The WONDER WEEKLY

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The sea life that colours our oceans

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Fun word changer challenge:

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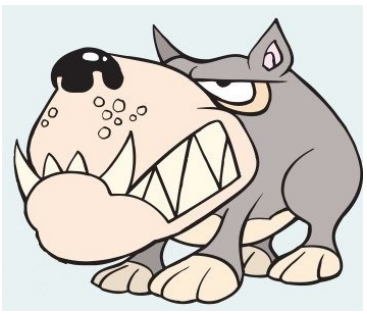

BLUE BEAUTY

Share projects inspired by *The Wonder Weekly* with us.
Email: UnderwoodCentre.Enquiries@utas.edu.au

Picture: Jemina Stuart-Smith

LIKE a fabled wonder from a fairy tale story, the Disappearing Tarn on kunanyi/ Mount Wellington made a reappearance recently.

It won't be long before it once again disappears.

A good friend of *The Wonder Weekly,* Dr Jemina Stuart-Smith captured the awesome photograph above.

You may know Jemina, a marine biologist, as one of the researchers who is working hard to save the rare and endangered red handfish.

Jemina, like many Tasmanians, is also a keen bushwalker, and braved the winter chill to capture a glimpse of the Disappearing Tarn.

A tarn is a mountain lake, and this one only appears after a couple of days of heavy rainfall or a heavy dump of snow.

"I've seen it a few times before, and always keep an eye on the rainfall," Jemina said.

"It's really beautiful - the photos never do it justice."

The striking thing about the tarn is its colour, a mysterious blue, which made us wonder about the colour of water generally.

A glass of pure water appears to be clear, but is it really?

The ocean is blue, well at least it is during the day, but at night it appears to be a much darker colour, almost black.

Is it just reflecting the sky above, or are there other factors involved?

And what about rivers and lakes, they are blue, aren't they?

Well, actually no, not always.

Sometimes the rivers in Tasmania's wilderness areas are stained brown, like a cup of tea, even though the water is very clean.

Why is snow - made up of frozen crystals of water - white?

And while snow is white, glaciers - formed from compacted snow - are a deep blue colour when you see them close up.

The answers to all these questions relate back to the way light works.

In an article in *The Conversation* (theconversation.com/) Justin Peter, a climate scientist at the Australian Bureau of Meteorology, wrote that the light we see is made up of tiny particles called photons.

These photons have different wavelengths, some are short and some are long, and together make up all the colours of the rainbow.

The photons with the shortest wavelength we can see are blue, while those with the longest wavelength are red.

It is how the photons interact with all the things on Earth which determines the colours we can see.

Depending on what light touches, some photons are soaked up and others bounce back, or scatter.

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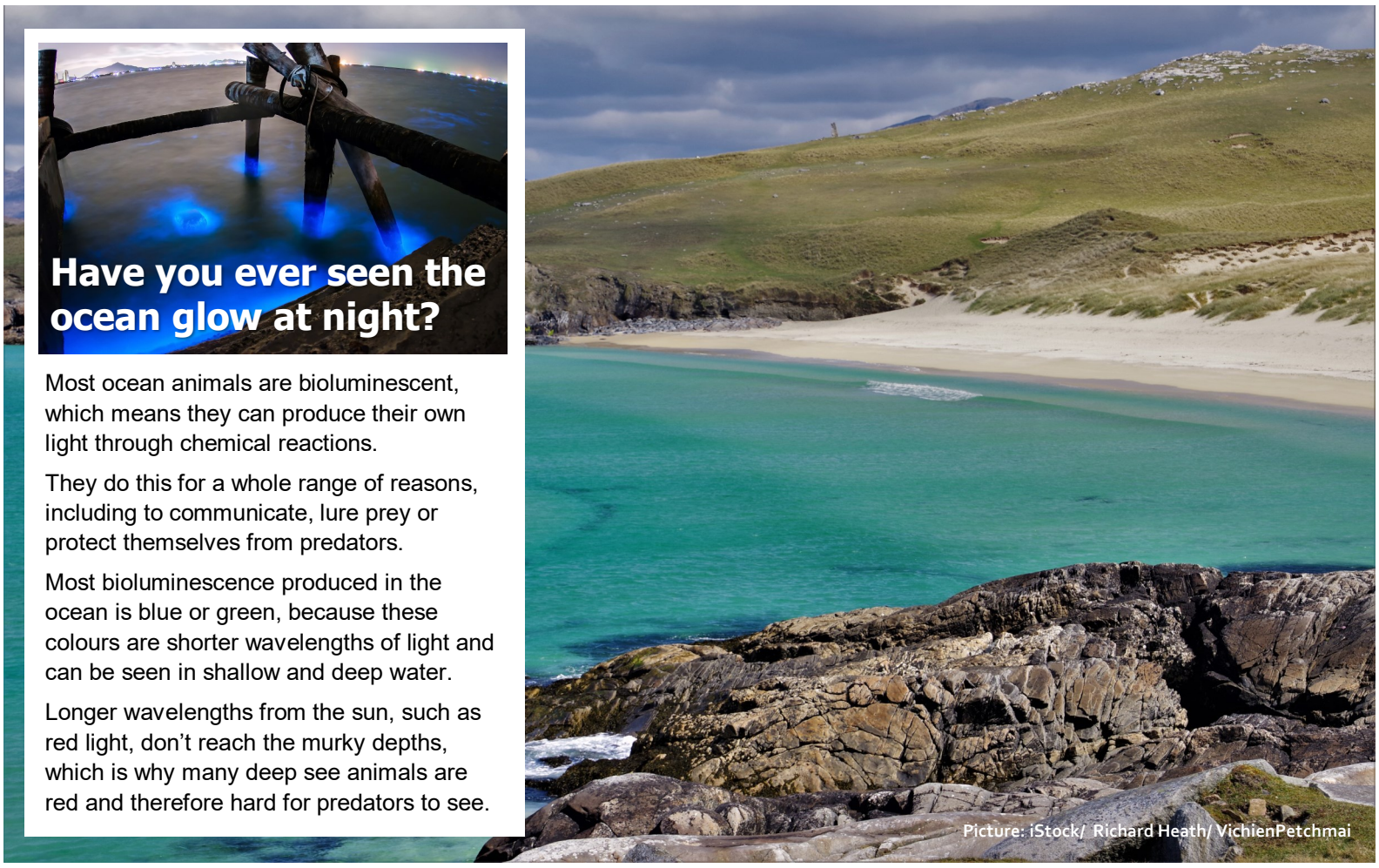
"Education perhaps more than anything else is a passport to a better life." - Peter Underwood AC



Have you ever seen the ocean glow at night?

Most ocean animals are bioluminescent, which means they can produce their own light through chemical reactions.

They do this for a whole range of reasons, including to communicate, lure prey or protect themselves from predators.

Most bioluminescence produced in the ocean is blue or green, because these colours are shorter wavelengths of light and can be seen in shallow and deep water.

Longer wavelengths from the sun, such as red light, don't reach the murky depths, which is why many deep see animals are red and therefore hard for predators to see.

Picture: iStock/ Richard Heath/ VichienPetchmai

Shining a light on tiny lifeform

ANOTHER element that changes the colour of the ocean, lakes and rivers is phytoplankton.

Phytoplankton are tiny organisms, usually too small to be seen with the human eye.

But in high numbers they can change the surface colour of the ocean to shades of green.

There are many different types of phytoplankton (more than 5000 known species), but most are single-celled plants.

Like land plants, phytoplankton contain chlorophyll, which enables them to get energy from the sun and carbon dioxide through a process known as photosynthesis.

Chlorophyll absorbs red and blue wavelengths of light, and reflects green.

The growth of phytoplankton depends on the presence of carbon dioxide, sunlight and nutrients such as nitrate and calcium.

When conditions are right populations can explode, which is called a bloom.

Blooms in the ocean can cover hundreds of square kilometres, and can be seen in satellite images from space.

Phytoplankton are very important to our environment.

They are the base of the marine food chain.

They feed zooplankton, small fish, even whales, and many of the animals that eat phytoplankton, particularly krill, are in turn food for other animals.

Scientists at Institute for Marine and Antarctic Studies, at the University of Tasmania, and the Norwegian Polar Institute are studying the importance of phytoplankton to ecosystems and carbon levels in the atmosphere.

Each summer when the sea ice melts around Antarctica, it is replaced by dense green blooms of phytoplankton over an area about the size of Russia.

The scientists recently revealed that about 90 per cent of phytoplankton is consumed by grazers, such as krill, while the remaining 10 per cent transports carbon to the seafloor as they die and sink.

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Your challenge is to think of another small living thing that is really important to other life on earth.

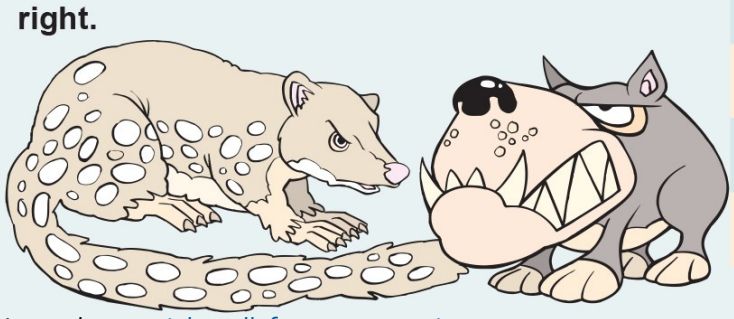
It doesn't have to be microscopic like phytoplankton, just small and important.

Present your findings in a creative way.

Children's University Tasmania members can earn stamps in their passports for this challenge, at the discretion of school coordinators.

Word CHANGER

Change one letter and arrange them on the next line to make a new word. Use the clues to help you change a spotted-tailed quoll into a Tasmanian devil. The answer is at the right.



Artwork: www.johnpollyfarmer.com.au/

	Q U O L L
Long, stiff feather	___ ___ ___ ___ ___
Small game bird	___ ___ ___ ___ ___
Of the same size	___ ___ ___ ___ ___
What something is worth	___ ___ ___ ___ ___
Captive worker	___ ___ ___ ___ ___
Brides wear these	___ ___ ___ ___ ___
	D E V I L

SOLUTION: QUOLL, quill, quail, equal, value, slave, veils, DEVIL.

Absorbing the beauty of the deep blue

From Page 1

Water absorbs more of the red light than the blue light.

The more water the light touches, the more red that is absorbed and the more blue we see.

This is why a glass of pure water appears to be clear, but if you fill a swimming pool with the same water it is blue to our eyes.

The deeper the pool the bluer the water.

So the ocean is blue because it is a vast amount of water and it absorbs more red light?

Yes, that is the main reason, but it is not the full story.

It is true that the surface of the ocean reflects some of the light from the sky, so this factor plays a role as well.

The ocean is also not pure water.

It contains salt and other particles suspended in the water, which also absorb and scatter light.

The scattered light from these particles would normally appear white, but because the light passes through many metres of water it retains a blue colour, just not the same blue as the swimming pool of pure water.

The same elements influence the colour of lakes, including the Disappearing Tarn, which is an unusual blue colour.

This is likely because particles, or sediment, suspended in the tarn's water, are scattering the blue light.

The brownish water you see in rivers and creeks in Tasmania's wilderness areas is the result of tannin.

Tannins are tiny particles of matter from leaves and roots and other plant material that have dissolved into the water.

Other materials, sometimes the result of run-off from the land, and algae can also effect the colour of the ocean, rivers and lakes.

When light hits snow, the whole spectrum of colours (all the colours of the rainbow) reflect back towards us off the ice crystals.

Since no particular colour is absorbed, snow appears white to us.

But the snow which falls on glaciers is compressed, which forces out air bubbles and enlarges the ice crystals.

Like water, large amounts of ice appear blue.