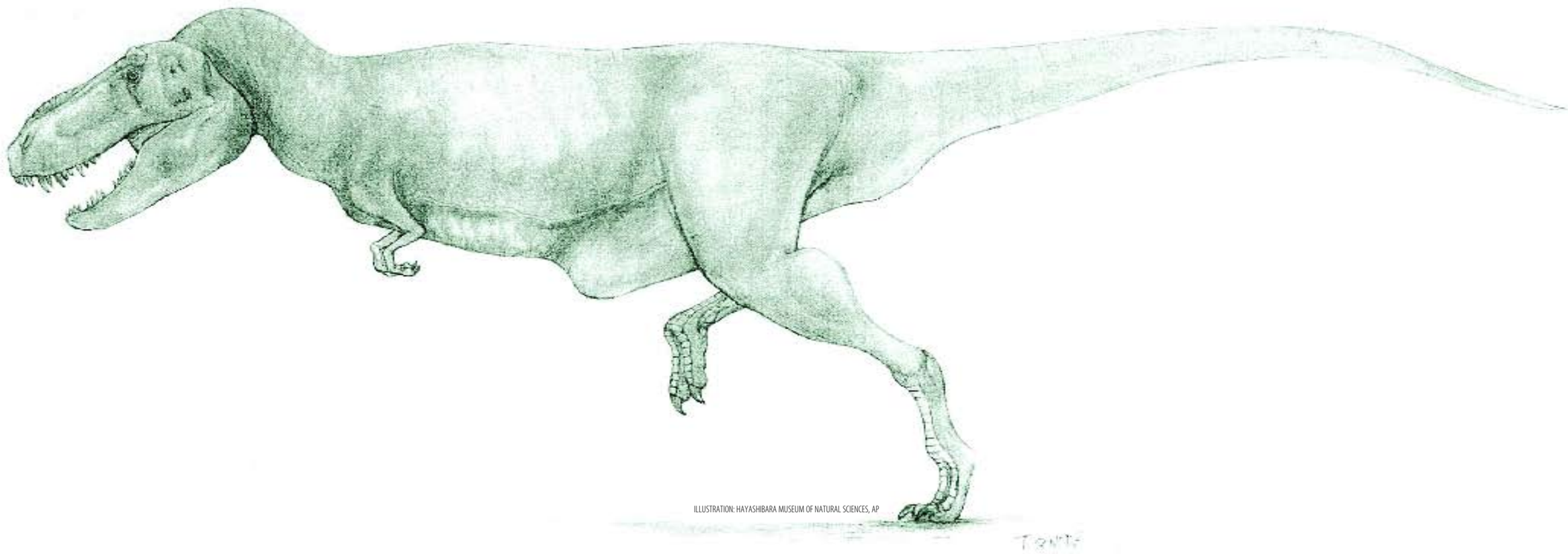

ILLUSTRATION: HAYASHIBARA MUSEUM OF NATURAL SCIENCES, AP

The dinosaur hunter

Steve Sweetman took up paleontology just eight years ago, but already he has discovered 48 new prehistoric species while scouring the coast of the Isle of Wight

BY **PATRICK BARKHAM**
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Beneath the turf lies one meter of sandy soil. Next comes a rusty brown layer from the last ice age, where you might find remains of woolly mammoths. Below that are several meters of sandstone, deposited by ancient rivers, which burns red in the light of the afternoon sun. Towards the base runs a small slice of flecked gray rock, crumbling on to the beach as fast as the rest of this cliff face on the Isle of Wight, which lies a few kilometers off the south coast of England.

"This is the good stuff, the pay dirt," says Steve Sweetman, whisking an oyster knife out of his pocket and prizing small pieces of fossilized charcoal from the rock. "This is what dinosaurs come out of. It's a chaotic mix and there is no grading of grains — small and large are all mixed up together. It's just full of fossils."

Brook Bay on the south side of the Isle of Wight is a bleak prospect in winter. The relentless roar of the sea is broken only by the lonely pew of an oystercatcher. But going dinosaur hunting with Sweetman is an illuminating experience. With a small magnifying glass hung around his neck, he swoops on an ordinary-looking rock and kicks it. "That's a dinosaur print," he says matter-of-factly. The size of his yellow collecting bucket, the rock is a perfect cast of a three-toed foot of a huge, herbivorous iguanodon. Sometimes you can even see the wrinkles of dinosaur skin imprinted in the rock.

In the last four years, Sweetman's trips to the beach have unearthed an astonishing 48 new prehistoric species, including eight previously undiscovered kinds of dinosaur. The new species, including crocodiles, lizards, frogs, salamanders and six tiny mammals, some as small as a shrew, come from the Early Cretaceous period, 125 million to 130 million years ago. Most spectacularly, Sweetman has found a new velociraptor-type creature, the rapacious dinosaur that terrorized the children in *Jurassic Park's* memorable kitchen scene. In reality, this fearsome, pack-hunting beast was only the size of a turkey; Sweetman has found a bigger species measuring 6m from nose to tail. "If this one I found hunted in packs, it could have attacked anything that walked the planet," he says.

In the 167 years since dinosaurs were given their name by the British anatomist and paleontologist Richard Owen, only about 1,000 species have been named. How, then, has one man found so many, so recently? Sweetman, a research associate a few kilometers down the coast at the University of Portsmouth, came to academia late but became fascinated by fossils at the age of 4, when he was given a fossilized sea urchin by his mother. "After that, I was just bitten," he says. Growing up on the Isle of Wight, he read about US paleontologists using sieves to sift through large quantities of mud and, as a teenager, rigged up his own version using an old bath and a flour sieve. Among his discoveries were some bone and teeth fragments. He talked to experts but, at that time, they didn't know what they were so he put them in a box and forgot about them.

He studied geology at Oxford University but didn't have the money to do a PhD. Apart from the occasional weekend looking for fossils for fun, he left his passion behind and became an oil trader in the City of London, later running a marine consultancy business. In 2001, he returned with his wife to the Isle of Wight and bought a small farm to keep horses. Just as he was packing his belongings for the move, a BBC TV program set on the island encouraged members of the public to show their fossil finds to their experts.

The Isle of Wight's shifting coastline and its origins as part of a coastal floodplain on mainland Europe make it a gold mine for professional and amateur paleontologists. PHOTO COURTESY OF ISLE OF WIGHT TOURISM

Sweetman took along some of his old finds. In the intervening years, paleontology had progressed substantially and, this time, the scientists were really interested in his boyhood finds. His passion was reignited and, after a chance meeting with a paleontologist from the University of Portsmouth, he was amazed to be offered a fully funded PhD.

Sweetman's home is unquestionably the right place for a fossil hunter. Nicknamed "Dinosaur Island," the Isle of Wight's constantly shifting coastline regularly exposes new treasures deposited when the island was roughly where Gibraltar is today and part of an archipelago that included parts of the west country, France and Spain. Every day, particularly after storms, men (it is almost always men) with rucksacks and geological hammers can be seen scouring recently eroded cliffs for newly exposed fossils.

Sweetman is not one of these orthodox fossil hunters. He discovered his riches not in the usual seams but in "plant debris beds," a "chaotic" sediment within the Wessex Formation that stretches from the Isle of Wight west to Lulworth Cove on the Dorset coast. While most of this ancient rock was laid down by river flooding, Sweetman's tiny crumbly section was created by torrential Early Cretaceous rains that sent floodwater through forests picking up trees, burnt wood from wild fires and, crucially, carcasses of dead dinosaurs. "The floods sloshed this stuff down on to the flood plain where they were deposited in depressions, including abandoned river channels and ponds," explains Sweetman.

For years it was thought to be useless; so churned up that there was little chance of complete bones being preserved. Sweetman developed a different theory. While fossilized species did not remain intact, the decaying plant material caught within the debris removed oxygen from the sediment and so helped preserve bone fragments, tiny bones and teeth caught in the torrent. "It is from these beds that I've found most of my dinosaur fossils," says Sweetman. "It is great to find a window into that period of geological history. Land animals were evolving rapidly at that time and there are very few sites of similar age around the world. Where they are found, they tend not to have anything like the diversity we have here."

The other reason Sweetman has been so successful is that, even among paleontologists, he seems to be at the methodical end of the spectrum. He chisels away mud, loads it into two buckets and heaves it into his 4x4. In scores of trips to the beach, he has taken away 3 tonnes. He enjoys the solitude: "When you've got three daughters and your hair is falling out, a bit of quality, peaceful time is perfect."

After heaving his buckets of mud into his barn, he dries the mud and then washes it through water with a sieving machine, which Sweetman has altered so it filters the very finest material. When he is left with various grades of gravel, he studies each fragment — grains that look like ground black pepper — under his microscope. A bucketload of mud takes a week to sift through. The end result is half a thimble-full of fragments of fossilized bones (a 0.25mm newt finger bone, for instance) and other microscopic teeth and fish scales. "I'm the first person to systematically apply a technique on the Isle of Wight using sediment that scientists said wouldn't reveal anything interesting," he says. "It's a tedious process, but what made it doable and even enjoyable was that virtually everything I was finding was new and exciting."

Sweetman's discoveries have not yet changed our understanding of the Early Cretaceous period, which is well before the dramatic mass extinction of the dinosaurs about 65 million years ago. As he modestly puts it, he is filling in the gaps. "Anywhere that produces a wealth of different species is very important because it is shining light on a period about which little is known but [when] lots is going on," he says. "With these discoveries I can paint a really detailed picture of the creatures that scurried at the feet and in the shadows of the dinosaurs."

While his discoveries end up in natural history museums, there is a lucrative underground trade in fossils. Some private collectors spend six-figure sums on dinosaur remains. Sweetman is not worried that his success will lead to the Isle of Wight being besieged by trophy hunters: the fragments he finds have no commercial value, he says. Are there more species of big dinosaur still to be discovered in the rocks? "Yes, definitely, and much better bits of things that we've already got. I've got tantalizing evidence of maybe three [prehistoric] birds but I've only got teeth. If we could find their bones we could probably name them."

Finding new species must lead to that most deliciously egotistical of pleasures — naming a species after yourself. Actually, says Sweetman, the naming of dinosaurs is governed by strict conventions. "You don't call things after yourself, but you can call them after your wife or dog." He has named one of his species after a private collector who handed him a crucial specimen — but you have to be careful: a dinosaur namer's academic credibility rests on not being later proven to have simply renamed an already discovered species. "There's nothing worse than erecting a new name only to find it's a synonym of something already in use, because that just creates confusion."

What a scientist wants is to be credited as the author of a new species. And so "Sweetman 2009" after the name of a new dinosaur gives him "a lot of satisfaction. It's immortality in a way. But you've got to get it right."

ILLUSTRATION: QUEENSLAND MUSEUM, AFP