180, Alberta, Canada.

Four days of fieldwork at the *Centrosaurus* bone bed (BB#180) under the direction of Dr. C. Brown. Formation: Dinosaur Park, L. Cretaceous. Cretaceous.

Scabby Butte, Alberta, Canada.

Continuation of fieldwork from 2014.

SPRING - FALL 2014

Dinosaur Provincial Park Bone Bed #42, Alberta, Canada.

Two weeks of fieldwork at the *Styracosaurus* bone bed (BB#42) under the direction of Dr. C. Brown. Trimble GPS mapping, and collections of multiple dinosaur fossils was performed. Formation: Dinosaur Park, L. Cretaceous.

Scabby Butte, Alberta, Canada.

Multiple day trips in the month of July with Dr. J.S. Anderson to the *Pachyrhinosaurus* bone bed (Described by Dr. W. Langston). Formation: St. Mary River, L. Cretaceous.

SPRING - FALL 2013

Tolman Bridge *Arrhinoceratops*, Alberta, Canada.

Multiple day trips during the months of May to August to the *Arrhinoceratops* bone bed under the direction of Dr. F. Therrien. Formation: Horseshoe Canyon, L. Cretaceous.

Aarons Locality, Alberta, Canada.

Mammal microsite that was both quarried and mass sediment collected under the direction of Dr. C. Scott and J. Sanchez. Formation: E. Paleocene.

Pisces Point, Alberta, Canada.

Multiple day trips throughout the summer, this site was being excavated for small fish fossils. Formation: Horseshoe Canyon, L. Cretaceous.

SPRING - FALL 2012

Olds *Champsosaur*, Alberta, Canada.

A one-day excavation of a large block containing a *Champsosaur* from the grounds of the Olds College in Olds, Ab. I later fully prepared this specimen, and it is now on display at the Royal Tyrrell Museum. Formation: Paskapoo, E. Paleocene

Milk River *Daspletosaurus*, Alberta, Canada.

I spent two weeks on an excavation of the Tyrannosaur *Daspletosaurus* from the Milk River area, under the direction of D. Tanke. We uncovered the nasal, a rib, and a several metatarsals. Formation: Milk River, L. Cretaceous.

Dinosaur Provincial Park Prospecting, Alberta, Canada.

One full week of prospecting around the western limits of the park under the direction of Dr. D. Henderson. Formation: Oldman & Dinosaur Park, L. Cretaceous.

Aarons Locality, Alberta, Canada.

Mammal microsite that was both quarried and mass sediment collected under the direction of Dr. C. Scott and J. Sanchez. Formation: E. Paleocene.

Southwestern U.S.A Field School, University of Toronto, Ontario, Canada.

12-day trip to Nevada, California, Utah, and Arizona to better understand the sedimentary environments of the Colorado Plateau.

SPRING 2010

White Fish Falls Field School, University of Toronto, Ontario, Canada.

10-day mapping trip under the direction of Dr. Ulrich Wortmann. I mapped a 1000m² section of the Canadian Shield in Northern Ontario, Canada. This trip required primarily mineral and structural geology identification skills.

References

Dr. Jason Anderson, Professor, Department Comparative Biology and Experimental Medicine, University of Calgary, Calgary Alberta, Canada. E: janders@ucalgary.ca P: 1-403-210-8661

Gregory Schneider, Collections Manager, University of Michigan Museum of Zoology, Ann Arbor, Michigan, USA. E: ges@umich.edu P: 1-734-649-8112