

Sparkling like black diamonds in the sun, countless obsidian pieces carpet a hillside in central Turkey. The slope is an ancient rubbish heap, littered with cast-offs from toolmakers who chipped away at the prized rock to make knives, blades and other implements.

For more than 500,000 years, obsidian veins formed by a nearby volcano were a stopping place for human ancestors trekking out of Africa to colonize Europe or Asia. Now the same volcanic glass is drawing people from even farther afield. Steven Kuhn, an archaeologist from the University of Arizona in Tucson, visited the site last summer, along with Turkish colleagues, to seek the remnants of archaic humans or their ancestors.

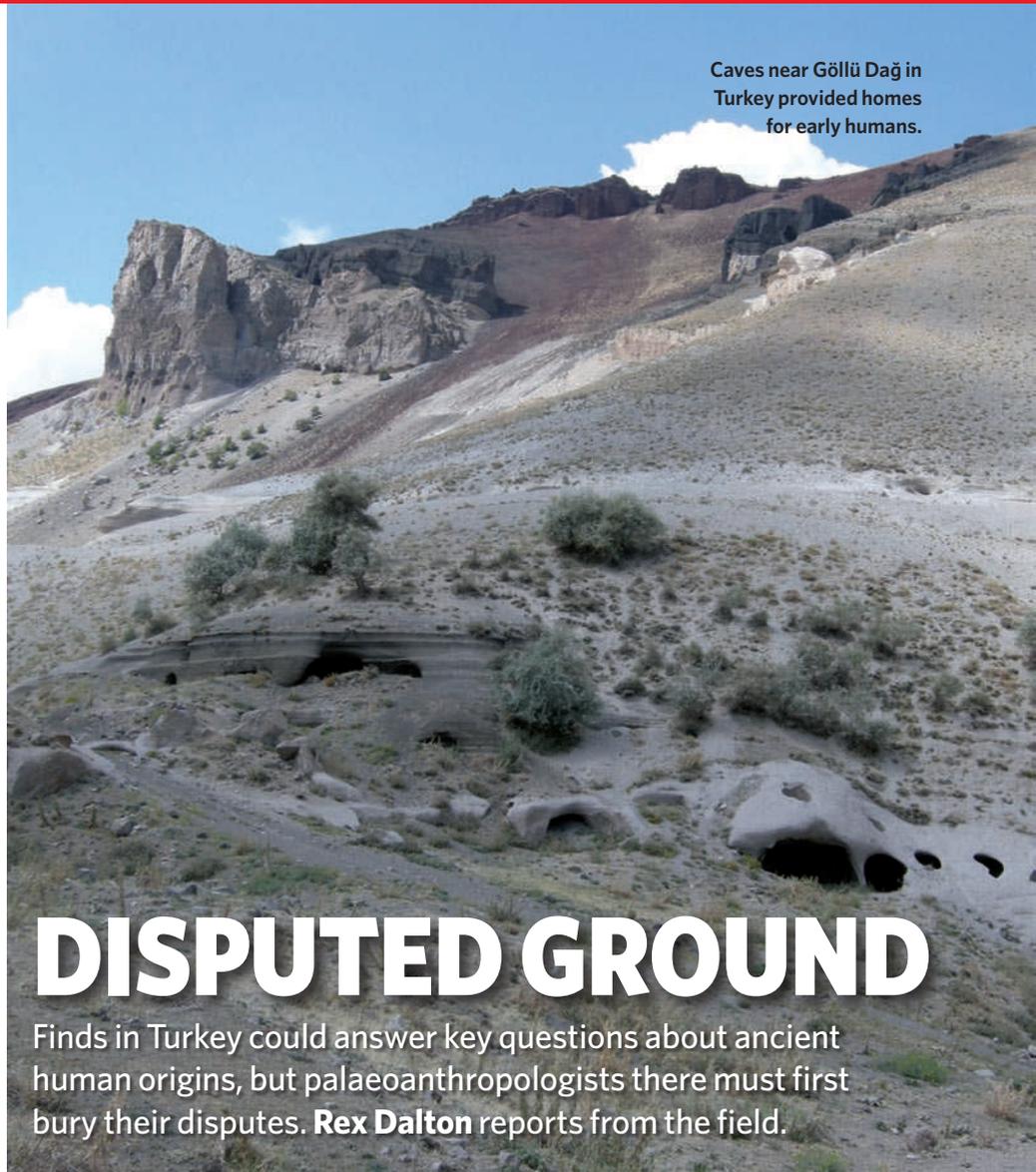
Hiking up a sheep trail, the research team found one cave with a promising base of sediments — deep enough, and therefore old enough, to preserve fossils of the ancient migrants. In a brief survey, the scientists were encouraged when they found stone tools of the type used by Neanderthals between 250,000 and 100,000 years ago.

This August, the research team, led by archaeologist Nur Balkan-Atlı of Istanbul University, will return to this cave and other sites around the volcano, known as Göllü Dağ. The researchers have high hopes, as do others excavating in Turkey, which has the potential to become the next hotspot in the world of palaeoanthropology. Because Turkey lies between Africa and Europe, the country offers an unrivalled opportunity to find fossils that reflect the initial evolution of the first humans who left Africa. And caves on the Anatolian plateau — with their relatively cool conditions — have the potential to yield bones with intact DNA.

So far, however, Turkey has failed to live up to its promise in palaeoanthropology. For nearly 20 years, several leaders in the field have been locked in bitter personal conflicts that have stymied progress and have had a detrimental effect on some young scientists. When work does proceed, researchers rarely publish in a timely manner, and they keep their specimens stored for years. To date, there has been only one full publication on an archaic human discovered in Turkey¹.

On top of those issues, the rise of Islamic fundamentalism in Turkey has made the working environment uncomfortable for palaeoanthropologists in much of the country.

“Turkey has a great potential for better understanding Neanderthal and modern human evolution and biogeography, but it is as yet unrealized,” says Tim White, a



Caves near Göllü Dağ in Turkey provided homes for early humans.

DISPUTED GROUND

Finds in Turkey could answer key questions about ancient human origins, but palaeoanthropologists there must first bury their disputes. **Rex Dalton** reports from the field.

palaeoanthropologist at the University of California, Berkeley, who has worked in Turkey.

The lure of finding archaic human tools and fossils keeps researchers coming back to places such as Göllü Dağ (see ‘Ancient crossroads’). On their hike along the obsidian-strewn hillside last year, Kuhn and his colleagues could hardly take a step without treading on implements such as blades, points and scrapers, as well as the cores from which the tools were knapped.

The researchers found entire hillsides of artefacts with similar characteristics, suggesting that these were made by the same ancient toolmakers.

One collection of sharp blades — as wide as a finger and the length of a hand — seems to be the work of a particular crafts-

man. The toolmaker’s style has perplexed Kuhn and his colleagues, particularly those who have practised knapping to understand how early humans worked. “No one can replicate this blade,” says Balkan-Atlı, who has spent more than a decade examining this wealth of stone tools.

The team has taken a multipronged approach to studying the obsidian products. They use the shape of a tool to identify its overall style, which provides general clues about its origin. Then, geochemical analyses of its constituent elements can help to pinpoint the source quarry and possibly the workshop where the tool was made. The researchers can compare these details with those of distant specimens to track where the tools were carried and traded over the broader region.

Relatively young items from Göllü Dağ — those less than 7,000 years old — have been traced to Crete, Cyprus, the Dead Sea, Iran and Iraq. But researchers are still trying to determine which ancient humans made the older tools at this site — and how far the tools spread.

Although stone tools appear everywhere at Göllü Dağ, fossils have been hard to find. The highly acidic soil in this region of the Anatolian plateau is part of the problem, because it does not favour the preservation of bones over hundreds of thousands of years. Balkan-Atlı’s team therefore hopes to find fossils in the sedimentary deposits of caves, where rainwater cannot reach the soil and form acidic fluids.

“They need to cooperate more. But I wouldn’t hold my breath on a quick solution.”

Finding fossils, however, does not guarantee academic success. The research atmosphere in Turkey can be every bit as corrosive as the soil on the plateau. Several leading palaeoanthropologists in Turkey have been involved in arguments for years, some of which have ended in court.

One of the researchers involved in the disputes is Erksin Güleç, who previously chaired the anthropology department at Ankara University and is now vice-chancellor for research and education at Ahi Evran University in Kırşehir, one of eastern Turkey's newer institutions. She has led several successful research expeditions and has trained a generation of researchers. But colleagues say that she has been bruised by the infighting that has severely disrupted progress in the field.

Legal battles

According to several Turkish scientists, the conflicts started nearly two decades ago as an intense rivalry between Güleç and two other Ankara University researchers who rose to prominence at the same time: palaeo-anthropologist Berna Alpagut and prehistorian İşin Yalçinkaya.

In the mid-1990s, a complaint was filed with Turkish government officials alleging that Güleç had carried out illegal excavations and had smuggled fossils out of the country. The complaint was filed under a false name, and the source was never identified. The government investigated the allegations and eventually dropped the case. Güleç says that she was cleared.

But she says that she became progressively angry as Yalçinkaya and Alpagut continued to repeat the allegations. In 2000, Güleç sued Yalçinkaya for making false statements and won 30,000 Turkish lira (US\$48,000 then) in a judgment that Yalçinkaya has appealed. A final decision has been delayed for years. A spokesperson for Yalçinkaya says that she cannot comment because the case is pending.

In 2008, Güleç also sued Alpagut, claiming that she too had made false statements. Alpagut settled by paying 4,000 Turkish lira early last year to resolve the case. In an interview, Alpagut acknowledged the payment but added that she didn't want to answer questions about "the very, very personal thing" with Güleç.

Güleç says that her adversaries have backed off since her litigation. "I wish I'd gone to court earlier. My life would have been more wonderful," she says.

But the conflicts have continued, spreading to involve students as well. Last year, Güleç sued one of her former PhD students, Ayla Sevim, who now works at



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Marks on this obsidian piece show where ancient people knapped tools at Göllü Dağ.

Ankara University, in a dispute over credit for a 2007 research article² on the discovery of a rare ape from the Miocene epoch, which ran from 23 million to 5 million years ago. Sevim is listed as a co-author, but she says that the article was published without her permission. Güleç denies that charge and sued Sevim for making false accusations. The case is still pending. Once the litigation is over, Sevim says that she hopes to publish her own article about the ape. She declined to discuss the issue further.

Battles aside, the discovery of this Miocene ape, *Ouranopithecus turkae*, helped to solidify Turkey's position as the richest location outside Africa for finding fossil apes. *Ouranopithecus turkae* is the largest known Eurasian hominid and became extinct between 8.7 million and 7.4 million years ago.

Three other apes are known from Miocene formations in Turkey. Alpagut and colleagues

discovered one³, and Alpagut was the lead author on a report on the rare skull of another⁴. To David Begun, a Miocene ape specialist from the University of Toronto, Canada, Turkey's resources are "a palaeontologist's dream".

But Begun, who did fieldwork in Turkey for several years, believes that the research atmosphere there suffers because of infighting and a resistance by Turkish experts to work with foreign collaborators. "It is a shame," says Begun, who is also one of the editors of the *Journal of Human Evolution*. "They need to cooperate more. But I wouldn't hold my breath on a quick solution. They may have to wait for the next generation of researchers to address the issues."

Some researchers are seeking opportunities abroad to avoid such conflicts. One scientist, Ömer Gökçümen, received a doctorate in anthropology from the University of Pennsylvania in Philadelphia in 2008. He is now a postdoc at Harvard University in Cambridge, Massachusetts, where he studies the genomics of human biology and cultural diversity. Gökçümen would consider returning home to work, but he worries that academic discord in Turkey would slow his research. "I would have to commit half my time to internal politics and petty bureaucracy," he says.

Archaeologists who study recent civilizations in Turkey have had more success working together and have made seminal discoveries, particularly in understanding Hittite culture⁵. They typically publish their results quickly, but those who study the Palaeolithic are generally much





Erksin Güleç (centre) oversees her team members as they dig for ape fossils near Sivas.

slower about releasing information.

To researchers such as Alpagut, the pace of publication is appropriate. "I do not agree with some scientists, who publish immediately," she says. She has continued her excavations at a cave inland from Antalya on the Mediterranean coast, where 14 years ago she discovered bones belonging to a Neanderthal or another type of archaic human. Dated to between 160,000 and 60,000 years old, the bones are some of the oldest human remains in the region. Researchers outside Turkey regard the specimens as important and eagerly await a description, but Alpagut has yet to publish a report on them. "In my opinion, you need to wait and consider what to publish," she says. "When the time is correct, the results will come out."

Güven Arsebük, an emeritus professor at Istanbul University who pioneered Turkish anthropology instruction 40 years ago, says that his country needs a more competitive publishing climate. "Unfortunately, we don't have a publish-or-perish principle in Turkey," says Arsebük. "Publishing is a real problem for us."

One instance of delayed publication relates to the Yarımburgaz Cave, west of the centre of Istanbul — one of Turkey's oldest habitation sites, possibly dating to 500,000 years ago. Arsebük and the late Clark Howell of the University of California, Berkeley, carried out a series of digs for three years ending in 1991. Tools and animal fossils — particularly from bears — were abundant.

Yet, more than 20 years after it was excavated, the site has not been fully described in the literature. And, today, the cave that once was adorned with Greek and Roman altars is now littered with rubbish from drug addicts and prostitutes, who frequent the site.

"We hope to complete the monograph this

year," says Arsebük, who acknowledges his own slow pace and is now working with Kuhn to wrap up the draft.

Recently, a new problem for palaeoanthropologists has emerged. As the country has grown more religious, particularly in its eastern and central regions, Islamic creationists are rejecting the work of anthropologists, particularly that relating to evolution.

This is creating an uncomfortable atmosphere for researchers and may be retarding Turkey's capacity to build up an anthropology infrastructure at central and eastern universities. Young graduates, who have studied and lived in cosmopolitan cities, are reluctant to move their families to these regions. Seventeen years ago, several dozen people died in Sivas, when Islamic extremists set fire to a hotel where intellectuals were staying. More recently, researchers have worried that local religious groups are watching dinner parties to determine whether scientists are violating Muslim tenets, for example, by drinking alcohol.

For international researchers, the difficulties in Turkey cause considerable frustration, which at times drives them away. But some have persevered because of the tremendous potential.

In addition to collaborating with Balkan-Atlı at Göllü Dağ, Kuhn and his archaeologist

wife, Mary Stiner, also based at the University of Arizona, have been working with Güleç for more than a decade at a picturesque cliff-side cave overlooking the Mediterranean Sea near Turkey's southeast border with Syria. The cave, called Üçağızlı, turned out to be a rich site. By 2005, the team had found a wealth of tools, ornaments, burial artefacts and animal fossils, representing human movements through the region from 41,000 to 29,000 years ago, during the last ice age⁶. Then, two years ago, Güleç discovered

the palate of a human skull, a few teeth and some associated bones, a potentially important find that has not yet been published. She says that she hopes to complete a manuscript this year.

Recent genetic studies⁷ have made the fossils from this site even more intriguing because modern humans and Neanderthals are thought to have interbred in this region, creating lineages that migrated around the world.

Land of the apes

Even as Güleç works on the ice-age material, she is seeking answers from much older formations. On a warm, early morning during last year's field season, Güleç's team readied their backpacks for a hike up a ridge to a site about 20 kilometres north of Sivas. Their destination was a ravine packed with fossils from about 9 million years ago.

The geological formations in this part of the country offer enormous potential for discovering early apes, ranging in age from 5 million to 18 million years old. Long before humans and their ancestors migrated from Africa, Turkey was the route for apes spreading from Africa to colonize Europe or Asia.

The ravine near Sivas has produced a wealth of fossils since digs began in 2006. Elephant, rhinoceros, horse and hyena-like carnivore bones are jumbled together in bands running across the hillside. Fossils are so plentiful that they spill out of the earth as erosion uncovers them. The researchers say that it is an ideal environment for finding a hominid from the time of the last common ancestor of humans and apes.

On that warm day, along the ravine, Cesur Pehlevan, a palaeoanthropologist from Ankara University and Yüzüncü Yıl University in Van, chipped away sediment, unearthing the attached leg bones of a three-toed horse. "Oh, beautiful, this is rare," he said.

From dawn to dusk, Güleç's team continues searching. They make casts to protect the bones and pack out the bounty to study it back at their home institutions. Last year, the team's schedule allowed only ten days for excavations, and they found no hominid fossils.

This year, they hope for a longer field season — one that not only produces an ape fossil but also a prompt publication. ■

Rex Dalton writes for Nature from San Diego, California.

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