

Fall 2014



Western



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Notes From The SA

The Sustainable Archaeology Newsletter

Summer 2014 at SA: Western

Summer 2014 marked the end of our third full year of occupancy at the facility, and brought a number of new faces, new research projects, and new opportunities.

In June, we were excited to welcome back conservators Lisa Ellis and Alexandra Suda of the Art Gallery of Ontario, to [continue their collaboration](#) with Sustainable Archaeology Research Associate Dr. Andrew Nelson of Western University, to micro-CT scan wooden

prayer beads from the AGO's [Thompson Collection](#). Their collaborative work continued throughout the summer, including a trip to the UK! To read more about Andrew's travels and this exciting research project check out our [series of blog posts](#).

This summer we welcomed several Western University students to the facility. PhD students Renee Willmon and Amy St. John from the Department of Anthropology worked with the micro-CT

scanner to conduct research contributing to their respective dissertations. Western work study students Mark, Rabia, Sarah, and Ilsa worked with us through the summer to test data entry and database protocol, as well as repackaging legacy collections for the Museum of Ontario Archaeology.

Throughout the summer our partner Archaeological Services Inc. (ASI) continued to [transfer boxes of artifacts](#) to the facility. *Continued on page 2*

Sustainable Archaeology: In Pictures



Left: CAA attendees try out the Oculus Rift at the SA: Western CAA open house. Center: SA Western's new Nikon SMZ-25 stereomicroscope (and digital camera) station in the Digitization Lab. Right: Dr. Rhonda Bathurst gives a tour of SA: Western to CAA conference attendees.

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ASI has been working closely with SA to provide feedback on our transfer policies and protocols, both for collections and for associated digital datasets.

In July we participated for the first time in [Day of Ar-](#)

[chaeology](#), a project that aims to provide anyone interested in archaeology with a look into the daily lives and jobs of archaeologists around the world. SA's blog post detailed our daily activities here at the facility, from finances and administration, to database devel-

opment, to on-going research. Check out our post [here](#).

It's been a busy, but productive few months, and we look forward to seeing what the fall has to offer. Have a great September!



Wrap up: 2014 CAA Conference in London, Ontario

Sustainable Archaeology was pleased to welcome colleagues from across the country and beyond as part of the Canadian Archaeological Association's 2014 conference held in London, Ontario in May.

The conference provided us with the exciting opportunity to open our doors to conference attendees as part of the *Evening at the Museum* event, held in partnership with our neighbours at the Museum of Ontario Archaeology. Tours of the repository and laboratories were conducted by Dr. Neal Ferris, Dr. Rhonda Bathurst, and Kira Westby, with Dr. Andrew Nelson exhibiting examples

of scanning projects at the micro-CT station in the Ancient Images Laboratory. The evening was a great success, with over 100 attendees touring SA and the Museum's galleries.

SA was also well represented in the conference sessions by a paper delivered in the "Modernizing Archaeology" session. The paper provided an overview of the development status and architecture of our database, our inventory management approach to collections and our 3D scanning capabilities.

SA also participated in the "Public Archaeology Day" at the end of the conference. Open and free to the

public, the public day provided us a rare opportunity to directly engage with the broader community in discussions regarding how digital technologies can help make archaeological artifacts and data accessible beyond the walls of the facility. And as always, the demonstration of the [virtual walk-through of the Lawson site](#) using the Oculus Rift virtual reality headset was a huge success!

Congratulations and thank you again to all those involved with planning, organizing, and running the 2014 CAA conference - it was a pleasure to participate, and a successful week!



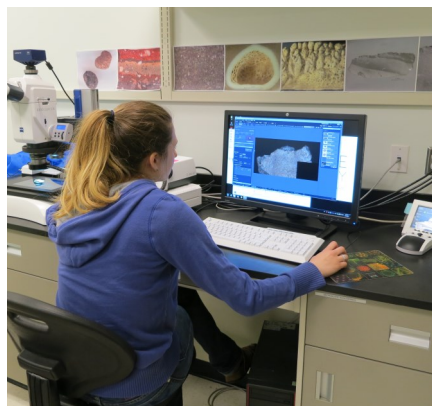
Summer 2014 at SA: McMaster

It's been a great summer here at Sustainable Archaeology: McMaster! Our Research Assistants Beatrice, Helena, Jenn, and Sam have made great progress on processing McMaster's legacy collections and continue to expand the microscopic and analytical applications of our lab facilities.



Summer RAs (left to right): Helena, Jenn, Sam, and Beatrice.

We recently increased the capabilities of our Zeiss AxioZoom microscope to include a tiling feature. This allows us to capture multiple regions of interest on an artifact at a high magnification in a single photograph by digitally stitching together a grid of images.



Sam demonstrating microscope tiling. The Zeiss software will merge the 9 tiles captured here into a single seamless image.

Combined with the z-stacking feature that stitches photographs captured at multiple depths, we have been generating some fantastic artifact images this summer.

In May, we had the pleasure of microscopically imaging a Vincent Van Gogh painting that is curated at the McMaster Museum of Art. Using our high-resolution AxioZoom, we captured images that aided researchers in their continued study of Still Life with Ginger Jar and Onions to explore possible treatments and pigments on the canvas beneath the 2.5 million dollar painting.

McMaster Innovation Park had a great turn out over the weekend of May 3 - 4 for Doors Open Hamilton. We hosted tours of our facility and enjoyed speaking with community members about our aims and operations. We also displayed a range of artifacts and site types that are currently housed here at MIP and were sure to highlight artifacts from archaeological sites right here in Hamilton.

Finally, we would like to say a big thank you to our graduating RAs Natalie and Sean. We appreciate their many hours in the lab and their contribution to preparing McMaster's legacy collections for future researchers.

3D Scanning for the Ikaahuk Archaeology Project

Colleen Haukaas, Western University
chaukaas@uwo.ca

Colleen recently completed her Master of Arts in Anthropology at Western. Her thesis, "New Opportunities in Digital Archaeology: The Use of Low-Cost Photogrammetry for 3D Documentation of Archaeological Objects from Banks Island, NWT" is available for download [here](#).

Over the last three decades 3D scanning technology has improved significantly, and many archaeologists have taken advantage of opportunities to replicate archaeological landscapes, sites, features, and artifacts. Replicating objects digitally in 3D has many advantages for archaeology. For instance, digital copies of objects can be used to provide access to artifacts from geographically remote archaeological sites and museums. This application of digital replication is useful for archaeologists who need to access collections for their research, but also for many other stakeholders groups, including local, descendent, and Indigenous communities, as well as the general public. Interactive 3D models that replicate archaeological objects have also been found to be a more engaging and effective means of communicating archaeological information in comparison to traditional means of archaeological publication, such as reports or journal articles.

My MA research was carried out as a part of the Ikaahuk Archaeology Project, a col-

laborative effort between the University of Western Ontario and the Inuvialuit community of Sachs Harbour, Northwest Territories, which is investigating the human history of Banks Island. Many community members wish to have access to artifacts that were removed by archaeologists in the past that are currently in museums elsewhere in Canada and the world; however, the physical repatriation of artifacts is currently not possible as Sachs Harbour does not have a facility for long-term artifact curation at this time. Instead, I explored ways of making digital replicas of artifacts and disseminating them online.

Using the resources at Sustainable Archaeology: Western, I created digital replicas of 17 artifacts made from stone, wood, and bone and ranging in size from 2 to 15 cm. These artifacts were loaned from the Prince of Wales Northern Heritage Centre in Yellowknife, NT which had originated from four archaeological sites on Banks Island.

Several steps were followed to create 3D models.

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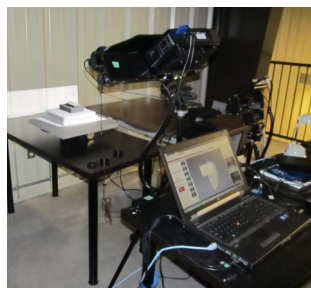


Figure 1: 3D3 White Light scanner at SA: Western. The artifact is placed on a rotating table, and the scanner collects data by projecting structured light onto the surface of the artifact.



Figure 2: 3D model of a decorated harpoon (PWNHC 982.50.362). Left: Model without texture. Right: Model with texture created using Zbrush.



Figure 3: 3D models created with 3D3 White Light scanner. Left: Awl made from bone (PWNHC 982.50.154). Right: Fishing lure carved from a polar bear tooth (PWNHC 982.44.003).

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First, I scanned the artifacts using a 3D3 White Light scanner with a large FOV (field of view) kit. This scanner projects patterns of structured light onto an object to collect information about its geometry. A turntable rotates the artifact so that the scanner can collect information from all areas of the artifact's surface. I processed the scanning data using Flexscan3D and Geomagic Studios™. To add colour to their surfaces I created UV maps of the 3D models, which are 2D representations of 3D models as if the models were cut along seams and laid on a flat surface. I photographed each artifact using a high-resolution camera with a macro lens and then used the software Zbrush to create texture maps, or image files that correspond to the UV map of each artifact. The 3D models and texture maps together make up the complete digital replica. The total time needed for all steps of the 3D replication process was about two hours per artifact.

Finally, 3D models were made available to the community of Sachs Harbour through online social media. 3D models were uploaded to the web-hosting site SketchFab (www.sketchfab.com), where users can view 3D models and interact with them by zooming and rotating the image (see Figure 4).

The models were linked to Sachs Harbour using the Ikaahuk Archaeology Facebook

page. PDF files for each 3D model created with Adobe Acrobat X Pro were also included in our annual report.



The results of my research indicate that white-light scanning has great potential for archaeological replication. The replicas were high-quality and representative of the original artifacts, and in a digital form they could be made available online so that community members in Sachs Harbour can access them at any time from any location. Whereas our goal was to create artifact replicas for a particular community, 3D scans created using this methodology are also valuable for other purposes, including digitization for research databases, extracting data from the surfaces of complex objects, or broader public engagement in archaeology. Furthermore, 3D scanning can now be used to make not only digital replicas, but also physical replicas with the development of 3D printing technology. Further research with the rapidly-improving 3D scanning will likely identify more ways that 3D replication technology can be adapted and utilized within archaeology.

To learn more about this project, visit the [Ikaahuk Archaeology Facebook page](#).

First PhD dissertation project completed at SA

Congratulations to Dr. Jennifer Morgan, who recently completed her PhD in Anthropology at Western University. Using SA's microCT scanner, Dr. Morgan's dissertation assesses the value of micro-CT to palaeopathology for the non-destructive analysis of orbital and cranial porotic hyperostosis. The objectives of her research were to evaluate the reproducibility and reliabil-

ity of two-dimensional (2D) and three-dimensional (3D) methods of micro-CT data collection for the quantitative analysis of bone microarchitecture, and to quantitatively evaluate orbital and cranial porotic hyperostosis to determine the value of micro-CT methods for understanding disease pathogenesis and improving the differential diagnosis of these lesions.

Dr. Morgan's dissertation "The Methodological and Diagnostic Applications of Micro-CT to Palaeopathology: A Quantitative Study of Porotic Hyperostosis" can be downloaded from the University of Western Ontario's Electronic Thesis and Dissertation Repository [here](#).

Best wishes for the future!

Publication in World Archaeology

In the spring Dr. Neal Ferris published a paper with two of his current graduate students, Namir Ahmed and Michael Carter, in the first 2014 issue of *World Archaeology*. The special edition focuses on digital imaging in archaeology. Titled "Sustainable archaeology through progressive assembly 3D digitization", the paper "examines the issues related to mass scanning techniques and their poten-

tial effectiveness to enable research on and access to extensive archaeological collections. It attempts to lay the groundwork for sustainable and effective scanning methodologies within multiple contexts of practice, including cultural resource management and collections management facilities."

The paper features research gathered during the sum-

mer of 2012, when Sustainable Archaeology [hosted digital animation students from Loyalist College in Belleville](#) for a twelve week internship at the facility.

A link to the abstract and citation of the paper can be accessed [here](#). Those readers with a subscription to Taylor and Francis online through an institution will have full access to the paper at that same link.

Research Grant Opportunities

Note: Please verify all application criteria and deadlines with the appropriate granting organization.

MITACS Accelerate Research Internship Program

Through Mitacs Accelerate, graduate students and post-doctoral fellows from over 50 universities apply their specialized expertise to business-related research challenges.

Interns spend approximately half of the time on-site with the industry partner; the remainder is spent at the university advancing the research under the guidance of a faculty supervisor.

The program is open to all disciplines and all industry sectors.

Each 4-month internship project receives \$15,000 in direct funding, with the partner organization and Mitacs each providing \$7,500

Application Deadline: Applications are accepted throughout the year, and projects may begin at any time.

For specifics on the program, funding, application criteria and more, visit www.mitacs.ca/accelerate

MITACS Elevate

Mitacs Elevate supports postdoctoral fellows and Canadian companies and partners to collaborate on cutting-edge research projects and build capacity for the next generation of R&D management leaders.

The two-year program provides fellows with an opportunity to lead a long-term research project with a partner organization while developing professional skills and benefiting from leadership training.

Application Deadline: The next call for applications is tentatively scheduled for Spring 2014.

For more information on eligibility, how to apply, and more, visit www.mitacs.ca/elevate

Canadian Association of Physical Anthropology (CAPA): The Shelley R. Saunders Thesis Research Grant

Grants support the costs associated with Ph.D. dissertation research. Grants support lab research, fieldwork, museum or archive work. Student members of CAPA in good standing, currently registered in a Ph.D. program in physical anthropology, may apply.

Application Deadline: February 1st.

For more information, visit capa.fenali.net/career-development/funding/

Research Grant Opportunities

Note: Please verify all application criteria and deadlines with the appropriate granting organization.

The Leakey Foundation Research Grants

Funds research related to human origins, including paleoanthropology, primate behavior, & studies of modern hunter-gatherer groups.

Research Grants to doctoral student are in the \$3,000-\$13,500 range; larger grants to senior scientists and post-doctoral students may be funded up to \$22,000. No citizenship restrictions.

Application Deadline: January 5 and July 15 annually

For more information visit www.leakeyfoundation.org/grants/

Sigma Xi Grants-in-aid of Research Program

Grants of up to \$1,000 to students from all areas of the sciences and engineering. Grants are used to pay for travel expenses to and from a research site, or for the purchase of non-standard laboratory equip-

ment. Membership of Sigma Xi is not a requirement. No citizenship restrictions.

Application Deadline: October 15 and March 15 annually.

For more information on the program, and how to apply, visit

www.sigmaxi.org/programs/giar

Raymond Davis Scholarship

Awarded to an advanced level undergraduate or graduate student with an academic and/or research focus in a field related to imaging.

A certificate and grant of at least \$1,000 are given to recipients of this award. One or more awards are made annually, depending on available funds.

For more information, visit: www.imaging.org/ist/membership/davis.cfm?AwardCode=RS

Wenner-Gren Foundation

A variety of the Founda-

tion's grants support students enrolled in doctoral programs leading to a Ph.D. (or equivalent), including grants for dissertation research.

For more information on specific grants, application criteria, and application deadlines, visit www.wennergren.org/programs/ or contact the Foundation by email: inquiries@wennergren.org

Ruggles-Gates Fund for Biological Anthropology

Fund administered by the Royal Anthropological Institute that provides grants for graduate research in biological anthropology. No nationality restriction.

Application Deadline: March 31 yearly

For more information on the nature of the award, and how to apply, visit www.therai.org.uk/awards/research-grants/ruggles-gates-fund-for-biological-anthropology/

Sustainable Archaeology: Western
1600 Attawandaron Rd., London, ON
Phone: 519-850-2565

For more information, contact Dr. Rhonda Bathurst,
at rhonda.bathurst@uwo.ca



www.sustainablearchaeology.org

Sustainable Archaeology: McMaster
McMaster Innovation Park, Hamilton, ON
Phone: 905-525-9140 x21970

For more information, contact Dr. Catherine
Paterson at sustarc@mcmaster.ca



Sustainable Archaeology's Mission Statement

Sustainable Archaeology is dedicated to advancing a transformative practice of archaeology that integrates the many forms of the discipline – commercial, academic, avocational – by consolidating the extensively recovered archaeological record from a region of the world and converting that material and contextual data into broadly accessible and integrated digital information. This compiled and converted record will allow for ongoing and innovative research advancing the knowledge, conception, appreciation, and engagement of this compiled and rich archaeological heritage left by the countless previous generations of those who loved, lived, and died in this place, by all those today who draw awareness, meaning, value, and identity from this human heritage.

Upcoming Conferences

British Association for Biological Anthropology and Osteoarchaeology Annual Conference, September 12-14, Durham University, Durham, United Kingdom. www.dur.ac.uk/archaeology/conferences/current/babao2014/

Ontario Archaeological Association 2014 Symposium: "The Land Between", October 24-26, Peterborough, Ontario. www.ontarioarchaeology.on.ca or follow on Twitter: [@OntArchSoc](https://twitter.com/OntArchSoc)

5th International Conference on Remote Sensing in Archaeology: "The Age of Sensing", October 13-15, Duke University, Durham, North Carolina. space2place.classicalstudies.duke.edu

Conference on Cultural Heritage and New Technologies: "Urban Ar-

chaeology", November 3-5, Vienna, Austria. www.stadtarchaeologie.at

Canadian Association for Physical Anthropology (CAPA) Annual Meeting, November 6-9, University of New Brunswick, Fredericton, New Brunswick. www.unb.ca/conferences/capa. *Abstract Submission deadline: August 15*

Chacmool 2014: "Breaking Barriers", November 7-9, University of Calgary, Calgary, Alberta. arkey.ucalgary.ca/chacmool2014/

Abstract submission deadline: October 5. Poster Competition abstract deadline: November 3

Society for Historical Archaeology (SHA) 2015 Conference: "Peripheries and Boundaries", January 6-11 2015, Seattle, Washington.

sha.org/index.php/view/page/annual_meetings.

Computer Applications and Quantitative Methods in Archaeology 43rd Annual Conference: "Keep the Revolution Going", March 30-April 2 2015, University of Siena, Italy. caaconference.org

Society for American Archaeology 80th Annual Meeting, April 15-19 2015, San Francisco, California. www.saa.org/AbouttheSociety/AnnualMeeting/tabid/138/Default.aspx.

Canadian Archaeological Association 48th Annual Conference, April 29-May 3 2015, St. John's Newfoundland. www.mun.ca/caa2015/index.html. *Deadline for session and forum proposals: January 9, Deadline for paper abstracts: February 8*