

## Hide and seek

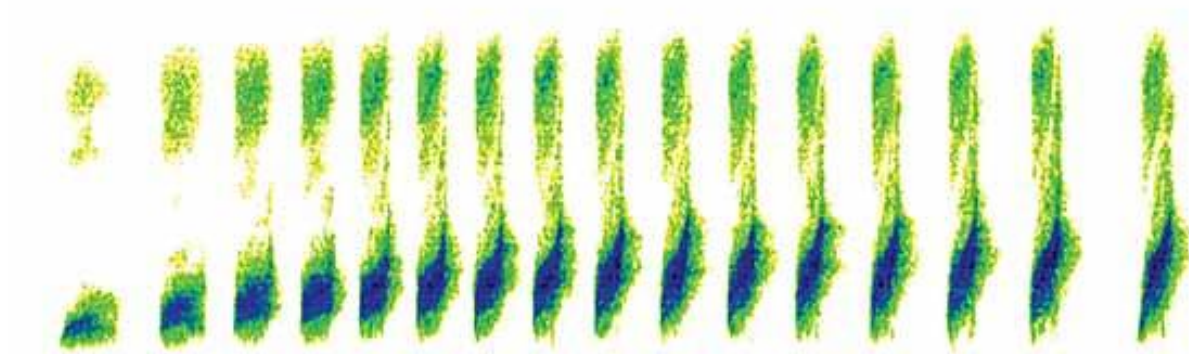
MAY 21



### **Turns out there are many ways to be cryptic, even if you're not a crossword.**

SOME WORDS DON'T MEAN WHAT YOU THINK THEY MEAN. CRYPTIC IS AN ADJECTIVE THAT USUALLY REFERS TO SOMETHING HAVING A MEANING THAT IS OBSCURE – HENCE THE DEEP AND FRUSTRATING SEAM OF HARD-TO-DECIPHER PUNS MINED BY THE SADISTS WHO DESIGN CRYPTIC CROSSWORDS.

In the natural world, however, “cryptic” can either refer to a bunch of species that look alike but are genetically distinct, or species that are difficult to monitor because they're hard to find. And, according to Laura Molles, an Ōtautahi-based ecologist who has been working on the behaviour and conservation of native birds for 20 years, in New Zealand we have more cryptic species than we know about.



ROLLING SPECTROGRAM OF A FEMALE GREAT SPOTTED KIWI.

For a start, anything nocturnal is cryptic: kiwi, morepork, bats, kākāpō, moths. Then there are those species who want to hide out in daylight hours. Their cryptic-ness is often assured by camouflage, like the bitterns who blend among the rushes in their wetlands. The best way to track them is to listen for their booming. And most insects are cryptic, thanks to being small, camo-clad or dark-crawlers.

Cryptic species are pretty interesting to study, but studying them can be hard, because they're, well, cryptic. Want to learn about a particular kind of intertidal spider for its amazing silk? It might take you months. The right place at the right time with the right tide might be 3am on a morning you're somewhere else.

One way to monitor these kinds of species is to put out some sort of benevolent trap. Like a weta hotel, for example. But aren't there protections for some species against that kind of intervention? Yes, and no. As a general rule, Laura says, "Anything with a backbone has more protection than anything without a backbone. But there are some invertebrates that are protected, including some of the bigger-bodied species, like giant weta, that are known to be in trouble. Anytime you need to catch something to monitor it, you need to make sure you've gotten good advice and arranged the right permissions."

“Etymologists are odd people and we tend to look at genitalia in close detail”

Laura studies her current cryptic species of choice, the great spotted kiwi, by listening. The science name for this, should you need it for a crossword, is passive acoustic monitoring. She has set up sound recorders around their habitats in the Paparoa Range, at Atarau Sanctuary's Kiwi Crèche and at the Willowbank Wildlife Reserve, and she uses special software (a mix of commercially-available software and her own command-line type scripts in an open-source program), years of experience and her finely-tuned ears to analyse the sonic results. Through this, she can identify sounds, trends and, eventually, individualised calls. She also gets the opportunity to hear things she may not be listening out for. "I think one of the key things about the work for Atarau is that it used to be super labour-intensive, but not any longer."

She says the special software that's now available, and in the pipeline, has made it possible to dig the required information out of recordings without listening to it



minute by minute.



JEWELLED GECKO (*NAULTINUS GEMMEUS*) PHOTO: MARIEKE LETTINK

“When the hardware became available (the actual automated recorders), people were really excited and started gathering piles and piles of recordings. And then the reality set in that it we didn’t have software that could turn those recordings

into information. The software is finally catching up with the hardware. I couldn't have done sound analysis work I did in 2017 three years before that, and I couldn't have done the work I'm doing now in 2017. It's rocketing along that quickly." Turns out software and hardware are a bit of a chicken before egg affair. Or, in this case, kiwi before egg.

"The science name for this, should you need it for a crossword, is passive acoustic monitoring"

Ongoing monitoring of cryptic species has for too long, in New Zealand, been in the too hard basket – funding often relies on a Masters or a PhD student who will work for three years on a species with an 80-year lifespan. Yet research of this kind is crucial to our understanding of, and conservation of, some of our most difficult to reach species.

It seems crazy, but here in Aotearoa there is often only one person in the whole country who can tell you about your one particular species. One of these particular people is John Marris of the Bio-Protection Research Centre at Lincoln University, who knows everything known about a certain small brown beetle, *Protodendrophagus antipodes* from the *Silvanidae* beetle family. "As insects go, it's not physically the most spectacular thing, but I think it's sexy," John says. "When 'describing' a species, you are obliged to nominate one specimen as the 'holotype' – the defining specimen," he explains. In the initial description, the holotype of this particular little beetle was a male from Mt Cedric in Nelson Lakes National Park. The 'paratypes' (other examples) were females found in Kahurangi National Park. They looked a bit different, but physical differences between the sexes are not unusual in the insect world. But then (!) John found what he believed could be a much more likely female match pinned out under glass at the Canterbury Museum. He was excited. Could this be a cryptic mix?

John and friends followed the only lead they had back to the type locality (where the holotype was found), though a label saying "under rocks" is not much of a clue to go on. "We rolled a million rocks and failed to find the little blighter. But by chance we poked around in a rocky outcrop on the way back to the hut. And there they were."

Now, knowing how and where to look in narrow cracks of rocks, they've found *Protodendrophagus antipodes* everywhere from Kahurangi National Park down



to Fiordland National Park, and the specimens from the original description are now confirmed as a mix of two species. They're a "genuine alpine beastie" who only live at relatively high altitude (from 1500 to 2000 metres and higher), and they are flightless which means they are, in effect, stuck on island mountain tops. "Though nothing's published yet, I can safely say we have at least four new species, though figuring that out is another bit of cryptic detective work using detailed microscopic analysis as well as examining their DNA makeup," John says. "Etymologists are odd people and we tend to look at genitalia in close detail as one of the most certain ways to tell. But finding new species of insects in New Zealand is not an overly unusual event – we probably only have about half the species named. We probably have about 10,000 named at the moment, but we reckon we're only halfway to recognising all the insect fauna."

Lizards are also cryptic. Some of them are nocturnal, some of them are rare, some are small and they're often well camouflaged, or at least they think they are, racing across a patio in the heat of the summer for the shade of another lizard-coloured rock. So very, very cryptic.

Smooth skinned skinks, geckos with great big eyes. A good one to google is the jewelled gecko. Do an image search, then see if you can see it in the photos; it's like those dotted pictures you're supposed to see more than dots in.

Again, how do you monitor a creature so hidden, so slinky? Lizard shelters are one answer, little huts armed with super-spy technologies like CritterPic®, an automated system that captures high-quality images from small animal species with real-time image transfer to users, revolutionising our ability to passively detect and monitor these species. CritterPic, designed by [Boffa Miskell Ltd](#) and Red Fern Solutions, is being used for everything from monitoring the success of gecko translocations on offshore islands to determining optimal lures for wetapunga (a kind of giant weta). The technology can use AI to classify species, and, potentially, even different individuals.

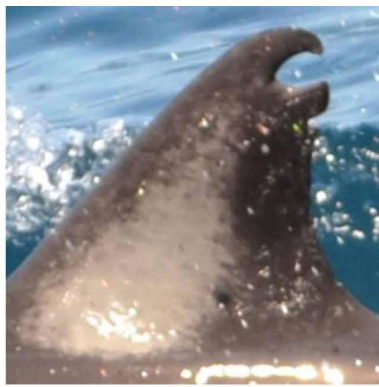
And while you cannot put a leg band on a lizard like you would on a bird because they literally shed their skin, you can co-opt trampers and mountaineers to the cause. Marieke Lettink, wildlife ecologist and herpetologist from Fauna Finders, took a short break from complex analysis of a lizard data set to share a good news cryptic story with us, about "this handsome chap, a Cascade gecko" who inhabits Fiordland and South Westland. Over the last two decades, Marieke explains, this



PROTODENDROPHAGUS LARVA.

is “one of the species we’ve got to know quite well, thanks largely to records sourced from the climbing/alpine tramping community after targeted advocacy. Other species are still practically unknown and there are still many mysteries (for example, there’s one gecko species that no lizard expert has been able to find since its initial discovery in 1968, though every decade or so there’s a sighting from a trumper, so it’s tantalisingly still out there somewhere).”

Then there’s the cryp-tastic creatures of the sea. Krista Hupman of NIWA studies common dolphins, which are also considered cryptic. Don’t let their ‘common’ moniker fool you. There’s so much about them we don’t know: how they migrate, for example, and the scope and occurrences of human impacts and/or injuries over time. That tourist boat in Auckland and that other tourist boat in the Bay of Islands – we’re not even sure if they’re watching the same dolphins. And though we know they’re not patri- or matriarchal, we know little about their social structure, who is associating with who.



### SPOT THE DIFFERENCES: FIN BLEMISHES AND PIGMENTATION HELP SCIENTISTS IDENTIFY INDIVIDUAL DOLPHINS.

NIWA has acoustic buoys, similar to Laura's recorders and, similarly, Krista uses machine learning algorithms to sort through the results. She reckons that facial recognition software, the kind they use in those little passport gates these days, would change the marine mammal monitoring game completely. "The people who do the airport scan technology told me this is so easy, this is so boring, we could do it in a second," she says, but it's been a long second and she's still waiting. As well as money, it takes a lot of time, and very large data sets to develop the technology reliably.

"The challenge for the species with smaller data sets is encouraging engineers and statisticians and computer scientists that the animal world needs their help, and that these are worthwhile projects," Krista says. This is, perhaps surprisingly, where dolphin-viewing tourism can be a help. Tourist boats take maybe 500 photos a day of the 2,500 or so common dolphins that are either resident in or visitors to the Hauraki Gulf, and it is often a condition of their research permits that they share this data with the Department of Conservation (DOC). But it's not straightforward. Matching individuals over time depends on whether fins are 'clean' or whether they're blemished with nicks and notches, which of course can change because of the wear and tear of life. Interestingly, researchers have found that pigmentation is a much more reliable form of identifying these critters, with



pigmentation patterns giving around a 95% chance of getting an ID right. Nicks and notches change but the pigments don't. Dolphin researchers aim on getting as many photos as possible to get more and more individuals matched, kind of like learning to recognise a cancer cell, or a constellation.

Krista, it should be noted, is also internationally famous for studying seal poop, particularly this one time that a USB stick with tourists' photos was found in a frozen sample from Oreti Beach in Southland. Shit is an excellent way to work shit out about cryptic species. Top tip, though – if Laura ever asks you if you want to smell kiwi poop, the correct answer is heck no. It reeks.

LIZ BRESLIN

Liz Breslin writes poems, plays, stories, reviews and columns. In 2020, so far she has co-created The Possibilities Project with the Dunedin City of Literature, slammed and open mic-ed in NZ and Zoom-toured on four continents.  
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