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**Working with dinosaurs**

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* In the classic 1938 screwball comedy, *Bringing Up Baby*, Cary Grant is a palaeontologist who loses the last, long sought-after bone - the intercostal clavicle - that will complete his dinosaur. When Katie Hepburn blithely suggests that, now they know where to find it, can't they go back and get another one, he looks at her as if she's lost her senses. In fact, she may have had a point. Had he gone to dig in Utah, he would probably have fallen over one sticking up out of the bare rock.

Utah is surely the world's premier dinosaur graveyard. It was from here that, when Andrew Carnegie wanted something really big to put in his new museum in Pittsburgh, the palaeontologists shipped back 350 tons of bone and rock, ending up with 20 complete skeletons of nine different species. When I heard about Utah's dinosaur quarries, I assumed someone had been quarrying for stone and come across a dinosaur bone. Not so. Here the quarries are *for* dinosaur bones - and they're brimming over with them.

"At Crystal Geyser quarry, the entire hilltop has bones sticking out of the surface, though for the good stuff you have to go down about two metres," says state palaeontologist James Kirkland, a big sun-weathered man with a shock of black hair, wide western leather braces and a voice like gravel. "There are thousands, maybe tens of thousands of bones there. We've got 1,700 just from one small area. It works out around 200-400 bones per cubic metre."

At the Dinosaur National Monument in the Uinta Mountains, you get the picture. In the wide red desert lies - or rather stands - the largest Jurassic fossil bone quarry in the world. The riverbed where the bones collected aeons earlier was thrust to the surface and turned on its side by the same massive forces that created the Rockies. The monument is a vast wall of dinosaur bones, a canvas of death and destruction.

"We were in the right place at the right time," explains Kirkland, "with the right conditions for the dinosaurs to live in the first place and then to preserve them." He relates this to the Triassic, Jurassic and late Jurassic eras with enthusiasm and then comes to the Cretaceous era, the final period of the dinosaur's reign. "We've just named a bizarre new species from this period - about 125 million years ago - Falcarius utahensis, which we found at Crystal Geyser Quarry."

Kirkland already has over 90 per cent of the bones for Falcarius and estimates hundreds, maybe thousands, of dinosaurs from hatchlings to adults died at the two acre site. Falcarius is the fourth new species Kirkland has discovered in 11 years but he believes there will be many more to follow. "Most of the area - hundreds and hundreds of miles - has never been looked at by scientists. It's like a Valley of the Kings for dinosaurs - we'll be digging for the next 500 years."

The digs themselves consist of four or five palaeontologists plus volunteers and, given the altitude and extreme weather conditions, the annual digging period is short and intensive. For eight weeks in the summer a new area is exposed and worked then covered before the wild winter weather can damage it. This entails working in temperatures of 100°F plus, hiking into the desert site and camping out on the rocks. You need a lot of patience, washing rocks and bones, chipping away at the surrounding matrix, jacketing the bones so they don't disintegrate before they can be freed.

"You spend a lot of time bent over the rocks, breathing in dust, and being pestered by the nosee'ums - bugs that you can't see but you can certainly feel." Sharon Walkington, a former dancer and teacher, has been a volunteer for 10 years and spends time in the museum lab at the University of Utah as well as on digs. "It's hard work but it's fun," she insists. "We find turtles and crocodiles and so many bones it's like a jigsaw puzzle we have to glue together."

Kirkland encourages volunteers even if they've never had anything to do with geology or palaentology before. "Some of our volunteers are students working on their PhDs but you just need to have an honest interest and learn on the job, knowing when to stop and ask for help. You don't just whack stuff with a hammer - you have to have respect for the resource."

The digs take place in a breathtaking landscape of high desert with spectacular sandstorms and thunderstorms. "You have a 50 mile view in every direction and no sign of humanity," says Kirkland. "People can get pretty spooked by that. But we're here in a place that has been deep desert, as deep as it gets, to humid swamp and it's all here in this little slice of rock. It's an incredible pageant of a changing world. And there is nothing like finding something that no man has ever seen before."