

M O'BRIEN: Ngai pirrku mankulankula

Ngai nari Kumatpi Marrutya

Ngai wangkanthi marni naa pudni

Kurna yarta-ana

Irdi yarta.

Hello, it's Micky O'Brien here, ambassador of the Kurna people, and today we're on Kurna country and I'm known as the impatient one. So

Ngadlu wangkanthi

Naa marni

naalitya

Marni naa pudni

parrku pirrku

Warra mankunthi

Kurna yarta.

So we can say hello to you and we also welcome you to this podcast recorded on Kurna country.

M LLOYD: Welcome to the South Australian Museum podcast. I'm your host, Meg Lloyd, and I'll take you through the curious and complex collections of the South Australian Museum. If you're ever in Adelaide and you take a stroll down tree-lined North Terrace, you'll find our museum right there, between the library and the art gallery. There are five floors of displays, from Australian Aboriginal cultures on the ground floor to opalised fossils, megafauna and Ancient Egypt right at the top, but the museum collection is so much bigger than just what you see on display. The museum was founded in 1856 and the collection comprises over 4 million objects, only a fraction of which are in the public galleries. When we talk about the collection, we're really talking about many different collections gathered together over the last 160 plus years. I wanted to give you a chance to see behind the scenes, to struggle with some of the big questions in the museum and to hear from the scientists

who work closely with our collections. How do you make sense of a collection that houses thousands of organised, analysed and labelled birds eggs, processes blue whale carcasses to create a library of skeletons, creates timelines of environmental change from fossils and attempts to explore over 80,000 years of Aboriginal culture, all in one institution? We'll try and explore a simple question with complex answers. How did these objects get here? In this first episode we'll dive into the biological sciences. I went to the Science Centre, an area closed to the public, where the scientists work and where the majority of our biological collections are housed. Firstly, I went to the Mammals Department, and interviewed Collection Manager, David Stemmer. We sat in the sub-fossils room, a tiny old office full of labelled wooden drawers, at the desk in the centre of the room, where volunteers can usually be found sifting through boxes of tiny mouse bones, but we're here to talk about collecting a much bigger specimen.

D STEMMER: Hi, I'm David Stemmer and I'm the Collection Manager of Mammals at the South Australian Museum and I'm also managing the Bolivar Skeleton Preparation Facility. So, basically, I'm looking after all mammals, from the mouse to the blue whale, which is a bit of a challenge because, obviously, there's a rather large size difference between those two and they require a very different approach on how to prepare them for the collection. We have a registration system, which is fairly common, which is just a running number with a prefix, "M" for Mammals, and we're currently approaching 28,000. The oldest specimen with a known collection date is from 1863, which is a numbat that has been collected in what's called the Murray Scrub, which is a very vague locality, as the Murray Scrub was an entire area of mallee all along the Murray, pretty much from the bottom all the way to the top. The collection has many purposes. It's like a library of life. It is a record of, in some cases, what we had and what we've lost. Every

specimen is a record of what occurs or has occurred in a particular area at a particular time. They're also used to learn about the biology of the animal, to record diversity. There is no such thing as an average day. They can be anything from mundane, with lots of meetings and emails and nothing very exciting, to having a call that a whale is stranded somewhere and I frantically organise a team trying to recover that whale, organise accommodation and gear to recover that whale, and, yeah, it can be very different from one day to the next. A specific whale? I guess one of the most memorable whales was a sperm whale down in the far southeast, near Piccaninnie Ponds, which is, like, a five-minute walk from the Victorian border. It was August and the weather was not very kind. We had, sort of, very windy, drizzling rain making it rather unpleasant. The whale was on the beach in only a teeny bit of water during low tide. During high tide it was sort of half afloat. It was still sitting on the ground, but with the swell moving, sort of, back and forwards. So it was not very easy to cut apart as it was like sitting on a boat while trying to cut it up. One of my team members actually got seasick and had to lay down for nearly a day because she didn't feel terribly well after sitting on the moving, rocking whale for a few hours. The one thing that will always stick in my mind is that this whale exploded on us, not just once, but twice. You can't really quite put it into words. The first time it did a big bang and blood and guts spewed out about five metres high, or higher, and we were just running in all four directions and it was splattering down onto the ground behind us. The second time, which was even more unexpected, because normally whales only release their pressure once and that's it, I was cutting at the back end of the whale and it did release gases again and it sounded like there was still pressure in it. So I was very careful and I kept cutting and eventually it did another bang and a nearly three-metre foetus blew out of the back of the whale and landed with a big thud on the beach. The other very memorable thing about this whale was when we finally

got into the inside and found the stomach and we opened it up, we found it full of giant squid beaks and lots of really cool, interesting stuff, and it may sound gross, but we all got excited like kids in a candy store and we got the big gloves and big buckets and we were scooping out all the stomach contents into big buckets.

M LLOYD:

So gleeful.

D STEMMER: Yes, a big grin on our faces because we've never seen squid beaks of that size before. I think you have to be a little bit weird working for the museum, otherwise you probably won't last very long. Collecting whales is definitely the most rewarding part of my job. It may seem odd saying that I enjoy cutting up a rotten blob on the beach, but it is a very rewarding process, going out to that rotten blob on the beach, retrieve it, bring it back to the museum and after lots of work that goes into it, end up with a beautiful skeleton in the collection.

M LLOYD: Speaking of squid beaks, I'll take you now to Marine Invertebrates, a massive collection made up of amazing sea life. Every time I see marine invertebrates I think about how there are so many ways to be alive. Some of these things, sponges from the deep sea, for instance, look more like plants than animals, and, indeed, there's no script that says you have to look a certain way as a living being. You can have an array of eyes or no eyes at all. You could have tentacles. You could be a sessile algae attached to a rock for your entire life. When you see photographs of these creatures, they look like a colourful abstract painting. In the collection they are lined up in shelf upon shelf of strange items floating in jars of ethanol, mostly bleached of their colour.

R KING:

My name's Rachel King and I am the Research Scientist for Marine Invertebrates here at the South Australian Museum. When I was a kid I really just had an affinity for marine work, the ocean. I lived nowhere near the ocean. I lived inland, northeast of Melbourne, but every time we went to the beach I was there all day, in rock pools, and so I was a little bit obsessed from a young age. I never was a collector. I've never been a collector of things. I've more been a questioner. So, I think, the joke in my family is that I was born asking questions. I was just inquisitive and I wanted to look into rock pools and see what was going on and all that sort of stuff. So marine invertebrates are animals that live in marine environments, the ocean, and they don't have a backbone. So they're soft-bodied or they have a hard outer shell. Marine invertebrates are a really big, diverse group; such things as worms, sea stars, crustaceans, which are my specialty, corals, jellyfish, molluscs. All those sort of animals are marine invertebrates. So we have currently, in the Marine Invertebrates Collection alone, roughly 20 phyla.

M LLOYD: Phyla are classifications of life. In the system for classifying life on Earth, we start off with life, then divide living things into three domains, then kingdoms, then phyla, then class, and then there are still three more divisions before we get into species. Why we divide living beings into different categories, well, that's a podcast all of its own, but the point here is to give you some idea of the massive breadth of the Marine Invertebrates Collection. Mammalia, mammals, is a class that exists within one phyla. Marine invertebrates come from many different phyla.

R KING: And about, I think, the last general count was over 1.5 million individual specimens in the collection. So a day at the museum for me

is probably different from one day to the next. I have PhD students that I mentor and help. So I may be checking in with students and seeing where their projects are. I do research writing, writing papers for scientific publications. Maybe I might be looking at specimens, I might be going into the collections to look for animals that I need some information on. I might be doing collaborations with colleagues, trying to work out different new projects. So there's lots of things. And I may be in the field another day. So there's lots of things. A day, generally, at the museum doesn't look the same.

M LLOYD: Fieldwork is a term that scientists use for when they go out to conduct research away from the museum. For every scientist this will look different. For Dr. Rachel King it could be heading down to the bottom of the sea in a submersible or fishing in hidden springs in the desert.

R KING: So fieldwork, for me, oh, has been really diverse at the museum here, which has been great. I had two children over the last six years and so that's severely curtailed my fieldwork, but I did a lot of oceanographic work in the US. I love it. I don't get seasick and I have managed to weather quite a bit of rogue waves, some storms and hurricanes in the US. So working on the big boats, it can be a juggle: tight spaces, trying to get all your gear for photography; for sorting, trying to sort animals with sloshing dishes; if the boat's listing this way and that, it can be, you know – but I love it. So it's just lovely to get out. Such an opportunity and it is rare to get out on those big boats. So I think everybody just is super-excited to be there when they're there. I went on a four-person submersible. It was a wonderful little thing. It had a big Perspex bubble window at the front that one scientist sat in with the pilot, and then at the back was like a can that another scientist sat in with a tiny little porthole and another pilot sat in the back. So there were four people and it was fantastic. I went down off Florida and went

to about 650 metres and it was just – it was pitch-dark, the bioluminescence was flashing at us in response to our lights. It was wonderful, and we just saw some lovely escarpments under the ocean and some amazing deep-sea coral reefs and deep-sea fish and lots of things. Yeah, it was a wonderful experience and we had this wonderful new boat that the Federal Government have funded through the CSIRO, which is the Investigator, and myself and colleagues have managed to get students out and people out on there and it's custom built for deep-sea research. So that has the ability to go to 4,000 metres, so, four kilometres depth, which is amazing and very exciting. I'm looking for crustaceans and the animals that I look at tend to be in the sediments and I pick them up out of that, sort of thing. So we'll get, like, grabs of sediment from the depths that come up and then we sift through them all and find the animals out of there, but there's loads of things that come up. We get rocks, which the geologists love, and then there's things that are the sponges and corals and things that are on those rocks, all sorts of sessile animals that are the ones that don't move around that attach to something. I'm pretty proud of the deep-sea collection that we have here now. It's something that we collectively decided to push to have that housed here at the South Australian Museum. We're on the southern coast, adjacent to the Great Australian Bight and there was a lot of work going on in deep-sea areas around the Great Australian Bight and we wanted to have that housed here. And so it's taken quite a bit of effort, but we've got roughly 3,000 specimens of deep-sea marine invertebrate material housed here and a lot of it, I'd say maybe 80 percent of it, is unknown, is new species. So being deep sea, it's really valuable. We don't get out there very much and it's hard to sample little small things in the deep sea. You don't always get a lot of animals with each collection. So lots of small samples of small animals, but they are really valuable. So I'm proud of that deep-sea collection that we have. I'm trying to think of something else. I guess

the other for me is also we are traditionally the marine invertebrate section, but I do a lot of work in fresh water at the moment. So we are marine and fresh water technically. The skills that I have in terms of describing species, exploring for species, it transfers between habitats. So I'm doing the same work, I'm just doing it in both marine and fresh-water environments, and so building up the fresh-water collections at the museum here is something that's been important and has been really worthwhile doing. So I've been working in lots of different groundwater habitats. The Mound Springs in South Australia are really special. They're up near Roxby Downs and the big Olympic Dam Mine. So the Oodnadatta Track is historically famous and largely it's there because it was the route north from Adelaide to Darwin and it had fresh water. So these springs are the only sources of fresh water in the desert that are available on the surface and they were a well-established Aboriginal trade route. They knew where all the water was. Later, in colonial times, it became the route that people travelled to do the telegraph and the train. And so it's been known, but what it hasn't been was, it was never really looked at for the animals that were associated with this ground water. So, really, in the last 10 to 15 years we've been looking at that really extensively and we found that there are loads and loads of different springs, and we group them into super-groups of springs, we call them, and in each super-group, basically, there is a unique community of invertebrates that live in the water and they're found nowhere else. And then, say, 50 kilometres up the track there is a new group of springs and there's a new, unique community of invertebrates that live in those fresh-water springs as well. They look very similar, but molecular work has shown us that they've been isolated in these springs for millions of years. There are small amphipod crustaceans which won't be more than a centimetre long, maybe half a centimetre generally, and then there are really, really, tiny, tiny things like ostracod crustaceans and copepods, and they're very

small. They're if you were to imagine just little specks in the water, flitting around, and there are snails, little spiral-shelled snails, and in some of the springs there are larger isopod crustaceans. So a lot of these springs are dominated by crustaceans and not crabs or anything that you would think of, but really tiny little shrimp, is sort of the best way that I can think to explain them. So for ground-water work, when we're looking at subterranean fresh-water systems, we could be, basically, fishing in the desert, driving out into the middle of nowhere in the Pilbara with a fishing rod and a net, very small net, maybe 10 centimetre diameter with a little cod-end on it, and we've made these ourselves, and we just fish down a borehole. It's a weighted line so we let it go all the way down the boreholes, and some of them can be a hundred metres or something down, and then we will let it go all the way down and then we pull it up for a bit, let it go down again, sort of fish up and down the borehole, and then bring it back up and have a look, see what we've got, and then that gets preserved in alcohol and brought back to the museum.

M LLOYD:

We'll continue our collecting journey on land with herpetology, the study of reptiles. I spoke with Mark Hutchinson, an honorary researcher at the South Australian Museum in his office. I have to move some jars of tiny lizards to make room for the recording equipment. The walls of his office are full of letters from school children thanking him for visiting, photos of his family and posters of lizards.

M HUTCHINSON: I'm Mark Hutchinson. I'm a recently retired member of staff here. I was in the Reptile Amphibian Collection area as a researcher for 29 years, since 1990 when I started, and I've come back straightaway after retiring as now an honorary researcher in the same area, because there's a lot of things I haven't finished yet. I'm still just

as interested as I ever was in that sort of area with that sort of group of animals. The Reptile and Amphibian Collection, Herpetology Collection, has something over 70,000, I think, specimens that have been accumulated since the late nineteenth century. So, the specimens themselves that we're talking about are preserved mostly as whole bodies of little animals in ethanol. It means a specimen can be sampled in one particular year and decades later, a century later, someone can look at that same specimen and still recognise all of its important parts and be able to, sort of, connect it up historically or at the present time with living populations. A proportion of those specimens come into the collection because museum staff go out and get them, and so that would have happened over the last 50-odd years, let's say, as part of biological survey efforts. We'll be in sometimes very remote areas, you know, only in radio contact with anybody on the outside. Usually it will be a group of people with several different sets of skills. Often in the past we've collaborated with the Environment Department and the Herbarium. So there will be a couple of botanists and, perhaps, a bird specialist, reptile specialist, mammal specialist, entomologist, one or two people who are helpers; a group of, sort of, eight or nine people camped at a spot for about a week with everything we need to put all the various trapping devices that the different groups use and preserve the specimens in perpetuity for other people to study into the future. For reptile survey work, many of the species that we look at are cryptic in their behaviour. They spend a lot of their time not being seen in order to stay safe. They're in the middle of food chains and anything bigger than them is a danger. Also reptiles are low-energy animals and they don't have to, in many cases, be active if a situation isn't exactly right, because they don't have to eat every day and because when it's cold they don't need much energy anyway. They go for long periods of time just curled up somewhere safe and completely invisible and out of sight. So we use pitfall traps. We use, basically, just holes in the

ground, lined holes in the ground, and we put a drift fence along those pitfall traps so that when they, sort of, walk up to the fence they'll tend to walk along the fence and that will lead them to a pit. They usually don't fall in by accident. When I've watched them at a distance, they usually jump in, they're exploring. The thing is they've never experienced a totally slippery surface before and they jump in and realise only afterwards that they can't jump out again. The pitfall traps mean that the animals, largely, they are not hurt by the trapping activity. So as we come along and check them, we can release the ones that we've already got samples of and look for ones that we haven't got before, and we pack that all up and leave after about a week, usually. So in terms of our effect on the population, we are acting a bit like a predator that's there for a week and then moving on, but those then give us everything we need to know about that population in terms of appearance and genetics, which is very convenient. Given that so many populations of animals now survive only if we know enough to manage them, to not try and get all the information we need because of it being distressing at an individual level to take an animal from the wild and preserve it for the museum, that's not a good enough excuse not to do it. To not intrude and to say, "Let's just leave them all alone and let's not do anything," that's to give up the responsibility that we have forced on ourselves because of the way we've damaged the environment, the way we constantly put a load on the environment. There's hardly an eco-system anywhere in the world that can now just be left by itself because there's too many humans, we've had too much of an impact and we're in the middle of a massive extinction at the moment, and there are so many species that we don't know anything about or know far too little about to know what do we have to do for this particular one to stop it from disappearing in 20 years or 30 years time, and museum specimens have an absolutely core role in achieving those understandings, if we can manage to do it in time.

M LLOYD: The question that a lot of people have when viewing the Mammals Gallery or the Biodiversity Gallery at the museum is, "Don't you kill them?" Or I find people assume that we kill the animals and they are either okay with this sacrifice for scientific purposes or frightened by it. The answer, as with many things, is more complex. We do collect some specimens like lizards by euthanising a small amount of their population. As an aside, the mammals in the Mammals Gallery are mainly from the Adelaide Zoo after they have died of natural causes. The whales and dolphins, as David explained earlier, are mostly collected when they wash up on the beach. The act of collecting is a part of living, part of a larger system. It's a concept that also exists in local Kurna culture. In the intro to this episode you would have heard Uncle Michael O'Brien giving a welcome to Kurna country. Here he is talking about collecting practices.

M O'BRIEN: [Aboriginal Language]. It's Micky again and I'd like to talk to you today about animals and the importance that they had with our people and how we protected them, not only by the totems that we had with the connections of those animals, but we understood that we didn't eat all of those animals, that we left one animal that would be protected and not be eaten, and if we did that by all of the family, therefore, we ensured that all of those animals would live. And so, therefore, we had plenty to share. But what's also important to recognise about the animals is how we cared for them. When we would walk the land we would clean out the waterholes so that when the rains came and they filled those waterholes, those lizards would have plenty of water to drink and, therefore, when we travel we would have water to drink, but more importantly those animals would still be there, present for us to gather and hunt when we needed those food sources, but also to ensure that all of those food sources were available for those lizards. Today

we see many of those lizards here as examples of our vast and wide array of different creatures that has marked this landscape. And so the museum has carefully collected these for you to see and to understand the importance of all creatures that walked this land, because we understand that we don't own the land, the land itself owns us, so, therefore, we are a part of the land, and when we recognise that we understand the importance to protect. And so when we know more, we understand more and, therefore, we can do more. And so, please, come enjoy the information, observe and maybe possibly feel these things, so that you can have a better understanding of the importance of all things that we have on this land. Ngaityalya.

M LLOYD:

Thank you for listening to the South Australian Museum podcast hosted by me, Meg Lloyd, and recorded on Kurna country. Original theme music by Peter Saunders, audio production by Jake Holmes. This podcast has been made possible by the support of National Science Week. See their website, www.scienceweek.net.au, for amazing science events happening all over Australia. Thank you to all of the SAM staff who trusted me to record their stories. For more information about our museum, please visit our website, www.samuseum.sa.gov.au, or get in touch by emailing programs@samuseum.sa.gov.au. That's it for this week. Next week we'll talk about caring for the Humanities Collection and how to breathe life into an instrument that's spent years in storage. Ngaityalya nakutha. Thank you. See you later.

M O'BRIEN: We never say goodbye, we always say nakutha, being see you later, and I hope that we see you later, not only in the physical, but the spiritual. And, please, enjoy this wonderful series presented to you by the SA Museum. Ngaityalya.

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