

# THE RIDDLE OF THE DESERT GLASS

Documentary film crew seeks answers — with help of Sandian Mark Boslough — to origins of desert glass used in King Tut's priceless breastplate

Story and photos by Mark Boslough (unless noted)



Speeding across the vast expanse of Sahara desert sand in a four-wheel drive vehicle was not something I had thought to put on my Outlook calendar when I planned this year's activities.

Riding in a caravan of Land Cruisers with me are two other scientists and a British film crew. Our goal is to reach the site of an

unusual deposit of the purest natural silica glass ever found, covering an area bigger than Bernalillo County in the Libyan Desert of western Egypt.

It was in 1932 that British explorers in Model-A Fords first visited this part of the desert, where they discovered the mysterious yellow-green glass scattered across the surface. Ever since, Libyan Desert Glass has fascinated scientists, who have dreamed up all sorts of ideas about how it could have formed. It's too silica-rich to be volcanic. In some ways it resembles the tektites generated by the high pressures associated with asteroid impacts. That observation is the starting point of a scientific debate that was the subject of the documentary being filmed for *National Geographic* and BBC.

### An astonishing discovery at the Egyptian National Museum

I was chosen to participate in the role of a dissenter from the preferred explanation that the glass was formed by direct shock-melting by a crater-forming asteroid impact. I had stumbled into the debate by accident in 1996, when I attended a conference in Bologna on the subject of the 1908 explosion of an asteroid or comet that knocked down nearly a thousand square miles of trees in Siberia. I stayed an extra day to attend a meeting about the desert glass, where I argued that similar — but larger — atmospheric explosions could create fireballs that would be large and hot enough to fuse surface materials to glass, much like the first atomic explosion generated green glass at the Trinity site in 1945.

Shortly after that workshop, one of the Italian organizers made a discovery that raised public interest in the subject. Vincenzo de Michele visited the Egyptian Museum in Cairo, and noticed that one of King Tutankhamun's jeweled breastplates contained a carved scarab that looked suspiciously like a piece of the glass. A simple optical measurement confirmed the match in 1998. The connection of a catastrophic explosion with the treasures of ancient Egypt eventually became a sure-fire formula for a documentary to be called "Tutankhamun's Fireball."

### Did I want to be part of this?

Last December, when I was first asked by the producer to be interviewed for the documentary I was a little skeptical. After all, television is known more for sensationalization than for scientific accuracy, and the King Tut connection had fueled pseudoscientific speculation on the web. One website even presents fanciful "Evidence for Ancient Atomic War," making the case that Egyptians had detonated nuclear weapons (but ignoring the fact that the glass is 29 million years old). Did I want to be part of this?

Fortunately, I was assured by other scientists that this would be a legitimate documentary that would focus on natural explanations for this enigmatic glass.

Then, just before the holidays, the producer asked if I would join a scientific expedition to the site, along with an Egyptian geologist and an Austrian colleague who specializes in geochemistry of shocked materials. Six weeks later, I found myself in Cairo with Dr. de Michele, getting a firsthand look at King Tut's glass scarab and preparing for nine days in the desert.

MARK BOSLOUGH'S work on collision dynamics and impact physics modeling is funded by Sandia's Laboratory Directed Research and Development (LDRD) program. The trip to study the Libyan Desert Glass provided an opportunity to gather real world physical data to reinforce computer modeling and simulation of impact events.



LIBYAN DESERT GLASS — Did King Tutankhamun hold up his glass scarab to see the same refraction of light? Did he call his young bride Ankhesenamun to see it too?

### 1,000 km over the Great Sand Sea

Our jumping-off point was the Bahariya Oasis, a large valley of villages and adobe houses that (except for the date palms) looked a little bit like those of old New Mexico. After the 300-km drive on a two-lane highway through the lifeless desert, the irrigated fields were startlingly green — the last green we would see for some time.

Leaving the road at the last checkpoint, we embark on a 1,000-km voyage across the Great Sand Sea. Despite the lack of water, that name is apt. Like mariners, we don't follow a specified route. We are guided by the sun, compasses, dead-reckoning, and (like modern sailors) GPS. If the dunes are the swells of the open ocean, our first day's trip is an excursion through a field of icebergs. Towering monuments, hoodoos, and mesas of stark white limestone provide a maze through which we meander, opening up to a featureless flat sand plain.



MARK BOSLOUGH (at left), Cynthia Page (TV6 director/producer, at right), and members of the documentary crew and outfitters at their campsite deep in the desert. The apricot firewood from Bahariya Oasis was used every night. A bowl of peanuts was served as a snack every night around the fire, washed down with Luxor beer. (Photo by Christian Koeberl)

make it. The naturally occurring geological finds are the most exciting. Several times we find fulgurites, sand that is fused into worm-like shapes by lightning



strikes. Our best find is a meteorite, a large stone that had probably been sitting on the sand for millennia, covered and uncovered countless times over the ages.

### Tea brewed Bedouin-style over an apricot wood fire

February in the Sahara is cool, and the wind blows so hard on the Great Sand Sea that it can be hazy like a marine fog. Every night our guides park their vehicles in the shape of a U, open to the east, with exotic rugs for windbreaks and comfortable sleeping for the crew (the scientists and film crew sleep Western-style, in dome tents). We have our meals here, with sugar-saturated tea brewed Bedouin-style over an open flame of apricot wood carried from the orchards of Bahariya.

As we progress to the southwest, the rolling sand builds to great seif dunes and the sea rises. Vehicles frequently get stuck and have to be rescued by digging and driving up special aluminum ramps. It takes a special sailor's eye to distinguish between a safe hard surface and the treacherous soft sand, especially at 100 km/hour. Driving against the grain of the dunes means rising over the crests and dropping down the other side, over and over for hours: speeding, digging, rising, dropping. Arabic, French, and English conversations crackle over the radio, and throbbing Egyptian music plays on the driver's iPod.

Just before we reach the site of the glass, the dunes become linear — unbroken parallel ranges running north-south for hundreds of kilometers. Here we must carefully pick our crossings, and then we run at high speed southward in the "corridors," the freeways that have been used by nomads for centuries (as evidenced by 100-year-old camel skeletons).

### The riddle remains, but friendships endure

On our third day after leaving the last road, our maps tell us we are within the area where glass has been found. We stop to look. There are pieces of sandstone everywhere, and no plants in sight. It looks strikingly like the surface of Mars, and sand sifts underfoot. The first bits of glass we find are yellow-green jewels that have smooth surfaces sculpted by the incessant wind. We hold them up to the sun to see how the light refracts and scatters. This is probably what the Pharaohs did with their piece, and the Neolithic people before them.

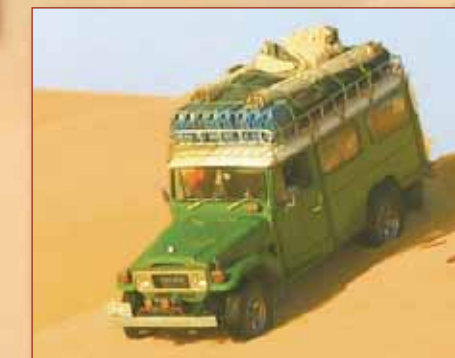
Nine days of geologic exploration and discussion bore fruit. You get to know your colleagues well during long days driving and long nights in camp. Everyone figures out the strengths and weaknesses in one another's ideas. It would be premature to claim that we solved the mystery, but new friendships and collaborations have emerged, and renewed interest in this scientific mystery has energized debate over this unique glass.



MAKING CAMP in the Great Sand Sea.



*Ancient Asteroid* will be shown Sept. 21, 8-9 p.m., on the National Geographic Channel (channel 52 on Comcast cable in Albuquerque). National Geographic's website describes the program this way: "Ancient Asteroid traces the amazing story of how a quest to uncover the origins of a strange yellow-green glass used in one of Tutankhamun's necklaces leads to the discovery of a historic cosmic event in the Egyptian desert. What happened there 30 million years ago could happen again and threatens us all."



OVER THE DUNES, again and again and again . . .



. . . and buried axle-deep in sand more than once.



SCIENTIST Christian Koeberl examines a just-discovered meteorite.



TV6 FILM CREW interviews Mark Boslough about formation of the desert glass.



Scientist published the story, which ultimately led to the BBC/*National Geographic* documentary. (Photo courtesy of TV6 Productions)

