

# The **BRAINWAVES** Club



**Term 1 2021: Einsteins – Years 3 and 4**

**Venue: North Curl Curl Public School**

**Term Fee: \$285.00**

## **EINSTEINS' ENVIRONMENTAL EVOLUTIONS**

Some of our most amazing technologies have been inspired by nature. The Speedo swimsuit was inspired by shark skin and the Japanese Shinkansen (bullet trains) were inspired by Kingfisher birds. The desert fog water filters were inspired by beetles and Velcro was discovered by Georges de Mestral when he observed the burrs from burdock plants attached to his dog's fur... *Voila* – the inspiration for Velcro. More and more designers are seeking sustainable engineering solutions from our natural world. We have before us more than a three-billion-year history of evolution by natural selection! Using our understanding of this science we will create our own inventions to solve real-world issues. This semester, Einsteins will dive into the world of biomimicry and learn about the significance of biodiversity, adaptations, physiochemistry and nature-inspired designing.

### **13 February**

**Meeting 1: Winging It!**

**Focus: Biology, evolution, adaptation, aeronautical design**

These days, we are very accustomed to seeing all manner of things, both natural and made-made, flying through the air. But this hasn't always been the case. During this meeting, Einsteins will learn about how different organisms have adapted and evolved differently to cope with the same problem all around the world. Convergent evolution resulted in birds, butterflies and bats all having wings but with different structures and we will look at how this evolution occurs. We will take a deeper look at how these structures differ in function and learn about some other techniques of flight in the natural world. Inspired by these natural solutions we will create our own flying machines and experimentally test them.

### **27 February**

**Meeting 2: Cooking Up a Storm**

**Focus: Chemistry, climate change, sustainable solutions**

Einsteins will delve into the world of molecular gastronomy as we move into our venue's kitchen this meeting. What are the physical and chemical reactions that make popcorn pop or milk curdle? We will consider different reactions between acids and alkalis that are commonly found in the kitchen and why these reactions occur. Einsteins will then consider what happens when these reactions happen on a much larger scale. How are these very same reactions affecting the climate? We discover how the same gas that causes bubbles in soft drinks also causes global warming. We will experiment to discover how greenhouse gases are changing the climate and then work on some sustainable solutions to carbon emission inspired by nature.

### **13 March**

**Meeting 3: A Balancing Act**

**Focus: Conservation, biodiversity**

The natural world is a very delicate balance and removing or changing even one piece can disrupt a whole ecosystem. In this meeting, Einsteins will learn about keystone species that help define an ecosystem and their importance in the natural world. We will conduct an experiment to assess the impact of climate change on coral reefs and understand the chemical reactions involved. We will investigate the changing ocean chemistry as a result of global warming and how carbon dioxide is making the ocean more acidic. Einsteins will also assess the impact of mass coral bleaching on the Great Barrier Reef and, of course, consider solutions to these problems.

**27 March**

**Meeting 4: Survivor**

**Focus: Biology, ecology, astronomy**

Our bodies are finely tuned instruments that need to maintain a relatively stable internal state that persists despite changes in the world outside. We have survived for so long due to our internal workings as well as our innovation. Aboriginal medicines helped European soldiers from seasickness in World War II. Einsteins will get a taste of how human society survived before the industrial revolution and modernisation and will explore how nature provided for all our needs. Einsteins will delve into the world of medicinal plants, bush tucker and some handy tips to survive if lost in the bush, ensuring homeostasis is maintained in our bodies. Once equipped with this vital information, we will help a castaway survive in a jungle and find their way back to civilization. A floating compass will form part of our survival kit, but what else do you predict we will need?

**What to bring:**

Please bring a notebook and a well-stocked pencil case to each meeting as well as a hat, drink and snack for the break (no nuts please).

**About the Club Leader: Anu Vijayan**

Anu Vijayan is a Science Outreach Officer for the NSW Government. She has double Master's in Conservation Biology and Research. She has worked as an assistant researcher in Behavioural ecology at Macquarie University and Program Presenter at Taronga zoo. She is passionate about all things with fur, feather and chlorophyll. Anu worked as a VFX artist for a decade with various studios around the world before changing careers to follow her dream of saving the world. Anu aims to make science fun and interesting to young minds while encouraging them to be problem solvers and world changers!