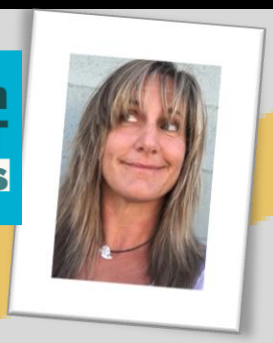
EPISODE ONE | RESOURCE PACK

ACTUALLY, IT'S PHYTO-PLANKTON!

Go2Qurious/Go2Q Remote Sensing acknowledge the Traditional Custodians of country throughout Australia and their continuing connections to land, sea, and community. We pay our respects to elders past and present and extend that respect to all Aboriginal and Torres Strait Islander peoples today.

Meet Kirsten Carlson Founder of Fathom iT Studios



Kirsten is an artist, a scientist, a graphic designer, a photographer, and a children's book author/Illustrator all to convey the beauty and wonder of nature through the lens of science and art.

Lascaux Caves (France)

Image credit: Prof Saxx

Kirsten explains that as a species we have been doing science and art together for tens of thousands of years. She thinks about the Lascaux cave drawings in France (pictured above) as a great example. These depictions of animals such a bulls and horses are dated at approximately 17,000 years old.[1] Kirsten says that humans are story tellers and putting pictures together with descriptions of our world has been important throughout human history.

The Maliwawa Figures (NT) & Quinkan Rock Art in Laura (QLD)

Video 1: Click image above to play

Image Credit: Michael Gardener

Lachlan and Jamie live and work on Gubbi Gubbi Country and think about Australia's First Nations People when they ponder the history of science and art. Check out this depiction of bilby-like creatures from the Maliwawa Figures in Arnhem Land, Northern Territory.

These figures are thought to be between 6,000 and 9,400 years old. Learn more about The Maliwawa figures and the team at Griffith University documenting & researching the site alongside Traditional Owners.[3]

Lachlan's a kid from Cooktown, North Queensland (that's Guugu Yimithirr Country). He fondly remembers visiting the National Heritage site in Laura to see the Quinkan Country rock art (pictured above - bottom right). These depictions of spiritual beings called Quinkan are estimated at being 15,000-40,000 years old.[2] Discover more: https://www.anggnarra.org.au/our-country/rock-art

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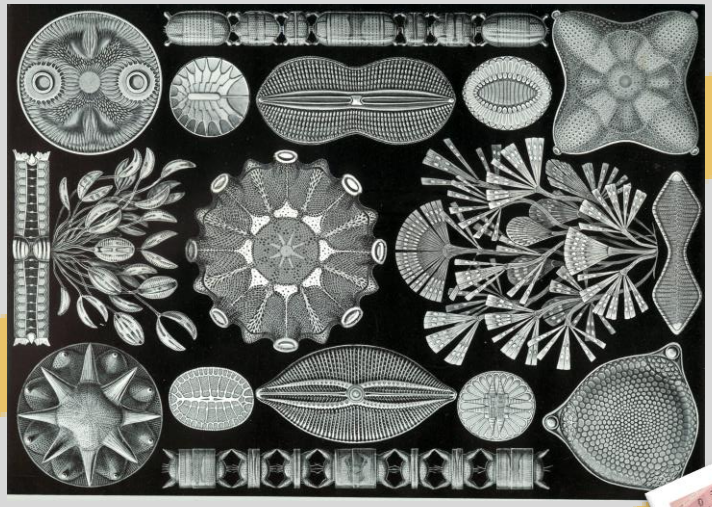
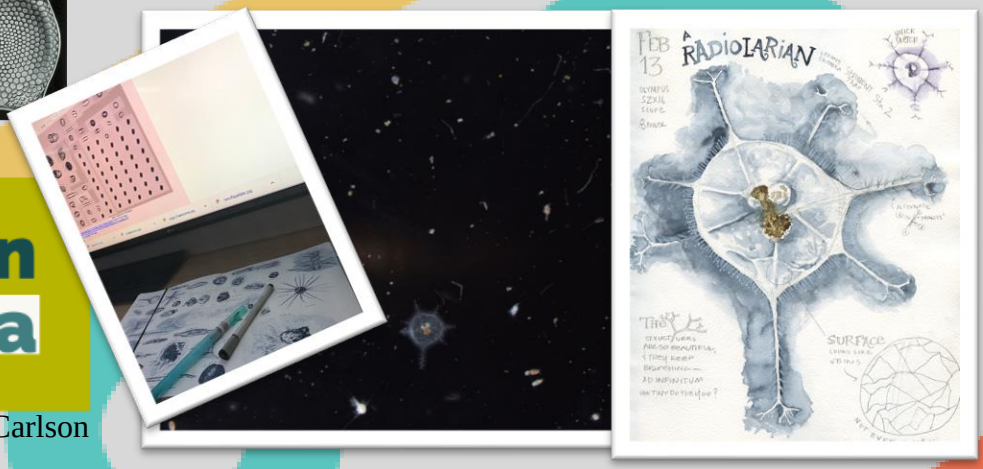
Kirsten draws sci-art inspiration from the past



Albrecht Durer (1471-1528 German) by day was a religious painter, and by night a scientific illustrator (although Kirsten tells us that term was not in use at the time). He is credited as one of the first people to draw a walrus (pictured right) from specimen or possibly descriptions.

Ernst Haeckel (1834-1908 German) was a scientist who drew tiny animals and plankton by looking at them through a microscope (pictured left). He has been nicknamed "The German Darwin". Haeckel is one of Kirsten's sci-art heroes!

Adventures of an Artist-at-Sea



Images Credit: Kirsten Carlson

It all starts with field sketching! That's a sketch that you do when you're out and about in nature. It's keeping a book of multiple pages with a mixture of drawings and journal notes. Kirsten calls them illuminated journals. Keeping a sketch book is not about being a good artist, it's about recording observations. Science is about being curious and looking out at the world around you, and being an artist is about recording that.

Joining science and art allows Kirsten to connect emotionally with a subject and get super passionate about it, and her analytical brain really enjoys it too. Especially when interacting with other scientists, her creative approach often brings the team to a new level of inquiry.

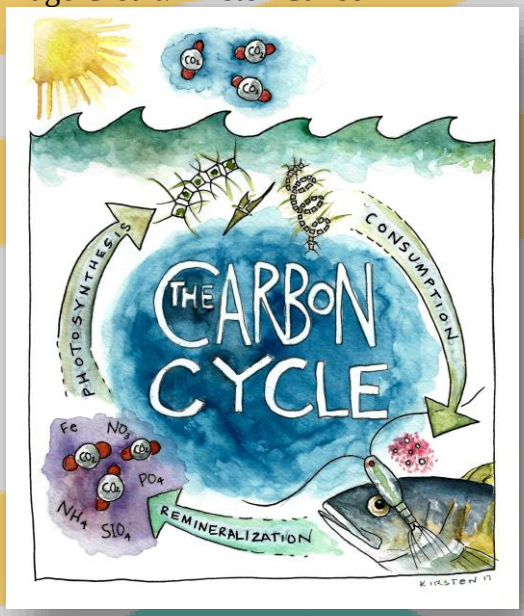
Kirsten sailed as Artist-at-Sea on the RV-Falkor with Ivona, Ryan, Aimee & Ben (all guests on our podcast), on the Sea-to-Space cruise with Schmidt Ocean Institute. She got everyone on the ship to draw plankton. Kirsten had to adapt her drawing techniques to account for being on a rolling ship and ever-present seasickness.

Why hand-drawn illustrations?

A photograph is one moment in time of one individual. They are important, of course! But, when an illustrator looks at something and illustrates it, they are taking a composite of multiple images. Any book that talks about species identification characteristics is not just talking about one individual. It's got to be the type; the way the animal looks in general.

Illustrators can communicate concepts that a photograph may not be able to convey. Kirsten has created a carbon cycle (right) that no photographer could, simply because it doesn't exist in a photographable space.

Image Credit: Kirsten Carlson



GET SKETCHY!

Now it's time for **YOU** to try field sketching! Inspired by Kirsten, Lachlan has been recording the birds in the backyard. He's been doing a lot of yard work lately which stirs up bugs, lizards and worms. The Willy Wagtail Birds love to swoop down and grab flies. Lachlan has also observed them eating fence skinks!

Images Credit: Lachlan McKinna

1. Go outside and look for something in nature you find interesting.
2. Watch & observe, take photos, collect samples if possible (like flowers or leaves).
3. **Draw it!** It's not about being good, it's about being observant.
4. **Accompany drawings with notes** about what you have noticed. Try:
    a. Colour/Movement/Sounds
    b. Weather/temperature/time of day
    c. Feelings/sensations/behaviours

Early Learning Corner

If you have little ones at home, they will love the program *Languages of our Land* on ABC. "Languages of our Land is an active learning Interstitial series sharing the Aboriginal language of Yugambeh, located in South East Queensland". (https://iview.abc.net.au/show/languages-of-our-land). This program shares traditional names of the natural world with engaging Illustrations and animations. PLUS The educational resources are AMAZING: Find them here: https://www.abc.net.au/cm/lb/12867820/data/education-pack-data.pdf

WELCOME TO THE FUTURE
MEET DR BEN KNÖRLEIN

Computery Guy, Virtual Reality Wizard, and Aspiring Cyborg Assassin (jk), Ben Knorlein is a software developer, formally at Brown University in the USA. His PhD is about visuo-haptic augmented reality, which means he created virtual objects appearing in the real world.

Ben sailed on the RV Falkor with Ivona & Kirsten for the Schmidt Ocean Institute Sea-to-Space cruise.

Video 2: Click image above to play

BEN

VR BASICS

The basic idea of virtual reality is you simulate some sensory feedback of a virtual world, and then you feed it back to the user so that it seems that this virtual world would be real. In most cases, it's just visual where the user has a disk-plate in front of their eyes and the virtual world is drawn on that. What makes it feel immersive is that depending on where the user looks, the images change. You can use special controllers to grab things and interact, and you can walk around in the virtual world.

Learn with VR

Things like guided excursions are very popular ways to use VR in education. As Ben says, "You can walk on the moon, or on mars, and then a couple of minutes later you're at the bottom of the ocean, a Mayan pyramid or an Egyptian temple." VR can also showcase history. You can go back to medieval times and Ben says that because VR is such an immersive experience it becomes more of personal experience as opposed to reading books or watching films. It's also a great way to do "risk-free" chemistry labs and classrooms. You can do chemistry experiments without poisoning yourself or accidently blowing yourself up. YIKES!

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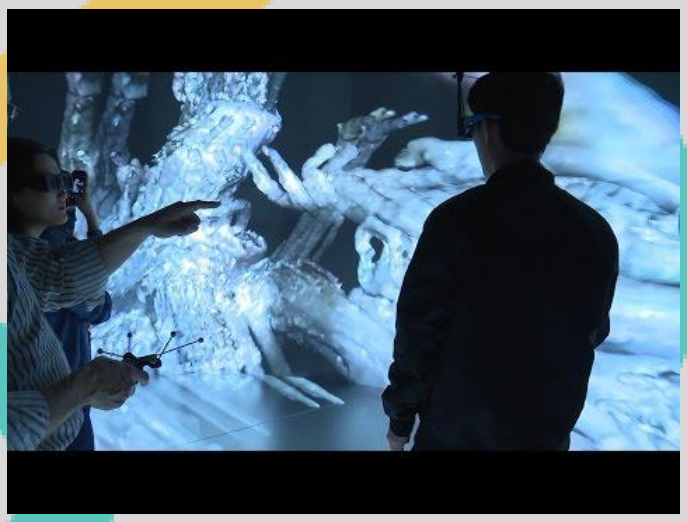
Ocean Science meets VR

VR is a great tool when the places are hard to reach. Underwater ecosystems are certainly in that category. A lot of research projects use VR to present interactive environments in which the user can explore. Another application is to help scientist better understand and interact with the data they have collected. 3D data is kind of hard to display on a traditional 2D monitor. When you take scientific data into the VR space, the scientists can walk amongst their data and interact with it. This is very useful for oceanography. Ben gives examples such as 3D reconstructions of coral reefs or microscopic 3D images of phytoplankton. With VR a tiny phytoplankton can now be the size of a horse. If the scientist wants to measure something, they can use a virtual ruler or measurement band.

Video 3: Click image above to play



Video 4: Click image above to play

Get set up!

Some universities have big expensive set ups intended for researching VR. These are large rooms that resemble the Holodeck from Star Trek. More accessible sets ups include cardboard cases that use your smart phone as the screen display. Cardboard cases are a great cheap option, but a little bit limited in their application. Higher quality, but still relatively affordable systems include the Oculus Quest products. These systems can track the movements of your head and hands as you have handheld controllers.

OCULUS QUEST 2

WIN

Find out how:
https://www.go2qurious.com/contests

Get the Skills

Ben says you do not need to be a coding genius to create VR but having some coding knowledge is a good idea.

There are a lot of tools out there that make it easy to make VR scenes. Ben recommends using Unity 3D. The student and personal software are FREE to use, and if you want a little more there are the PLUS and PRO plans available for a fee.

Download Unity3D Student or Personal here:
https://store.unity.com/#plans-individual

Ben says you only need to plug some components together and you are basically ready to go. Unity 3D has a physics engine, so it replicates and imitates the physics of the real world.

Video 5: Click image above to play

The Phytoplankton Zoo

Ben and his collaborators have created a VR experience called *The Phytoplankton Zoo*. It was made to celebrate the 5-year anniversary of Schmidt Ocean Institute's research vessel the RV Falkor. In the application, the user shrinks down to the size of a phytoplankton. The user dives in the ocean with lots of phytoplankton swimming around them. They can them hunt after the phytoplankton and grab them. Grabbing a phytoplankton reveals educational information about each type. Ben says the hunting and grabbing sounds easier than it actually is because the phytoplankton can move in surprising ways. The Phytoplankton Zoo was written in Unity 3D.

If you have a VR system, you can access Ben's game here: https://github.com/VRocean/InteractivePlanktonZoo

Bibliography

1. World History Encyclopedia (2016). Lascaucx Cavie. Retrieved from https://www.worldhistory.org/Lascaux_Cave/
2. Our Art Our Quinkan –Rock Art Paintings (2021) Retrieved from https://www.anggnarra.org.au/our-country/rock-art
3. Newly Documented Aboriginal Rock Art is 'Unlike Anything Seen Before'. (2020) Retrieved from https://www.smithsonianmag.com/smart-news/ancient-australian-aboriginal-art-unlike-anything-seen-180975984/

Information in this resource pack has been gathered from interviews with expert guests and then transcribed (not verbatim). All still Images are public domain or credited where appropriate. We do not claim ownership of any videos in this pack. Links to all videos are detailed below.

Video Links

1. Arnhem Land Maliwawa Rock Art: https://www.youtube.com/embed/5w5-jtV1gR0?feature=oembed
2. Computer visualizations bring new perspective to science: https://www.youtube.com/embed/yRhuZnMaknA?feature=oembed
3. VR 180| Virtual Dive Great Barrier Reef | Underwater 5.7 for Oculus Quest https://www.youtube.com/embed/72fg0n3FrYg?feature=oembed
4. Welcome to the YURT: Brown's Virtual Reality Tool https://www.youtube.com/embed/pCBqgREiSUE?feature=oembed
5. How to make your first game today (Unity 3D) https://www.youtube.com/embed/pCBqgREiSUE?feature=oembed