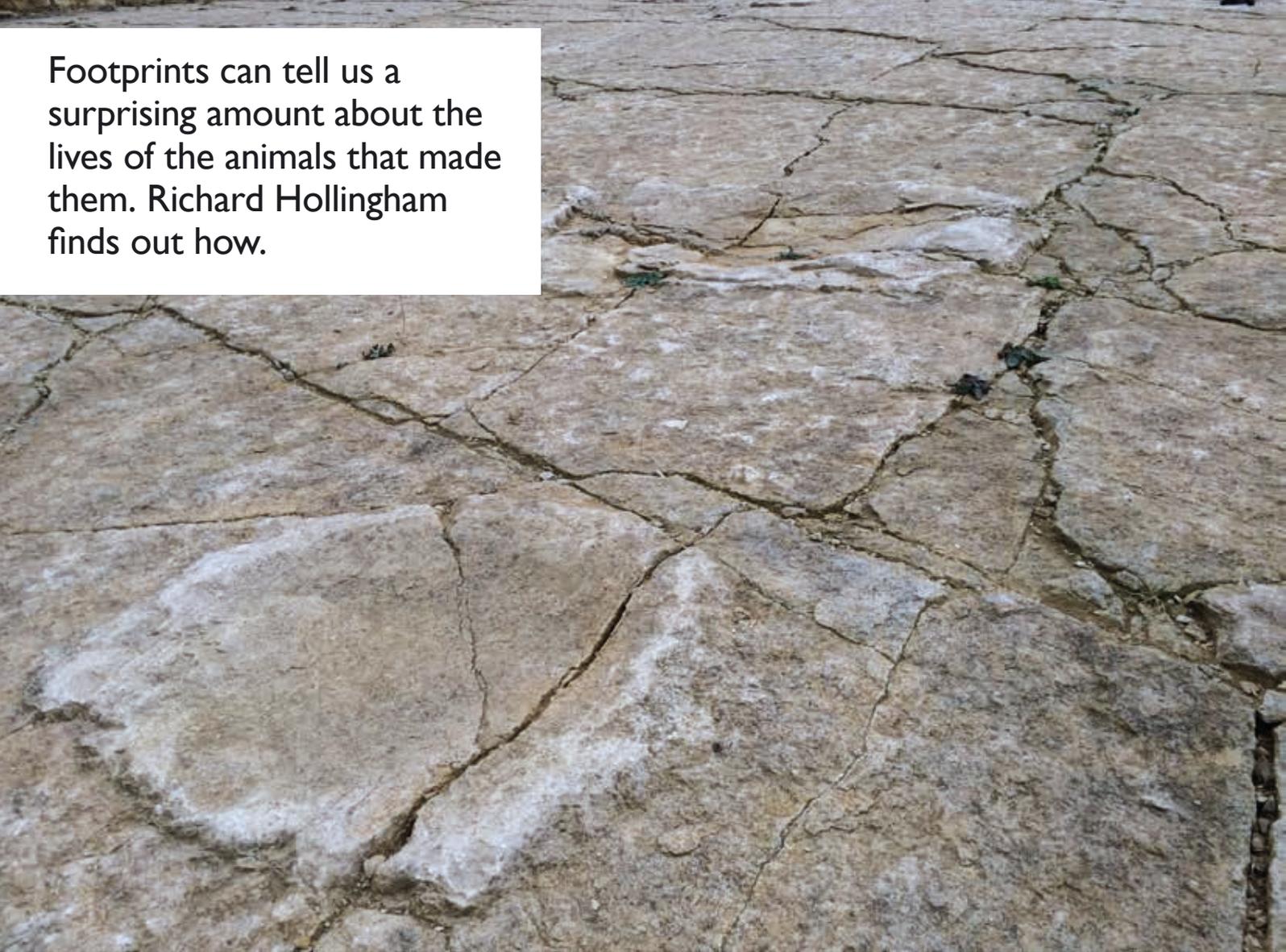


Footprints can tell us a surprising amount about the lives of the animals that made them. Richard Hollingham finds out how.



In the footsteps of dinosaurs

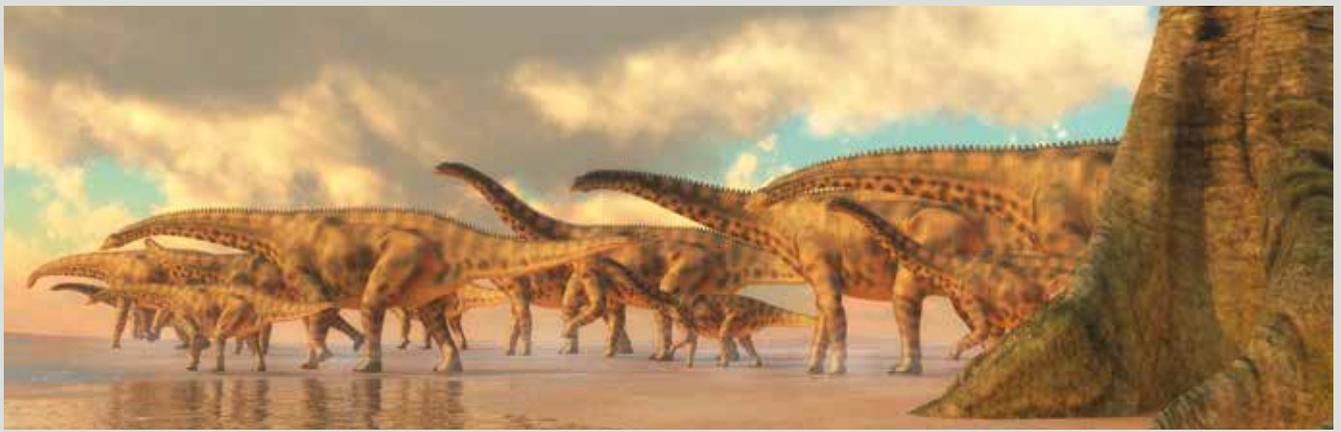
Richard Hollingham: I've come to the beautiful Isle of Purbeck on Britain's Jurassic Coast to an area of exposed dinosaur tracks. They are being studied and mapped by a team from the University of Manchester – we'll talk to them in a moment. But first I'm joined by local geologist Paul Ensom. Paul, we're surrounded by fields, but this is a shallow dish of exposed rock and within it are these depressions. What are we looking at?

Paul Ensom: We're standing on a surface of Purbeck limestone. It was exposed in the late 1990s by a local quarryman – it caused quite a sensation. A team came down for the National Trust, which owns the site. They surveyed it and came to certain conclusions about what had made the marks. Dinosaur tracks are not always straightforward.

RH: Each one of these is about, what, four times the size of a human foot, maybe even more. They are circular – there's no obvious footprint.

PE: No. One thing we've discovered here is that sometimes the animals were walking at a higher level and their tracks were being transmitted down onto lower levels of limestone. So one dinosaur could produce several levels of track all in one go. A sort of wonderful replication system, which of course was quite good from the quarryman's point of view – they got more for their buck.

RH: Well let me introduce the team from the University of Manchester: Phil Manning, Victoria Egerton and Bill Sellers. Phil, what kind of animal was walking across this landscape?



Phil Manning: You're looking at the tracks of enormous long-tailed, long-necked, barrel-bodied quadrupeds, the sauropod dinosaurs. These trackways are a fantastic insight – not only into where the animals were walking; the geometry of the tracks can even tell us about how they walked. So if you want to walk with dinosaurs this is the perfect place to study them.

RH: We've got a field of cows behind us, a grazing field of cows. Is this the dinosaur equivalent?

Bill Sellers: It's very hard to work out exactly what the animals would have been doing when they made these tracks. It's difficult to spot any sort of pattern and it looks like it might just be a herd of trampling dinosaurs, but we're hoping that when we've done the mapping properly we'll be able to identify some specific trackways, because it's much more interesting in terms of working out what the animals might have been doing if we can identify an individual and follow its path.

RH: Victoria, this has been exposed since the late 1990s but you are now mapping it in detail.

Victoria Egerton: Yes, so what we're trying to do now is create a 3D digital reconstruction, so we can measure how big these footprints really are, how deep they go in and the depressions that they make so that we can understand more about what the sediment underneath was doing at the time that these animals made their footfalls.

RH: So, Phil, talk me through how the scanning works. You've got here a tripod, a surveyor's tripod really, but on the top is a box which looks like two shoeboxes stuck together with a computer screen on one side, and in the centre a camera – something like that. What's it doing?

PM: It's firing out a laser beam which then reflects back from a surface. We know the speed of light, so the detector picks up that reflection and calculates how far away whatever it bounced off is. It does 50,000 of these points a second. The really cool thing is it has a high dynamic range camera built in as well, so after it has taken the laser scan of the surface it then takes photographs which you can overlay, giving you a perfect colour 3D representation of your landscape, your skeleton or your person holding a microphone doing a recording in the middle of a field. It's the ultimate 3D capture device.

RH: And what does this tell you that simply getting down on your hands and knees with a tape measure wouldn't?

BS: It's really hard to get 3D data from just a tape measure, and

the 3D data is what we need to try and reconstruct what these animals were like.

RH: So creatures 140 million years ago left these marks. You're building up a picture of what they were like. How has that picture changed thanks to this technology?

PM: The fossil record is an incredible mosaic of information, with lots and lots of pieces missing. Whenever we find something as beautiful as this we can piece together a few more of the tesserae, as it were, to make better deductions about how these animals might have functioned, how they might have walked, and more importantly where they lived – dinosaur bones can be transported miles from the point of death.

RH: So what was this area like?

BS: This was a lagoon, so you get both land-dwelling animals and marine ones. This animal was moving along the shoreline and presumably there were food sources nearby that it was taking advantage of.

VE: One of the nice things about footprints is that they are evidence of behaviour, something we don't really get in the fossil record. This tells us about living, breathing animals that walked across this landscape – it's incredible to have that record.

RH: Paul, you've been coming to this site for almost 20 years now, since it was discovered.

PE: Yes. The interesting thing about the site is that having been discovered and described, it was actually buried to protect the surface and it's only because Dorset County Council, the Jurassic Coast team, are in discussions with the National Trust on whether this can now be opened up to the public that it's now been reclassified and is being reassessed. The new survey, new technologies being used, new ideas about dinosaurs and new thoughts on the nature of these tracks all make this a very important bit of research.

PM: It can also help inspire future generations of scientists. We're really pleased to be working with the Jurassic Coast team on a fantastic project – the Jurassic Classroom. They're bringing primary school teachers here to see what we're doing. Kids all over the UK will be able to learn about our research and how it can help us understand more about dinosaurs, but more importantly about how they can become involved with looking at this kind of data and get much closer to literally walking with dinosaurs.

This Q&A is adapted from the Planet Earth Podcast, 3 March 2015. The full podcast and transcript are on Planet Earth online: www.planeteearth.nerc.ac.uk/multimedia/story.aspx?id=1796