

Hi this is Steve Nerlich from Cheap Astronomy www.cheapastro.com and this is *The dreamtime meteor crater*.

The following is an interview between myself and Mr Duane Hamacher who originates from Missouri, but is currently undertaking a PhD at Macquarie University in Sydney, Australia.

Duane I understand you have discovered a meteor crater on Google Earth. I imagine that's a fairly elite club. Do you know how many other people might have achieved that?

I know in Australia there were two. The first guy discovered one in 2007, his name was Hickman, so the crater is named Hickman Crater in Western Australia – and last year there was a retired geologist who discovered an impact crater outside White Cliffs, New South Wales. So, I don't know about the rest of the world, but in Australia I'm actually third in line.

Congratulations, that's quite exciting and I understand there's a particular story behind your find that involves an Indigenous Australian dreamtime story. Can you tell us about that?

Yes, for the last year I've been looking at Aboriginal accounts and descriptions of comets, meteors and cosmic impacts in the literature – and I found several that described stars falling out of the sky and crashing to the Earth, in some cases causing death and destruction. In several of the stories, it seemed to indicate that these were actually witnessed – they closely paralleled with scientific explanation. So I decided to look at these areas on Google Maps as some of the stories gave specific locations – or at least we knew the particular Aboriginal community that the story came from.

So, there was one particular story, a western Arrernte story from the central desert that talked about a fiery star that fell out of the sky and crashed into a waterhole called Puka, making a noise like thunder. A small boy who had just been initiated went over and looked into the hole and the Rainbow Serpent ate him – and the rest of the community were very upset and they burned all the food they had collected for his ceremony and moved camp.

So the story seemed to describe a cosmic impact – of course not sure if it really was or not, so I got on Google Maps and I had a look at the area of Palm Valley, which is actually relatively small. The valley itself where the palms are is only a couple of kilometres long and kind of does a big loop and right in the centre of that I saw a large bowl-shaped structure that looked just like an impact crater. So I contacted a lecturer here in the Department of Earth and Planetary Science, by the name of Craig O'Neill and he said it looked very interesting and we should go check it out.

The people you mentioned are the Arrernte people? And that location is west of Alice Springs?

Yes, south west. It's in the Finke Gorge National Park about 13 kilometres south of the town of Hermannsburg (or Ntaria). It's accessible, but you've got to have a pretty good 4 wheel drive to get you through it. The road that leads to Palm Valley is actually a river bed, so without a good four wheel drive you are going to have a hard time getting there.

The first evidence of Indigenous Australians in Australia is from something like 40,000 years ago. So how do you explain this? Presumably the meteor impact is measured in millions of years ago – so presumably the Arrernte people didn't actually see this impact. How do you think they developed this knowledge of it.

You're right, we believe that the crater is millions of years old based on the level of erosion and the lack of meteor fragments. We determined from the geophysics data and the rock samples that it is an impact crater – but there is no meteorite evidence there, which means it's very old. Now, this very well could be a case of pure coincidence, in fact a case of sheer dumb luck that there happens to be a crater there. There's no hard evidence at the moment that the crater and the story have any direct relationship to each other, other than their location.

However, I haven't ruled out the idea that the Arrernte were able to deduce or determine that this structure was caused from a cosmic impact. There are a few different lines of evidence for that. Number 1 is Gosses Bluff (or Tnorala in western Arrernte language). That's nearby and that's a comet impact crater. It's a ring-shaped mountain range that's the central uplift of a much larger, complex impact crater about 20 kilometres in diameter. The particular mountain range is only about 5 kilometres in diameter and about 150 metres high. The Arrernte story about the formation of Tnorala is that there were women dancing in stars in the Milky Way and one of them was carrying a baby and she got tired of carrying the baby and put it in a turna – a wooden basket and set it down on the ground (in the Milky Way) and the baby flipped off and fell to Earth and when it hit the ground the turna fell on top of it and the force of that drove the rocks upward.

So the idea that this mountain range was formed by something falling out of the sky, driving the rocks upward is a very astute scientific observation by the Arrernte – because that's exactly what happened. So, of course given that crater is 142 million years old, no-one could have seen that happen either.

Just about 700 kilometres south east of Palm Valley is the Henbury crater field, about 13 craters that were formed just over 4,000 years ago. It's very probable that the Aboriginal people would have seen that. When I was in Palm Valley at the crater rim looking down inside it, I was struck by how similar the inside of that crater looked to the Henbury craters – and the inside looked just like it, very, very similar. The one book I found the story in also talked about how there were regular routes between Henbury and Palm Valley and how those people had gone back and forth between those two areas. So all that put together – not solid evidence at all, but it's sort of circumstantial evidence that perhaps they were able to deduce that this big bowl-shaped circular structure was formed in the same way as the Henbury and Gosses Bluff craters.

The Gosses Bluff crater is unmistakable as a meteor crater, I would think. And as you say, the Henbury meteorites certainly could have been observed by humans and being only 4,000 years ago you could imagine that story has been passed down through generations. So there's a chain of logic there that doesn't require any particular mysticism to explain the story.

Right – and also if you look at Wolfe Creek crater in WA. The Djaru story of that – there are a few different stories – but a lot of them discuss how the crater was formed from the Rainbow Serpent falling as a star into the Earth. So there was this direct connection there as well – that they had a story of a star falling out of the sky and striking the Earth up in WA. It's not an isolated incident in Central Australia.

Can I ask about your PhD? Was it always the main focus of your research to find a meteor crater or are you looking at other issues.

Well, the PhD itself is on the topic of Aboriginal astronomy – trying to understand how the Aboriginal people incorporated the night sky into their culture, both in the past and present. So there's an archaeological approach to it and an ethnographic approach to it. As far as finding the impact crater... I've got a weird obsession with Google Earth and Google Maps. I just love spending time on there looking around. And of course I also have an interest in meteorites and meteoritics. And when people started finding them, like Hickman and the other gentleman found one in New South Wales, I thought oh this'd be great if you could find one, but... everything on Google Maps that looks circular, looks like an impact crater. You've got to know what you're looking for – and I'm not a geologist, I'm an astronomer.

Even though I find things that look interesting, you've got to get someone else to confirm it. It only takes two or three times to go into someone and say is this an impact crater, is this an impact crater – and until they get sick of it and tell you to go away. So I wanted to make sure I had the best candidates to show Dr O'Neill when I brought them to him. And the Puka was a pretty good one, because it's distinctly bowl-shaped and it didn't look like anything else in the region and that area's not volcanically active.

And I understand your plan is to name the crater Puka, rather than after yourself?

Yeah, I'm not that arrogant. I figure since we found it based on that story it would be appropriate to give it the name of the waterhole where the star fell. So yeah, we're going to call it Puka.

OK, very good. Look, thanks Duane. It's been a great pleasure. I really appreciate your time.

Likewise – no worries.

<http://www.sciencealert.com.au/news/20081803-17058-2.html> (Hickman)

<http://www.theage.com.au/news/technology/biztech/opal-miner-stumbles-on-mega-meteorite-crater/2008/11/22/1226770814042.html> (other guy)

Thanks for listening. This is Steve Nerlich from Cheap Astronomy, www.cheapastro.com. Cheap Astronomy offers an educational website where most of our story ideas just fall out of the sky. No ads, no profit, just good science. Bye.