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Forbidden cave: without permits, the discoverers of the hobbit are unable to continue digging at Liang Bua cave.

More evidence for hobbit unearthed as diggers are refused access to cave

Even as researchers uncover more details about the ancient 'hobbit' people of Indonesia, they fear that they may never return to Liang Bua cave, where the crucial specimens were found in 2003.

"My guess is that we will not work at Liang Bua again, this year or any other year," says team leader Michael Morwood, an archaeologist at the University of New England in Armidale.

The latest findings from the cave reveal, among other details, that the metre-tall humans, known as *Homo floresiensis*, lived on the island of Flores as little as 12,000 years ago (see page 1012). But continued exploration at Liang Bua is being blocked, the researchers say, because the discovery of miniature humans runs counter to the theories of Indonesia's senior palaeoanthropologist — and national icon — Teuku Jacob.

Based at Gajah Mada University in Yogyakarta, Jacob contends that the bones are of a genetically deformed *Homo sapiens*. A condition called microcephaly, which can cause dwarfism, could explain the miniature brain, he says (see *Nature* 434, 432–434; 2005).



Stone tools could provide clues about the cultural habits of the human species discovered on Flores.

Government officials will not issue exploration permits that might prove Jacob wrong, scientists say. Neither Jacob nor the officials involved could be reached for comment.

The study of the bones that have so far been recovered has already been hindered, the researchers complain. Last winter, after holding the remains for about four months, Jacob returned them to the discovery team with some bones broken or shattered. The bones may have been damaged when casts were attempted or during transport. Today's article was delayed by at least six months, the authors say, because the bones were not available for follow-up studies. The newly described jaw, for instance, was broken in half between the front teeth, and the break has obliterated certain key structures.

"It's an outrage," says team anthropologist Peter Brown, also based at the University of New England. "It is now impossible for future scholars to verify my work. The pelvis was whole; now it is 100 crumbs."

Today's report, which details evidence of nine *H. floresiensis* individuals found at Liang Bua throughout 2004, is likely to convince any remaining sceptics that a new species of human has been identified (see page 957).

The two jaw bones found are virtually identical even though their owners lived 3,000

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years apart. "You can't have a colony of microcephalics going through time," says Brown. "That's crazy."

The new bones also turned up features that are not found in modern humans. In particular, both of the jaws unearthed lack a chin structure; chins are a distinguishing feature of *H. sapiens*. The researchers also found arm bones from two individuals. "They are spectacularly long," says Brown, adding that the limb proportions are reminiscent not of *H. sapiens* but of Lucy, the 3.2-million-year-old *Australopithecus afarensis* found in Ethiopia in 1974.

But there are still many questions to answer, including how and when the species evolved, when it arrived on the island, and what its lifestyle was like (see 'The life of a hobbit'). Early this year, archaeologist Tony Djubiantono, director of the Indonesian Centre for Archaeology in Jakarta, told *Nature* that digging in Liang Bua would proceed in the summer. But he never issued the permits. Djubiantono, a co-author on today's paper, could not be reached for comment. But sources say he is reluctant to challenge Jacob and his allies in the upper echelons of the Indonesian government.

Disputes over palaeoanthropology dig sites are not uncommon — there has been considerable squabbling over the control of hominid sites in Africa. But it is unprecedented to close down such a spectacular site. "Liang Bua is the crown jewel of the caves," says Brown, adding that only a small percentage of it has been excavated so far. "This is where the team should be focusing."

Morwood says that during explorations this summer at other sites on Flores and neighbouring islands, the team has found promising hints about the origin of *H. floresiensis*, but no new hominid bones. Work in the Soa Basin, for example, suggests that hominids were present on Flores significantly earlier than 840,000 years ago, the earliest date previously reported (M. J. Morwood *et al. Nature* 392, 173–176; 1998).

"That's what you might expect in the context of some of the very primitive traits of *H. floresiensis*," says Morwood. "Historically the emphasis for early hominid studies has been Java. This may change."

But without access to Liang Bua, the mysteries of the ancient 'hobbit' people will probably remain secret for the foreseeable future. ■
Rex Dalton

The life of a hobbit

The latest archaeological finds from Flores shine further light on how life might have been for the tiny inhabitants of this Pacific outpost. The evidence suggests that *Homo floresiensis* was a decent butcher and cook, but not much of an artist.

Workers digging at Liang Bua on Flores found bones of a dwarfed form of the elephant-like species *Stegodon* alongside the tiny humans. "There are cut marks on the *Stegodon* bones, so we can infer that *H. floresiensis* was not vegetarian," says Bert Roberts, a geochronologist at the University of Wollongong, Australia, one of the latest study's authors.

Some of the bones are charred, he adds, which suggests cooking. "There are also circular clusters of burnt stones, akin to 'hearth' arrangements," he adds. "If you go to the effort of making a tidy fireplace, it's not a huge



Stone tools on Flores may have been left by *H. floresiensis* or by modern humans.

step to have a barbecue."

Other experts urge caution in inferring cultural activities such as cooking from an assortment of bones and stones. "The finds might be due to modern humans," comments Chris Stringer, who studies human evolution at the Natural History Museum in London.

So far, no modern-human remains have been found at Liang Bua from earlier than 12,000 years ago, the time *H. floresiensis* is thought to have died out. This suggests that the two species might not have lived directly side by side. *Homo sapiens* artefacts

at Liang Bua are separated from the older material by a layer of ash from a volcanic eruption that occurred at about that time.

"But it will take only one tooth from a modern human found below the ash for the theory to be rewritten," Stringer says.

The same goes for the stone tools found at Liang Bua, says Harvard University anthropologist Daniel Lieberman. The relatively unsophisticated implements could have been made by either *H. sapiens* or *H. floresiensis*, he says. Proving that it was the latter will require uncovering a site where tools have been deliberately buried with tiny human remains.

The site contains no evidence of pigment use or bone carvings, suggesting that painting and crafts did not play a big part in the life of *H. floresiensis*. **Michael Hopkin**