FORWARD TO NATURE

A School of Ants tour in rural and remote centres has involved hundreds of school children in scientific and artistic projects on ants. Coordinator Kirsti Abbott is shown bottom right (second from the right). Photos: Courtesy of Djarragun College (bottom right), Kirsti Abbott

SCHOOL OF ANTS AUSTRALIA

A new citizen science project coordinated by ecologist Kirsti Abbott aims to uncover the ants that run our cities and towns.
As yellow ants seethed up my legs, I breathed deeply and realised this would be my life for the next three years. It was the year 2000 and I was starting a PhD on Christmas Island in the Indian Ocean. I was there to work out what had triggered an extraordinary explosion in numbers of introduced yellow crazy ants. Since the mid-1990s more than 15 high density supercolonies had spread over more than 2500 hectares, some as large as 800 hectares. Becoming zen with formic-acid-spraying ants crawling all over me was my first mission.

I discovered that the yellow crazy ants were being fuelled by sugary honeydew that they harvested from also-introduced scale insects. In turn, among other benefits, the ants protected the scale insects from predators, a mutually advantageous arrangement that has been fatal for millions of endemic red land crabs and caused a cascade of irreversible changes in the structure, composition and ecology of the island’s unique rainforest.

Three years of delving into these ants’ habits, and subsequent work on the Pacific islands Tokelau and Samoa, showed me how a small number of ant species can dominate and change whole ecosystems. It led me to an immense respect for ants, and an intimate appreciation that little things do truly run the world, even in our cities and towns.

But most Australians take these tiny ecosystem engineers for granted. It could be that, although ants are everywhere and part of our daily lives, they rarely call attention to themselves unless they are overtaking our kitchens or biting our children.

Nonetheless, as I have found through thousands of conversations, everyone has ant stories – of the pain of being stung by a huge bull ant, of dismay at black ants swarming in a pantry or caravan, of fascination watching colonies move their young as storm clouds gather, and perhaps of shame at squishing them. Ants are embedded within our culture. Australians know no such thing as a picnic without little black ants! And honeypot ants – lolly shops in the desert – are an iconic part of Indigenous culture, inspiring the honey ant dreaming and important in a Central Australian bushfood diet.

It is through stories, embedded in and enhanced by science, that I hope to make ants more prominent and appreciated in Australians’ lives. They can enrich life in many ways. For entertainment, try tracking one as it hauls some booty triple its size back to its nest. As a social challenge, promote the fact that the world’s arguably most successful societies are run by females. And as a conversation starter at the dinner table, try identifying all the ways humans and ants are alike: livestock keeping (aphids for ants), fungi farming, warfare, the use of chemical weapons, enslavement, child labour, and ceaseless communication. There is no more accessible entrée into natural history.

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and ecology than ants – living all around us and performing diverse ecosystem functions, many of which, such as seed dispersal, soil aeration and predation, can be seen in action.

In 2012 I worked with primary school students in Melbourne to contribute to a School of Ants US project. We had a ball as they explored the ant life in their schoolyard. When, two years on, the students, parents and teachers were still excited about making new ant discoveries and still asking lots of ant questions, I decided it was time Australia had its own School of Ants.

School of Ants

School of Ants Australia is one of two offshoots of the parent project in the United States. Launched here in May 2014, our shared goal is to involve citizens in the exciting process of scientific discovery by uncovering the diversity, distribution and diet of ants associated with humans. The project is based at the University of New England in Armidale, and partners with the University of Melbourne and James Cook University. As I write this, I am finishing a yearlong School of Ants tour of rural and remote Australia.

Upholding the traditional model of citizen science, our major focus is collecting data to answer various research questions. By compiling large data sets across a broad area, we can use patterns in ant diversity, distribution and diet in towns and cities across Australia to ultimately help us understand which of their characteristics are sensitive to change. Fundamental to our scientific projects is the improvement of Australia’s capacity in ant taxonomy, and we provide a biosecurity service through citizen science surveillance and detections of invasive species. Invasive ants (the focus of an eradication program in southeast Queensland Australia’s environment, agriculture, economy and lifestyle are threatened in many areas by invasive ants such as red imported fire ants (the focus of an eradication program in southeast Queensland)

The taxonomy conundrum

Most citizen science projects in biology involve species that are well known or easy to identify, or are focused on a few indicator species. Ants are more challenging, for processing, sorting and identifying them is mostly an arduous process, and there are lots of species. Australia is home to 10 of 21 subfamilies of ants, 101 of 308 genera and more than 1500 described species and subspecies. There could be just as many yet to be described. Among them are a dozen invasive species, and more of these keep arriving.

Identifying ants requires long hours at a microscope distinguishing between characteristics like a medial hypostoma (underside of the head) and the rising angle of the clypeus (top lip). The number of people qualified, willing and able to do this job in Australia is low and dropping. For the mission of documenting biodiversity, as well as identifying invasive species and understanding the effects of a changing climate, taxonomists are essential. With citizen science projects like Atlas of Living Australia, Bowerbird, RedMap and School of Ants increasingly taking on the responsibility of identifying species, succession planning for taxonomy, especially for invertebrates, is no longer primarily in the hands of museums and government agencies. School of Ants is seeking to address the dearth of ant taxonomists by supporting and training students and amateur entomologists to work in our project, and developing a succession plan for aging ant experts.

Participants who send ants for identification to the School of Ants have to be patient. It can take several months to achieve taxonomic clarity. To sustain enthusiasm in the project and in the scientific process of discovery, we aim to reduce this lag time by improving Australia’s taxonomic capacity.

Invasive ants

Australia’s environment, agriculture, economy and lifestyle are threatened in many areas by invasive ants such as red imported fire ants (the focus of an eradication program in southeast Queensland.

There is no more accessible entrée into natural history and ecology than ants.
that has cost more than $300 million, electric ants (also being eradicated, in north Queensland) and yellow crazy ants. A dozen tramp ant species, so-called for their readiness to travel around the world with people, have invaded Australia. Several like the yellow crazy ant can form supercolonies and dominate vast areas. On Victoria’s Mornington Peninsula, for example, Argentine ants have formed a supercolony extending at least 100 kilometres. They have displaced native ants but not their functions. Instead of dispersing seeds of native plants, the Argentine ants are spreading the seeds of several introduced plants, and exacerbating weed problems.

The School of Ants can help detect new incursions and document changing distributions. When we receive an invasive ant species, we notify government authorities, as well as the person who collected it. So far, African big-headed ants have been found in Coffs Harbour, confirming a known distribution.

**Early achievements**

In its first 18 months, School of Ants has focused on protocols, partnerships and a website.

Our standard method for collecting ants involves three cheap food baits offering protein (deli frankfurts), fat (scotch finger biscuits) and carbohydrates (a cotton wool ball soaked in sugar solution). We tested our method with a pilot project in NSW to find out what ants are present along the gradient from Coffs Harbour at sea level to Bald Blair at the top of the Great Dividing Range and whether food preferences would change across the gradient. The method worked well. Thirty-four species of ground-foraging ants were collected, six of which occurred along the entire gradient, including in coexistence with the invasive African big-headed ant in Coffs Harbour. There was no pattern in food preferences, with all baits proving popular.

We (and several partners) created and led a 3-month project ‘Little Things that Run the World’, which brought art, science and the community together, with insect hotels that provide nest habitat for ants and other insects, a giant ant nest at the New England Regional Art Museum, and an AntBlitz in a small nature reserve. The reserve managers will use our data to track the effectiveness of management and habitat restoration.

Over the past year, we’ve had over 150 volunteers collecting ants. Some collect monthly on the same day, allowing us to gain a much broader understanding of the ant inhabitants of towns and cities.

During 2015 I have been touring with School of Ants, visiting schools in rural, remote and tropical regions, to provide one-day immersion classes on ants. The students and I discuss the wonders of ants around the world, how they eat, reproduce and build nests. A large aluminium cast of a meat ant nest helps children imagine life deep in the nest. We collect, analyse and interpret ant data, print t-shirts and peer at ants down microscopes.

The enthusiastic responses have been heartening. I will always remember one nine year old girl who approached me at the end of an ant day and, looking me straight in the eye, said, ‘You really inspired me today. I think I will take notice of ants forever now.’

**The future – science and poetry**

With a new website in 2016, we will be able to provide feedback to participants. An interactive map will feature all collected ants in their respective locations. We hope this will encourage long-term engagement by citizen scientists keen to see how the ants change over time in their backyards or parks. We are planning a special project on little black ants, to tease out whether the species in a kitchen in, say, Port Augusta are the same as those on a verandah in Kununurra. We are producing educational resources for teachers, and there will undoubtedly be more poetry after our first competition this year stimulated much myrmecological creativity (see the winning entry on page 45).

The research questions that can be answered using the School of Ants collecting protocols are endless. We’re looking forward to receiving your samples and telling your stories. We love a good story, and always let science get in the middle.

**Reading**

School of Ants Australia website (schoolofants.net.au) School of Ants US website (schoolofants.org) AntWiki (antwiki.org) Wilson EO. 2010. Anthill (a novel about a young boy discovering nature through ants written by one of the greatest ant researchers of all times).

**Dr Kirsti Abbott** is an ant ecologist and science educator at the University of New England in Armidale. After spending many years researching ants on tropical islands she now coordinates School of Ants Australia. She is passionate about involving non-scientists in the discovery process, and spent 2015 travelling around Australia with School of Ants and her family doing just that.