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Media Contact
Erin Greeson
egreeson@nhm.org
(213) 763-3532

From Giant Ground Sloths to Fossil Poop, BREAS Project Advances Tar Pits Research Globally

Scientists find and share new knowledge of Ice Age species and climates at Earth's asphaltic sites

Los Angeles, CA (April 8, 2020)—From extinct giant ground sloths in Ecuador to 50,000-year-old rodent droppings in the middle of modern Los Angeles, scientists from La Brea Tar Pits are making new discoveries about extinct species and past ecosystems preserved in asphaltic sites, or “tar pits.” Even as museums around the world temporarily close in response to the novel coronavirus, scientists affiliated with research institutions, like the Natural History Museums of Los Angeles County—which include La Brea Tar Pits—are carrying vital work and knowledge-sharing forward.

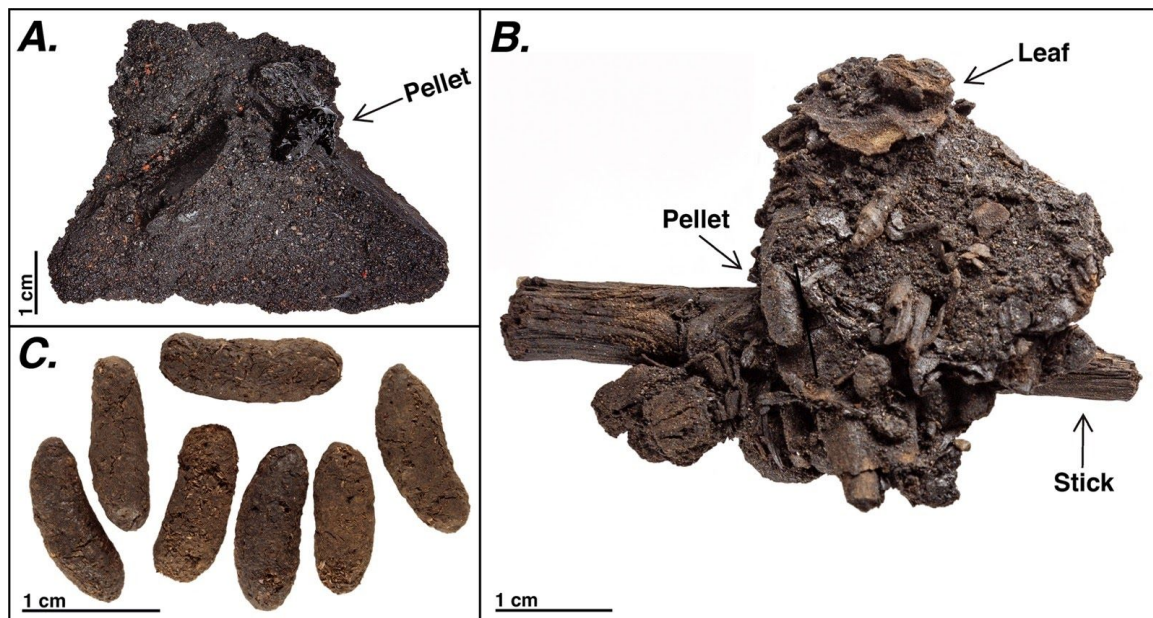
First published this January in the journal *Palaeogeography, Palaeoclimatology, Palaeoecology*, a team of researchers discovered the remains of at least 22 giant ground sloths that perished during the Pleistocene Epoch (“Ice Age”) in Ecuador, and were preserved by naturally seeping asphalt. This rare find gives new insight into how these animals lived—their habitat, social structure, and behavior—and even how these ones might have died.



[Ground Sloth Animation](#) - Several low poly animations of various animals found at La Brea Tar Pits were created as part of TarAR, an NSF grant in collaboration with University of Southern California to produce a virtual reality educational experience. This animation represents Harlan's ground sloth, *Paramylodon harlani*.

Then, a couple of weeks later, in the journal *Quaternary Science Reviews*, paleontologists published a wide-ranging study of Ice Age fossils discovered from numerous asphaltic sites on the island of Trinidad. This review represents the first comprehensive publication ever on Trinidad’s Pleistocene fossil record, and also lays out a road map for understanding and investigating other asphaltic sites globally.

Finally, last month in the journal, *Scientific Reports*, scientists described the discovery of hundreds of ancient, asphalt-preserved coprolites (fossil feces) right in their (museum’s) own backyard. The team determined that these “trace fossils” were produced by the packrat *Neotoma*, a critter whose nests provide valuable clues into past climate across the arid southwest. But no fossil *Neotoma* nests have ever been discovered near the coast before; the asphalt seeps at La Brea Tar Pits fortuitously preserved this one.



Example of Rancho La Brea coprolites from a new paper by Mychajliw, A.M., Rice, K.A., Tewksbury, L.R. et al. (A) and (B) in situ examples of bulk matrix from Project 23, with coprolites mixed in. (C) isolated coprolites sieved from the cleaned matrix. (Photographs by Carrie Howard, Preparator at La Brea Tar Pits. Courtesy of La Brea Tar Pits.)

“Tar pits are incredibly intriguing, and Rancho La Brea is probably the most well-known fossil site in the world,” said Dr. Emily Lindsey, an author on all three papers, and the Assistant Curator and Site Director at La Brea Tar Pits. “But, despite more than a century of research, we’re learning that we have only just scratched the surface.”

The newest discovery represents another first for the world famous site in Los Angeles, California, which has yielded the largest collection of late Pleistocene vertebrate fossils on Earth. A popular destination for scientists, students, tourists, and local communities, the site and associated museum are a hub of ongoing excavation and research. However, about a dozen other asphaltic sites across the globe—including the recently reported ones in Ecuador and Trinidad—preserve potential fossil treasure troves that have been far less well explored.

Now, in addition to on-site research, the institution is leading a global effort to advance and connect research and discovery at tar pits around the world. Through the BREAS Project—“Bridging Research and Education at Asphaltic Sites”—La Brea Tar Pits is working to foster integrative research collaborations, build capacity and connect science and communities at fossil sites.

“While asphaltic sites are rare, they can preserve both a tremendous quantity and variety of fossils, making exploring these sites a scientific priority,” said Lindsey. “Tar pits are one of the only types of fossil sites where we can find remnants of an entire ecosystem preserved—leaves and bones, megamammals and tiny insects, seeds and shells. As such, they are extremely valuable for paleontologists investigating important topics like evolution, paleoecology, and climate change, and are especially crucial in areas like the neotropics where the Pleistocene fossil record is sparse. The BREAS Project seeks to leverage these remarkable sites to advance paleontological research and build scientific capacity in some of the world’s least-explored regions.”

Connecting science and communities for STEM learning

In addition to developing high-impact research collaborations with scientists working at other global asphalt seeps, the BREAS Project aims to provide student training, technical expertise, and collections support to local institutions involved in excavating, preparing, curating, and studying fossils from these sites. BREAS also seeks to engage local communities by developing education and outreach programs to support local STEM education, to conserve and communicate the importance of these localities, and to support local institutions in advocating for the protection and preservation of their national fossil resources.



Students from the University of the West Indies at St. Augustine, Trinidad, examining undescribed fossils from Trinidad during a short course taught by Dr. Alexis Mychajliw, Postdoctoral Fellow at La Brea Tar Pits, and Collections Manager Aisling Farrell, in April 2019. (Photograph by Aisling Farrell. Courtesy of La Brea Tar Pits.)

"Historically, tar pit science has been synonymous with 'Rancho La Brea' because that's where the resources and scientific capacity were concentrated. This view limited not only the scientific potential of tar pits, but also who was able to participate in telling the story of their region's past biodiversity," said Dr. Alexis Mychajliw, a Research Associate at La Brea Tar Pits and lead author on the Trinidad and coprolite papers. "Through BREAS, instead of bringing specimens back to the U.S., we bring the scientific tools we've honed here to other tar pits globally, engaging communities with a deeper understanding of the places they live and opening up new avenues of study for local scientists. The response in Trinidad and Tobago has been overwhelmingly positive, with students, families, and community members joining us on field trips and even starting independent research projects. I can't wait to see what discoveries these new tar pit scientists will make!"

"The discoveries we make at tar pits help us understand how past species and ecosystems responded to late-Pleistocene climate changes and human activities—processes that are once again impacting life on Earth today," Lindsey noted. "By partnering with institutions working at tar pits around the world, and empowering local scientists and communities to study these sites, we can discover how these processes played out on multiple continents, and generate greater connections with the past, present, and future of these ecosystems we all depend on."

The Natural History Museums of Los Angeles County recently announced plans for a landmark re-imagining of La Brea Tar Pits, the iconic Los Angeles paleontological site and museum. Currently in master planning phase with New York-based architects Weiss/Manfredi, the design will include modern research labs and more space for scientists—including those visiting from other global tar pit sites—while updating interior spaces and exterior surroundings to better connect people with science learning through open, sustainable design.

"Asphaltic fossil deposits span a diversity of contexts and are found from Peru to Cuba to Azerbaijan," Lindsey added. "These unique sites are now connected by a program with a unifying vision: to advance scientific discovery, and open up the scientific process and findings to local communities, connecting people with science in new ways."



Students make protective plaster wrappings for asphalt-preserved giant sloth bones at the Tanque Loma tar pit locality in southwestern Ecuador. (Photograph by Martin Tomasz. Courtesy of La Brea Tar Pits)

The paper entitled “A monodominant late-Pleistocene megafauna locality from Santa Elena, Ecuador: Insight on the biology and behavior of giant ground sloths” was published in the journal *Palaeogeography, Palaeoclimatology, Palaeoecology*. Authors include: Emily L. Lindsey, Erick X. Lopez, Gordon E. Matzke, Karin A. Rice, H. Gregory McDonald.

The paper entitled “The biogeography of “breas”: Contextualizing the taphonomy, ecology, and diversity of Trinidad’s asphaltic fossil record” was published in the journal *Quaternary Science Reviews*. Authors include: Alexis M. Mychajliw, Ryan S. Mohammed, Karin A. Rice, Aisling B. Farrell, Aciano D. Rincón, Robert McAfee, H. Gregory McDonald, Emily L. Lindsey.

The paper entitled “Exceptionally preserved asphaltic coprolites expand spatiotemporal range of a North American paleoecological proxy” was published in the journal *Scientific Reports*. Authors include: Alexis M. Mychajliw, Karin A. Rice, Laura R. Tewksbury, John R. Southon, Emily L. Lindsey.

About the Natural History Museums of Los Angeles County

The Natural History Museums of Los Angeles County (NHMLAC) include the Natural History Museum in Exposition Park (NHM), La Brea Tar Pits, and the William S. Hart Museum. They operate under the collective vision to inspire wonder, discovery, and responsibility for our natural and cultural worlds. The museums hold one of the world’s most extensive and valuable collections of natural and cultural history—more than 35 million objects. Using these collections for groundbreaking scientific and historic research, the museums also incorporate them into nature and culture exploration in L.A. neighborhoods, and a slate of community science programs—creating a natural history museum experience that explores the past, but increasingly addresses the present and the future. Visit nhmlac.org.

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Interviews available upon request.

Media Resources:

Multimedia:

[Image 1](#) - Students make protective plaster wrappings for asphalt-preserved giant sloth bones at the Tanque Loma tar pit locality in southwestern Ecuador. (Photograph by Martin Tomasz. Courtesy of La Brea Tar Pits)

[Image 2](#) - Fieldwork at La Brea Talara in northwestern Peru. Paleontologists from NHMLAC and the Universidad de Piura on a 2018 field trip, prospecting near the historic fossil sites. (Photograph by La Brea Tar Pits Collections Manager Aisling Farrell. Courtesy of La Brea Tar Pits.)

[Image 3](#) - Example of Rancho La Brea coprolites from a new paper by Mychajliw, A.M., Rice, K.A., Tewksbury, L.R. et al. (A) and (B) *in situ* examples of bulk matrix from Project 23, with coprolites mixed in. (C) isolated coprolites sieved from the cleaned matrix. (Photographs by Carrie Howard, Preparator at La Brea Tar Pits. Courtesy of La Brea Tar Pits.)

[Image 4](#) - Students from the University of the West Indies at St. Augustine, Trinidad, examining undescribed fossils from Trinidad during a short course taught by Dr. Alexis Mychajliw, Postdoctoral Fellow at La Brea Tar Pits, and Collections Manager Aisling Farrell, in April 2019. (Photograph by Aisling Farrell. Courtesy of La Brea Tar Pits.)

[Image 5](#) - Preparator excavating fossils from Project 23 at La Brea Tar Pits in Los Angeles, California. (Photograph by Mario de Lopez. Courtesy of La Brea Tar Pits.)

[Image 6](#) - View of fiberglass mammoth sculptures in the Lake Pit, an iconic part of the grounds at La Brea Tar Pits. (Photograph by Mario de Lopez. Courtesy of La Brea Tar Pits.)

[Ground Sloth Animation](#) - Several low poly animations of various animals found at La Brea Tar Pits were created as part of TarAR, an NSF grant in collaboration with University of Southern California to produce a virtual reality educational experience. This animation represents Harlan's ground sloth, *Paramylodon harlani*.

Bios:

- [Dr. Emily Lindsey](#)

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