

## Activity 4.8 The next bug thing

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### Purpose

- To provide practice in reading and analysing extended text.
- To introduce binomial nomenclature and taxonomy.

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### Beetle mania

Many of the scientists who work on cataloguing biodiversity are specialists in one group of organisms. Much of their work goes on hidden behind the scenes in museums and research institutes around the world. Get an idea of the scale of biodiversity and the challenge faced by the biologists researching just one group by reading the extract of the article 'The next bug thing'. This is about two beetle taxonomists, Martin Brendell and Peter Hammond, who work at the Natural History Museum in London.

Look up any words that you are unfamiliar with before answering the following questions based on the text.

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### Questions

- Q1** What does Martin Brendell mean when he says that the beetle found in the Kalahari is probably an 'unrecorded species'?
- Q2** How many species of beetle have been 'described' by scientists so far and what does this term mean?
- Q3** Using Peter Hammond's lowest estimate of total number of beetle species, calculate what percentage of the estimated total number of beetle species have been described so far.
- Q4** Describe the characteristic features that all beetles have in common.
- Q5** How many scientific names does each beetle species have? State one example.
- Q6** Who devised the system of naming used by all biologists today?
- Q7** What are holotypes?
- Q8** Why do you think that the process of describing and naming organisms is actually one of the constraints in cataloguing global biodiversity?

## THE NEXT BUG THING

*They're stoic, skilful and brave and have no hang-ups about sex.*

*A A Gill falls for the beetle, the most ardent survivor in the world.*

The Kalahari is a place of few words. There are rules here, and you had better understand them. It is unforgiving of innocent mistakes. Things that do decide to make a life for themselves here tend to be curmudgeonly, suspicious, tooled-up specialists.

I love it here. At its heart, a day's slow, tooth-jarring, thorn-whipped drive from any direction, are the Makarikari salt pans. This is an extraordinary place, so flat and featureless you can turn 360 degrees and see nothing but the curve of the globe. In the wet season it becomes a shallow soda lake, overrun with flamingos. For most of the year, though, it's a baked crust of salt. Nothing lives here, things only die. Flocks of exhausted finches lie preserved in bas-relief. Elephants' footprints, perhaps a decade old, pad nowhere. For thousands of years, the San people, the bushmen, have trekked out here to collect salt, which they barter for tobacco and beads. Salt – the oldest currency in the world, the origin of our word "salary". Its main value is as a preservative, but it's also a poison. It sickens the earth, turns men mad, and burns and sucks the moisture from the living and the dead.

So while picking over the glittering white crust, I was surprised to come across a beetle. A couple of centimetres of questing, streamlined black oval. How had it got here? Had it been blown from the relative fecundity of the desert by the hot wind? And then there was another. And another. This was no unlucky shipwreck – the beetles must live here. But why, and how? It was one of the little mysteries of a desert where all life is something of a mystery. I collected a couple in a film canister, put them in my pocket and forgot about them. Weeks later, back home, with nothing better to do, I went to the Natural History Museum in South Kensington to see Martin Brendell, the lead curator of beetles.

I've always adored Waterhouse's monumental mausoleum to Mother Earth

on Brompton Road. It is the closest thing this city possesses to a humanist pantheon. To get to beetles, you go through the terracotta hall, up the grand staircase, left past the bust of the remarkable Frederick Selous, on through monkeys and the "Darwin Experience", past the stuffed drongo, until you come to large double doors marked "entomology library". Here, you step into the secret part of the museum. Museum is not the right word for this building – less than 1% of its collection is on display. It employs 900 people, 350 of them natural scientists. This isn't merely a temple or a museum, or even a resource, it's an ark. Up another flight of stairs – through a locked door with a sign asking you not to bring in unwanted live specimens – are beetles. Row upon row of cabinets that reach twice as high as a man, each filled with thin, wooden, colour-coded drawers. From a Hobbit-like den in a corner popped Martin Brendell. He has the personable manner of a man whose inquisitiveness is at odds with a natural reluctance to socialise. I'd guess that he was once a solitary foraging boy with disgusting pockets.

To say he's obsessed with beetles is not enough. He is possessed, and has been since he was 17, in the 1960s, when he came to the museum and wanted to work on mammals. "But there wasn't an opening, so I got beetles", he says, with a shudder of someone who narrowly escaped a life-deforming accident. He has been here ever since. In a couple of years he'll have to retire, and it doesn't bear thinking about, so he doesn't, and burrows on. I gave him my little beetle and waited. "Yes, well, it's carnivorous, a predator". Called? "Oh, I don't know. It's probably an unrecorded species." You mean I've discovered a new beetle? "Perhaps, I'll have to check." My mind races – a new species. I see papers in serious magazines, lecture tours, awards, honorary fellowships. A grateful nation. A beard – and a name: my name, appended to the great roll call of life. "Gill's salt beetle." And I can't understand why he isn't slapping me on the back, reaching for the dusty bottle of amontillado kept for just such occasions.

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This is exciting – a new beetle. It's more an observation than a question. "Ah," he says, with the apologetic reserve of a man who's about to piss on a stranger's fireworks. "Let me show you something." And he goes to a filing cabinet and starts pulling open drawers. Dozens of them. Inside each are hundreds of beetles, like a fairy's jewel case. Glossy big ones, bright little ones, ones with horns and flanges. Ones with stripes, spots and runic filigree. There are beetles that look like leaves and twigs, and one or two that just look like beetles. "All these beetles," he jerks a foreleg, "are unnamed. They came from one corner of the Venezuelan rainforest last year." He looks at my offering.

"About your beetle – we'll give you a call." And two weeks later, I got a terse call from an assistant: "It's a *Pogonus* of some sort." And that was that.

Over the next four years, once in a while, I thought of *Pogonus* and the metropolis of beetles, and promised that one day I'd go back and find out more. And then one wet afternoon with nothing better to do, I did. I sat in Brendell's little higgledy-piggledy den, with its piles of papers and books, curling postcards, paperweight beetles, jokey fridge-magnet beetles; the first-world-war army knife with its spike for horses' hooves and its blade sharpened down to a nub, the little magnifying glass and the bottles of pins. And I said: "Tell me about beetles."

It was, I now realise, not a question to be bandied about lightly, a question that should have come with the unspoken caveat of not how long have you got, but how long do you propose we live? It was like asking someone to bottle Niagara Falls with a spoon. He took a deep breath, rubbed a mandible on his thorax and said: "Beetles are by far and away the most successful creatures in the world. One in every four animals is a beetle. Every fifth living thing is a beetle. In one genus of weevils, there are 2,000 species. That's equal to half the total number of known mammals. In the beetle department, there are 10m named specimens, and 2m unidentified ones. This is the most comprehensive collection in the world. The Smithsonian may be larger, but it's got a lot of repeats. Paris may have more, but no

one knows where anything is. This museum has more variety, from more habitats, in more places than anywhere else. Let me show you."

And he's off again, pulling open drawers. "Beetles have colonised every conceivable habitat, from the edge of the polar ice cap to the middle of the hottest desert. The only place they don't live is sea water. There are beetles that live in ants' nests, imitating ants; there are thousands of plants that have their own specifically adapted beetles. There are beetles that look like bird sh\*\* and ones that are smaller than dust particles. There is one which is the size of a hot dog. There are beetles that eat opium and strychnine. There are beetles that specialise only in beaver hair. The whirligig beetle has an eye that's bisected – the top half sees in air, the bottom half underwater. There are beetles that live in collections of beetles, the museum beetle. And one, *Blaps gigantean*, lived for seven years in a goldfish bowl on my fridge; it was called Barnacle."

Stop, stop. Look, I've got to get a mandible on all this – how many species of beetle are there altogether in the world? "Ah," he said, "you need to speak to Peter Hammond." Hammond pops out of another den.

"It's an interesting question. Up until now, there are about 450,000 described species. There will definitely be 1m beetles, probably 2m, possibly 5m, conceivably 10." So let's get this straight – at the most conservative estimate, we know of less than half the beetle population of the world? "Very conservatively, yes. There are only 2,000 people in the world working on *Coleoptera* [beetles]." Christ, then beetles must be Darwinishly mutating at a rate of knots? They look at each other, then at me, with a fathomless pity. "Beetles" says Brendell, "were perfect . . ." ". . . 10m years ago," finishes Hammond.

So, with that much diversity, what makes a beetle a beetle? There is no one thing that all beetles have that no other insect has. But the general definition includes an exoskeleton, biting mandibles, six legs, and elytra – that is, the hard wing coverings. Incidentally, beetles, though not generally great flyers, have wings that can be five times the size of their cases. They fold them

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up like origami umbrellas. And they have four distinct lives – as eggs, grubs, pupae and adults, though not all beetles necessarily have all of them. Brendell's off again: "Some beetles that live in the desert have fused elytra, and form an air-conditioning system. Some are soft-bodied, some are hairy. There's one that never really develops from the larval stage . . ."

Stop, stop. We pass a man working at a desk, surrounded by specimens. What's he doing? "Well, all the beetles in the collection – which, by the way, started with Joseph Banks's specimens from Captain Cook's *Endeavour* – are stuck on pins, set at a specific height through their right elytron. But the old pins are brass, and have copper in them, and the copper reacts with the fatty tissue of the beetles and causes verdigris – which makes gas, which in turn can make the beetles explode. It's a problem, so they all have to be re-pinned and labelled. It's a delicate job. "But there are 12m." "Hmmm." Good grief. Imagine a lifetime spent defusing exploding beetles. I realise the more I know, the less I understand. So Brendell gives me a duffer's guide to *Coleoptera*, the standard work, a reference book of scientific terms, a couple of papers and a chair. It's all beginner's stuff, and after an hour I'm drowning in the vastness of the subject. So I go and look at more beetles.

What none of us has mentioned is how awesomely, arrestingly beautiful they are. Each tray is an aesthetic wonder. With their neatly written labels and amazing patterns, they bridge the chasm between science and art.

And as I pull out drawers, I slowly become aware of the importance of a corner of science I haven't ever paid attention to: taxonomy. The science of naming. From the Greek *taxos*, "arrangement", and *nomos*, "law". With something as vast and varied as the *Coleoptera*, precision in name is vital. The Aborigines believe that a thing without a name doesn't really exist. And what we call biodiversity is a meaningless and formless emotion if we can't put a name to its parts. If you order red snapper in a restaurant, you could get one of 30 different fish, all called red snapper. Aristotle tried to organise the haphazard colloquialism of

the world. He called beetles *Coleoptera* – "sheath wing". But it wasn't until 1758 that the Swede, Carolus Linnaeus, later ennobled Baron Karl von Linné, devised the binominal nomenclature system – a generic name coupled with a specific name – and set out to name everything all over again. So, for instance, my beetle is organised as, first, a family name: *Carabidae* of which there are 30,000 to 40,000 members (beetles have over 200 families), then a generic name: *Pogonus* – which is quite small, only about 30 known species, all *Halophilous* (salt-loving), then, a species name: *gillae*. Except it's not called that yet, because a drawing of its willy has to be made and reputedly published first. Beetle willies are like Yale keys – no two species are the same. And it's not the done thing to name a species after yourself, although Brendell has more than 15 named after him, including a hawk moth. Your peers do it for you – coleopterists look after each other in the immortality stakes.

For 200 years after the Linnean system, beetles were discovered and named in an amateur way. Since the war, it has all been more purposeful and scientific. Still, there have been enough species discovered since the beginning of the 18<sup>th</sup> century to account for one every six hours. In the trays, some specimens wear the discreet award of a small red dot. This means they are holotypes, original examples, against which all other contenders have to be measured. In some species, only one has ever been found. The Natural History Museum holds more holotypes from across the natural world than anywhere else. They are of huge value, and are sent to other scientists to study. This collection is, in fact, a priceless resource. Brendell once asked an obscure German museum for a holotype specimen, and got the curt reply: "Your RAF bombed it."

Hammond has a theory – he thinks that the success of beetles can be put down to two things: sex and crunchiness. I don't entirely understand the sex bit, but I think it's something to do with the fact that beetles are apparently easy lays. They don't go in for complicated displays and courtship; they're not picky. And the crunchiness is the ergonomic robustness

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of most beetles. They're utilitarian and can live in places that would put off other orders. They have a tough confidence.

I could have, should have, finished this story in a day. But I drag it out. The truth is, I'm hooked. There is a trendy new scientific word – biophilia, the innate emotional affiliation of human beings for other living things. Until now, I've been pretty immune to biophilic tendencies. I'm a city boy – the only natural world I'm drawn to are things that come off plates. But there's something about beetles, a connection. A pheromone of empathy. Perhaps it's a recognition of fellow bourgeoisie. Then, one morning, Brendell pops out, beaming: "I've discovered something about your *Pogonus*. I've found a paper published about a similar one in Tanzania. *Pogonus rodolphi*. It's a predator that has regressed to eating algae. Were your salt pans wet underneath? That'll be it, then. I expect it'll still be a new species." Even after all these years, he's shiny with pleasure. During Brendell's time here, the collection has doubled. He and Hammond have collected everywhere, from the dank rainforest to the high Himalayas. Always with difficulty, often with danger, and with a passionate patience. They collect using light traps, nets and sieves, smoking the canopy and using cadavers. "I find a goat's entrails are particularly effective. And sh\*\*, human sh\*\*'s marvellous." They use a specialist piece of equipment called a pooter – a glass jar with two tubes. You suck on one, and the beetle is pulled up the other. You mean you suck at rotten entrails and sh\*\*?" "Yes, it's disgusting." Brendell laughs. How many beetles do you think you've killed? "Oh, thousands and thousands." They use a fumigating poison that smells like nail-varnish remover, or a syringe for the larger specimens. "But I mind it more and more. I find myself picking individuals, and being pleased when they get away. I'm getting old. When I was young I collected like a madman, but now, well, they're so wonderful."

Being a coleopterist is as close as anyone can get to living the dream of being on the Starship Enterprise. You boldly go and find new habitats and weird life forms, then kill them. Beetles are as strange, marvellous and varied as the most vivid sci-fi imagination. We tend to think that the brightest edge of science is quantum physics, but there's so much left undiscovered and unanswered right here. The last frontier is at your feet, under a rock.

Brendell and Hammond look at the beetle collection and see a resource, a record of diversity and a monument to the awesome achievement of beetles. I see something perhaps they don't: it's also a monument to human achievement. Mostly unremarked and unregarded – lives devoted to the fundamentals of life on Earth, minute and inconsequential, but also transcendent. Brendell and Hammond find God in small things. Every one of the 12m specimens here in South Kensington carries with it a story of huge diligence, inquiry and the open-mindedness that is the defining characteristic of our species, *Homo sapiens*. *Sapiens*, the ability to think, to question. If the world were to end tomorrow and we could choose to save only one thing as the explanation and memorial to who we were, then we couldn't do better than the Natural History Museum, although it wouldn't contain a single human. There is, oddly, no Linnaean holotype for man. But there doesn't need to be. The systematic order, the vast inquisitiveness and range of collated knowledge and its consequent beauty would tell all that is the best of us, and pinned into a corner of this encyclopaedic wonder would be my little beetle, *Carabidae pogonus* (sod the orthodox procedure and proper channels) *gillae*.

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