Incredible journey through 'hobbit' brain

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Florida State University professor and chair of anthropology Dean Falk led an international team of scientists on an incredible virtual journey through the tiny brain of an 18,000 year-old hobbit-sized human. What they found has upended conventional evolutionary wisdom on the relationship of brain size to intelligence.
Findings from "The Brain of LB1, Homo Floresiensis" appear in the March 3 edition of Science Express, the online version of the journal *Science*, and will be featured in a March 13 special edition of Explorer on the National Geographic Channel at 8 p.m. EST/PST.

"The discovery of this species has flummoxed the field of anthropology," said Falk. "I believe it equals or surpasses the identification of other ancestors such as the Taung hominin in 1925, which marked the birth of modern paleoanthropology and sparked an ongoing debate on human evolution."

Last October, skeletal remains of a bipedal adult female barely 36 inches tall were unearthed by Australian and Indonesian researchers on the Indonesian island of Flores. The new dwarf human species was catalogued as LB1, Homo floresiensis, and nicknamed "hobbit."

With a brain one-third the size of a contemporary human's, LB1 had a blend of Homo erectus traits -- like a sloping forehead -- and more familiar Homo sapiens characteristics. It co-existed during the 25,000 millennia that Homo sapiens was presumed, until recently, to be Earth's sole human inhabitant. Given the hobbit's small brain, Falk, a paleoneurologist, was intrigued by the sophisticated tools and evidence

of fire that archaeologists uncovered near the remains.

With funding from the National Geographic Society, Falk and a team at Washington University Mallinckrodt Institute of Radiology in St. Louis used a process to reproduce the hobbit's external brain features, creating an endocast -- a three-dimensional model -- based on computer tomography (CT) data gathered in Indonesia. Falk also created a physical endocast out of latex. Together they provided a detailed map of imprints left on LB1's braincase that corresponded to the once-living organ's shape, grooves, vessels and sinuses.

"I thought the Homo floresiensis brain would look like a chimp's," Falk said. "I was wrong. There were fancier things on LB1's brain."

The endocasts revealed a surprising and significant swelling of the frontal lobe, along with other anatomical features consistent with higher cognitive processes. Those features, which correlate to initiative-taking and advanced planning, might explain the tools and signs of cooperative activities in LB1's cave despite the primitive size of its brain.

Researchers verified blood vessels and other markings to make sure they were relevant brain components and not simply artifacts left by a post-mortem impact. The intricate images were compared to other endocasts from a variety of sources such as chimpanzees, an adult female Homo erectus, a contemporary woman, an adult female pygmy and a microcephalic -- a human with an abnormally small skull.

Falk contends that her team's exhaustive analysis refutes skeptics' suppositions that Homo floresiensis was either a pygmy or a microcephalic. "The scaling of brain to body isn't at all what we'd expect to find in pygmies, and the shape is all wrong to be a microcephalic. This is something new."

The brain study supports the notion that the evolution of Homo floresiensis, a new species but closely related to Homo erectus, either reflected island dwarfing in response to limited food supplies or indicated that the two species may have shared an unknown, small-bodied and small-brained ancestor.

Co-authors include Falk, FSU; Charles Hildebolt, Kirk Smith, Barry Brunsden and Fred Prior, Mallinckrodt Institute; Peter Brown and Michael J. Morwood, University of New England, Australia; and Thomas Sutikna, Jatmiko and E. Wayhu Saptomo, Indonesian Centre for Archeology.

Source: Florida State University