

How islands shrink people

Evolutionary dwarfing affected living people on the island of Flores, and may explain the stature of the extinct hobbit

By Ann Gibbons

Living on an island can have strange effects. On Cyprus, hippos dwindled to the size of sea lions. On Flores in Indonesia, extinct elephants weighed no more than a large hog, but rats grew as big as cats. All are examples of the so-called island effect, which holds that when food and predators are scarce, big animals shrink and little ones grow. But no one was sure whether the same rule explains the most famous example of dwarfing on Flores, the odd extinct hominin called the hobbit, which lived 60,000 to 100,000 years ago and stood about a meter tall.

Now, genetic evidence from modern pygmies on Flores—who are unrelated to the hobbit—confirms that humans, too, are subject to so-called island dwarfing. On p. 511, an international team reports that Flores pygmies differ from their closest relatives on New Guinea and in East Asia in carrying more gene variants that promote short stature. The genetic differences testify to recent evolution—the island rule at work. And they imply that the same force gave the hobbit its short stature, the authors say.

“Flores is a magical place where things go and get small,” says population geneticist Joshua Akey at Princeton University, a co-author of the study. “This is the only example in the world where insular dwarfism has arisen twice in hominins.”

Princeton postdoc Serena Tucci set out to study the Rampasasa pygmies of Flores, who average just 145 centimeters tall. Famed Indonesian paleoanthropologist Teuku Jacob, now deceased, had controversially proposed that the Rampasasa people inherited some traits from the hobbit, whom he thought was a modern human. To explore the pygmies’ ancestry, Tucci and her then-adviser, Ed Green of the University of California (UC), Santa Cruz, traveled to Flores. With the pygmies’ permission, they began a “model” collaboration with Indonesian researchers, says molecular biologist and co-author Herawati Sudoyo of the Eijkman Institute for Molecular Biology in Jakarta. Her col-

leagues gathered spit and blood from 32 people and extracted the DNA. Then, Eijkman researcher Gludhug Purnomo hand-carried samples to Green’s lab, where he helped sequence 2.5 million single nucleotide polymorphisms, or alleles, in every individual, plus 10 complete genomes.

The team found no trace of archaic DNA that could be from the hobbit. Instead, the pygmies were most closely related to other East Asians. The DNA suggested that their ancestors came to Flores in several waves: in the past 50,000 years or so, when modern humans first reached Melanesia; and in the past 5000 years, when settlers came from both East Asia and New Guinea.

The pygmies’ genomes also reflect an environmental shift. They carry an ancient version of a gene that encodes enzymes to break down fatty acids in meat and seafood. It suggests their ancestors underwent a “big shift in diet” after reaching Flores, perhaps eating pygmy elephants or marine foods, says population geneticist Rasmus Nielsen of UC Berkeley, who was not part of the study.

The pygmies’ genomes are also rich in alleles that data

from the UK Biobank have linked to short stature. Other East Asians have the same height-reducing alleles, but at much lower frequencies. This suggests natural selection favored existing genes for shortness while the pygmies’ ancestors were on Flores. “We can’t say for sure that they got shorter on Flores, but what makes this convincing is they’re comparing the Flores population to other East Asian populations of similar ancestry,” says population geneticist Iain Mathieson of the University of Pennsylvania.

The discovery fits with a recent study suggesting evolution also favored short stature in people on the Andaman Islands, Green says. Such selection on islands boosts the theory that the hobbit, too, was once a taller species, who dwindled in height over millennia on Flores.

“If it can happen in hippos, it can happen in humans,” Tucci says. “Humans are not as special as we think. This shows we evolve like all other animals.” ■

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Serena Tucci,
Princeton University