A massive, remarkably complete skull from China may reveal the long-sought face of a Denisovan, a kind of ancient human known chiefly from DNA.

PHOTOS: XIJUN NI

PALEOANTHROPOLOGY

'Dragon Man' may be an elusive Denisovan

Paleoanthropologists are both excited and puzzled by "wonderful skull" from China

By **Ann Gibbons**

Almost 90 years ago, Japanese soldiers occupying northern China forced a Chinese man to help build a bridge across the Songhua River in Harbin. While his supervisors weren't looking, he found a treasure buried in the riverbank: a remarkably complete human skull. He wrapped up the heavy cranium and lowered it into a well to hide it from the Japanese. Today, the skull is finally coming out of hiding as "Dragon Man," the newest member of the human family, who lived more than 146,000 years ago.

In three papers in the year-old journal *The Innovation*, paleontologist Qiang Ji of Hebei GEO University and his team describe the skull and argue it represents a new species that is a sister group to *Homo sapiens*, even closer kin to us than were the Neanderthals. Other researchers question that idea. But they suspect the large skull, which the team calls *H. longi* (*long* means dragon in Mandarin), has an equally exciting identity: It may be the long-sought skull of a Denisovan, an elusive human relative from Asia known chiefly from DNA. "It's a wonderful skull; I think it's the best skull of a Denisovan that we'll ever have," says paleoanthropologist Jean-Jacques Hublin of the Max Planck Institute for Evolutionary Anthropology.

The stunning fossil was brought to light by the bridge builder's grandchildren, who retrieved it from the well after their grandfather told them about it on his deathbed. They donated it to the Geoscience Museum at Hebei GEO University. (The family asked to remain anonymous.) But the man died without saying precisely where he had found the fossil, leaving the researchers uncertain of its geological context.

> **"I think it probably is a Denisovan."**
> **Chris Stringer**, Natural History Museum

So Ji enlisted several researchers to help date the skull. Geochronologist Rainer Grün of Griffith University, Nathan, in Australia and colleagues linked strontium isotopes in sediment crust from its nasal cavities to a 9-meter layer of sediments around the bridge, which they dated to between 138,000 and 309,000 years ago. Uranium series dating on the bone itself gives it a minimum age of 146,000 years.

Next, the researchers tried to identify the skull. Paleontologist Xijun Ni of the Chinese Academy of Sciences and Hebei GEO University, who led the effort, was initially puzzled: The massive skull held a brain comparable in size to that of modern humans. But it couldn't be a member of *H. sapiens* because it had larger, almost square eye sockets, thick brow ridges, and a wide mouth, and its one remaining molar was huge. So Ni compared 55 traits of the skull—including its length, brow size, and dental features—with those of 95 other fossilized skulls, jaws, or teeth from the genus *Homo* from around the world. A computer model then sorted the fossils into family trees, and the tree that fit best with the data had four main clusters. The new skull nestled in a cluster with several other skulls from China's Middle Pleistocene, 789,000 to 130,000 years ago. Within that cluster, the new skull was most closely related to a jawbone from Xiahe Cave on the Tibetan Plateau.

Ni says the entire cluster of Chinese fossils was closer to early *H. sapiens* than the Neanderthals in the sample were. "Our discovery suggests that the new lineage we identified that includes *Homo longi* is the actual sister group of *H. sapiens*," he

told *Science*. If so, Dragon Man and his kin would displace Neanderthals as modern humans' closest known relative.

Ni says he chose to publish in the little-known journal *The Innovation*, part of the Cell family of journals, "because they promised that they can handle our submissions very fast and will respect our choice of novel research methods." Others are less respectful. "When I saw this analysis, I nearly fell off my chair," Hublin says. He and others question how the team concluded that the skull—which lacks a lower jaw—is closely related to the Xiahe lower jaw.

They also question Li's overall classification of the skull as a new lineage, close to modern humans. "It's premature to name a new species, especially a fossil with no context, with contradictions in the data set," says María Martinón-Torres, a paleoanthropologist at CENIEH, the national center for research on human evolution in Spain. Paleoanthropologist Marta Mirazón Lahr of the University of Cambridge calls the find fascinating, but says she's "skeptical of the statements about humans' long-lost sister lineage."

Instead, she and others say, Dragon Man is probably a Denisovan, an extinct cousin of the Neanderthals. To date, the only clearly identified Denisovan fossils are a pinkie bone, teeth, and a bit of skull bone from Denisova Cave in Siberia, where Denisovans lived off and on from 280,000 to 55,000 years ago. But the enormous, "weird" molar from the new skull fits with the molars from Denisova, says Bence Viola, a paleoanthropologist at the University of Toronto, who analyzed the Denisova fossils with Hublin. The link with the Xiahe Cave jawbone, if correct, would strengthen the case, as a protein from that fossil as well as ancient DNA in the sediments of the cave strongly suggest it was a Denisovan.

The authors concede that their critics have a point. "I think it probably is a Denisovan," says Chris Stringer, a paleoanthropologist at London's Natural History Museum and co-author on two of the papers. DNA analysis of the new skull could resolve the issue. But the team says it does not want to risk destroying the tooth or other bone to get DNA or protein.

If the new skull is indeed from a Denisovan, the team's claim to have found the closest human ancestor would crumble. DNA studies have established that Denisovans and Neanderthals formed sister groups, more closely related to each other than to *H. sapiens*. But Dragon Man would still be a landmark fossil. Viola hopes researchers can analyze its DNA, so that "I can finally look into the eyes of a Denisovan." ■

Researchers hope this black-footed albatross chick, settling in on Guadalupe Island, will return here to breed.

CONSERVATION BIOLOGY

Black-footed albatrosses find a new home across an ocean

International project offers a model for tricky translocation of seabirds threatened by rising sea level

By **Rodrigo Pérez Ortega**

On the morning of 16 June, Snowflake spread its wings and let the strong, cold wind of Guadalupe Island help it take a first flight away from its nest. But this was not the first time the young black-footed albatross had soared above the North Pacific Ocean: Five months before, as an egg, Snowflake had been flown more than 6000 kilometers on a commercial airline—in economy plus seating—from Midway Atoll northwest of Hawaii to the remote Guadalupe Island in Mexico.

Snowflake's own flight, just 3 days before World Albatross Day, marked a milestone in a binational project of the United States and Mexico, aimed at keeping the birds safe from the rising sea levels that threaten their survival. On Midway, they "were destined to drown," says Julio Hernández Montoya, a conservation biologist with the nonprofit Island Ecology and Conservation Group (GECI), who helped lead the effort.

Now, with nesting sites on higher ground, the albatross will be more resilient to environmental threats, says Axel Moehrenschlager of the Calgary Zoo. "One of the things that's really, crucially wonderful is that you're putting more eggs in more baskets," he says. Moehrenschlager, who chairs the translocation specialist group at the International Union for Conservation of Nature (IUCN), calls the project "potentially groundbreaking." Three projects have moved albatrosses within the United States and Japan. But this first transfer of a seabird species between nations "is exactly the type of approach that we need on a global level," he says.

He and other conservation scientists caution that translocations are not first-line interventions for saving species—but sometimes, they are the only option. In the past 30 years, he notes, there has been a 30-fold increase in translocations of species ranging from corals to elephants.

Albatrosses, top predators in the ocean's food chain, can spend years without touching land and fly thousands of kilometers in search of food. But they return every year to mate and nest in the islands where they were born. About 95% of the world's black-footed albatrosses (*Phoebastria nigripes*) nest in the Hawaiian islands; Midway Atoll, in a remote part of the state, is home to close to 21,600 breeding pairs, about one-third of the global breeding population.

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