New study suggests Borneo's had elephants for thousands of years

by John C. Cannon on 31 January 2018

- *The research, published in January in the journal Scientific Reports, used genetic information and changes to the topography of the region to surmise that Asian elephants arrived in Borneo between 11,000 and 18,000 years ago.*
- *The authors hypothesize that elephants moved from nearby islands or the Malaysian peninsula to Borneo via land bridges.*
- *It's an indication that the elephants are 'native' to Borneo, the scientists argue, and points to the need to bolster conservation efforts.*

The backstory behind the world's smallest elephants has always been something of a mystery. For one thing, scientists aren't sure exactly when — and how — Bornean pygmy elephants got to the island of Borneo from other parts of Asia. A 2003 probe into their genetics found that they've been genetically distinct from their closest elephant cousins (http://journals.plos.org/plosbiology/article?id=10.1371/journal.pbio.0000006) for 300,000 years and could have arrived in Borneo some time after that point. Another conjecture has been that they're a feral population descended from elephants introduced by humans (http://d2ouvy59p0dg6k.cloudfront.net/downloads/pages_from_originofelephants_in_borneofinal2oct07_2.pdf) only a few hundred years ago.

Now, a new study published on Jan. 17 (https://www.nature.com/articles/s41598-017-17042-5) in the journal *Scientific Reports* suggests that they've been in Borneo since the end of the Pleistocene,

around 11,000 to 18,000 years ago, when Borneo was part of a much larger land mass.

"The elephants in Borneo are much more than an introduced population and are not coming from a few introduced individuals," said Benoit Goossens, a wildlife biologist, director of the Danau Girang Field Centre in Malaysian Borneo and co-author of the paper. "Elephants have been there for thousands of years, and they are Bornean."

Elephant cow and her offspring in a palm oil plantation in the Kinabatangan. Photo courtesy of Rudi Delvaux.

The study used far-reaching genetic data gleaned from nearly 800 DNA samples collected for an earlier study (https://www.sciencedirect.com/science/article/pii/S0006320716300416). The team then compared that information to a series of statistical models covering different historical scenarios for the elephants. From that comparison, they discovered that Borneo's elephants passed through a "genetic bottleneck," when their population dipped to low levels — and thereby diminished the amount of genetic diversity within the population — about 11,000 to 18,000 years ago.

The team postulates that the conditions of the Earth's surface around that time may have forced Bornean elephants through this genetic window. During the Pleistocene, which began more than 2.5 million years ago and ended about 11,700 years ago, sea levels were on average a lot lower, and Borneo was part of a larger land mass connected to other parts of Southeast Asia.

Toward the end of the Pleistocene, rising sea levels began to swallow the land bridges between Borneo and the islands of Java and Sumatra, as well as Peninsular Malaysia, that had previously allowed animals to move around. Once the land bridges were gone, it cut Borneo's elephants, not to mention other large mammals, off from their kin, according to Goossens and his colleagues' hypothesis.

A female Bornean elephant in the Kinabatangan River. Photo by John C. Cannon/Mongabay.

Pruthu Fernando, a conservation biologist with the Centre for Conservation Research in Sri Lanka, who was not involved in the current study, called it "a good example of what can be elucidated from genetic information."

Fernando led the 2003 research leading to the conclusion that Borneo's elephants split off genetically from Malayan and Sumatran populations of the Asian elephant (*Elephas maximus*) — now considered an Endangered species by the IUCN (http://www.iucnredlist.org/details/7140/0). He also said the new study backs up his team's conclusions "that the elephant population in Borneo is indigenous to the island and not a feral population, and that colonization happened in the Pleistocene."

Elephants in a palm oil plantation in the Kinabatangan. Photo courtesy of Rudi Delvaux.

The elephants' long history on the island sends "a message that people should be proud of elephants, and they should feel that they belong to Sabah," Goossens said.

Their unique origins also strengthen the case for their protection, Fernando added.

"The fact that it is an indigenous rather than a feral population, one of only three island populations and a population at the edge of Asian elephant distribution, makes it very important that it is conserved," he said in an email, referring to elephant subspecies that live on the islands of Sumatra (*E. maximus sumatrensis*) and Sri Lanka (*E. maximus maximus*).

"However," he added, "these conclusions are not new."

The skull and tusks of a Bornean elephant after being found killed in Ulu Segama Forest Reserve recently. Photo courtesy of the Sabah Forestry Department.

John Payne, a biologist with nearly four decades of experience working in Malaysian Borneo, who was also not involved in the current research, said the study was "good and interesting." But he added that it does not rule out the possibility humans could have introduced the island's elephants just a few hundred years ago.

In 2008, Payne and several colleagues examined the historical record and found evidence that a 17th-century sultan in the Philippines may have introduced a few elephants from the Sulu Islands. The lineages of these animals could likely be traced back to the Javan elephant (*Elephas maximus sondaicus*), which went extinct in the 1700s.

"It might have been that the big bottleneck the population went through went could have actually happened in Java," Payne said. Still, he argued that the elephants' origins in Borneo shouldn't affect efforts to protect them.

Elephants roaming the Kinabatangan Wildlife Sanctuary. Photo courtesy of Rudi Delvaux.

Bornean elephants — considered by some scientists, though not all, to be a bona fide subspecies (*E. maximus borneensis*) of the Asian elephant — are under threat. The remaining 1,500 to 2,000 exist primarily in a narrowing patchwork of habitat squeezed between oil palm plantations in northeastern Borneo. What's more, the scourge of poaching for ivory seems to have found its way to Borneo, with two males apparently killed for their tusks in 2017 (http://www.theguardian.com/environment/2017/jan/03/wborneo-pygmy-smallest-elephants-pygmy-killed-for-ivoryorlds-smallest-elephants-killed-for-ivory-in-borneo).

"We really need to make sure that we manage those populations very carefully," Goossens said, "and that we stop losing males and breeders in the population."

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Banner image of elephants in the Kinabatangan Wildlife Sanctuary courtesy of Rudi Delvaux.
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