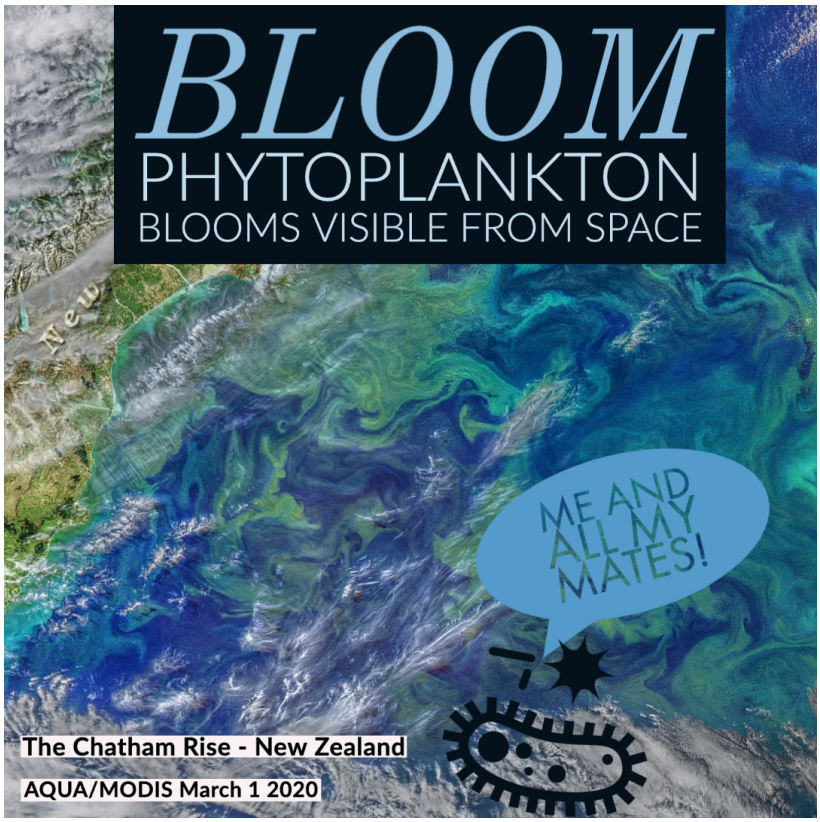
EPISODE ONE RESOURCE PACK

ACTUALLY, IT'S PHYTO-PLANKTON!

If you like to breathe air and eat food, you should thank phytoplankton. Here's why:

Microscopic phytoplankton are at the bottom of the marine food web and are eaten by everything that is bigger than they are. Energy that starts with phytoplankton provides fuel for life on our planet; including humans.

Just like rainforests, they are carbon converters. They change carbon dioxide to oxygen. Half of the oxygen in the air we breathe is made by phytoplankton.



If you can only see phytoplankton using a microscope, why can we see them from space?

Phytoplankton bloom in large amounts. From space we can see huge swirling marble patterns of green and red. You could see them with your own eyes from the International Space Station, but scientists use satellites to monitor them every day of the year. Scientists can be very precise with current satellites to know how much Phytoplankton is in the ocean. This is called biomass. However, we are not very good at knowing which *types* are there. NASA's PACE Mission will launch a new satellite that will be able to sense not just how much phytoplankton, but what types too.

Image Credit: Norman Kuring (NASA GSFC)

The ocean is blue right? Well...

Yes, water on its own looks blue. Sunlight is a spectrum of rainbow colours. When light hits the ocean surface, red light is absorbed (so we don't see it) and blue light is reflected. We see the blue light because the ocean bounces it back to our eyes like a mirror.

Phytoplankton are better at reflecting more colours than just blue. When there are large amounts of phytoplankton in the ocean, they literally change the colour of the water.

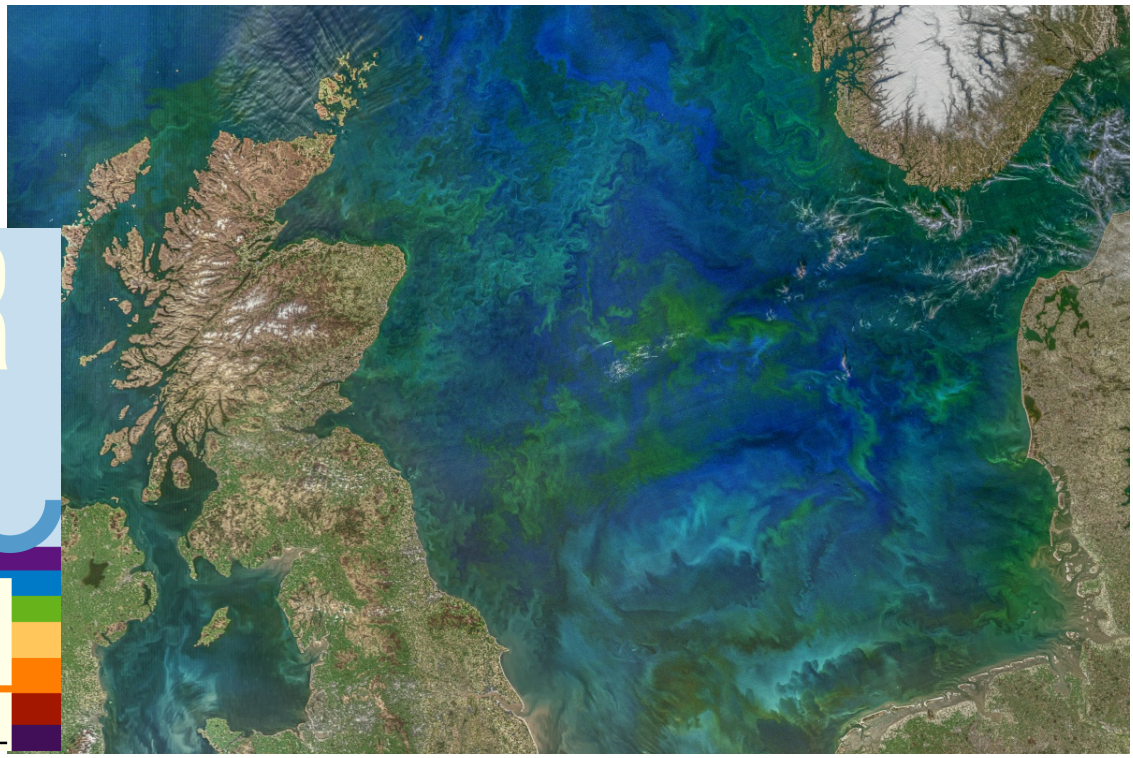


Image Credit: Norman Kuring (NASA GSFC)

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RESOURCE PACK

GO2Qurious

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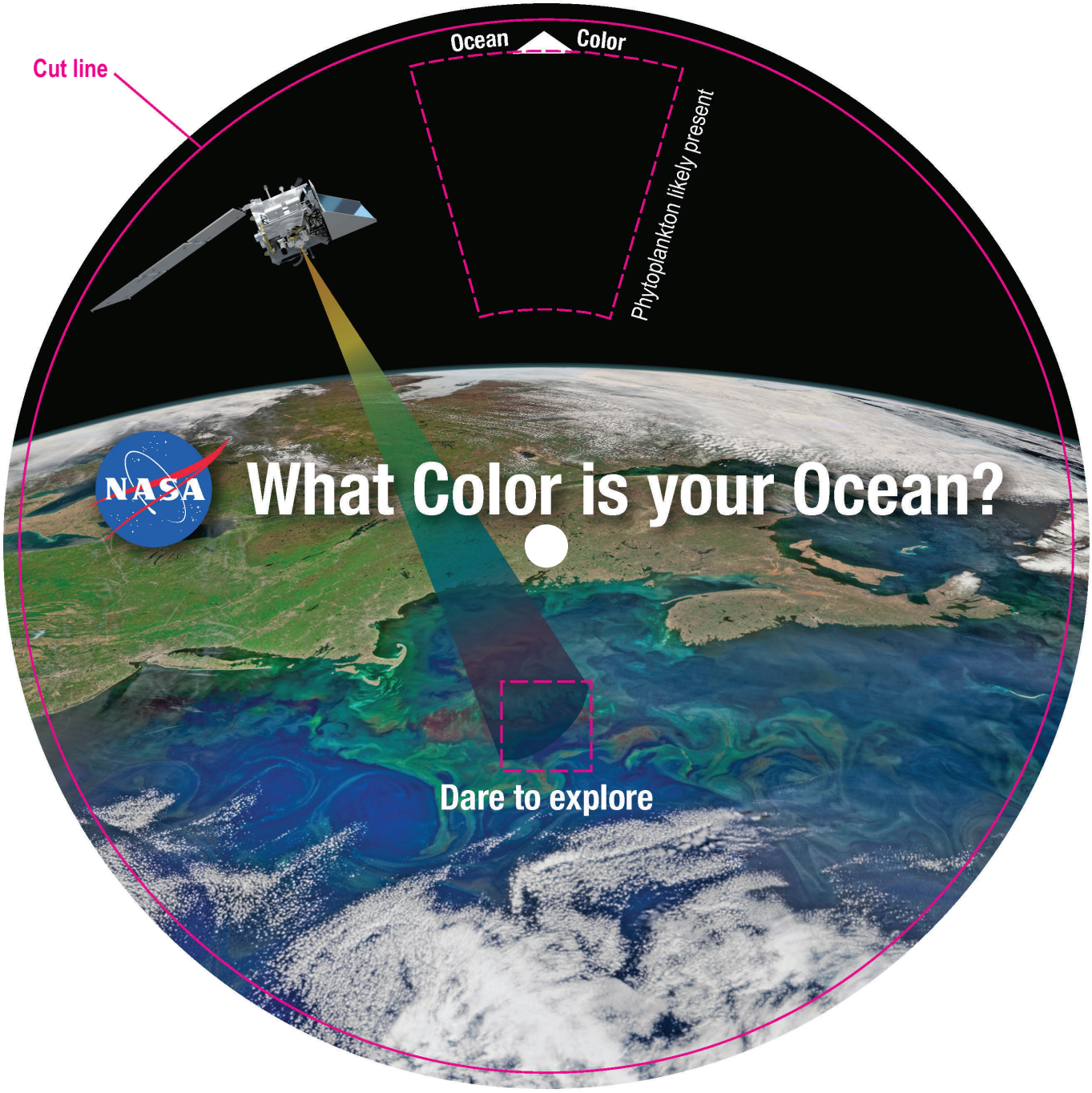
Ocean Color Wheel

Materials needed: Card stock or thick paper, round head fastener (1" or smaller), paste or glue.

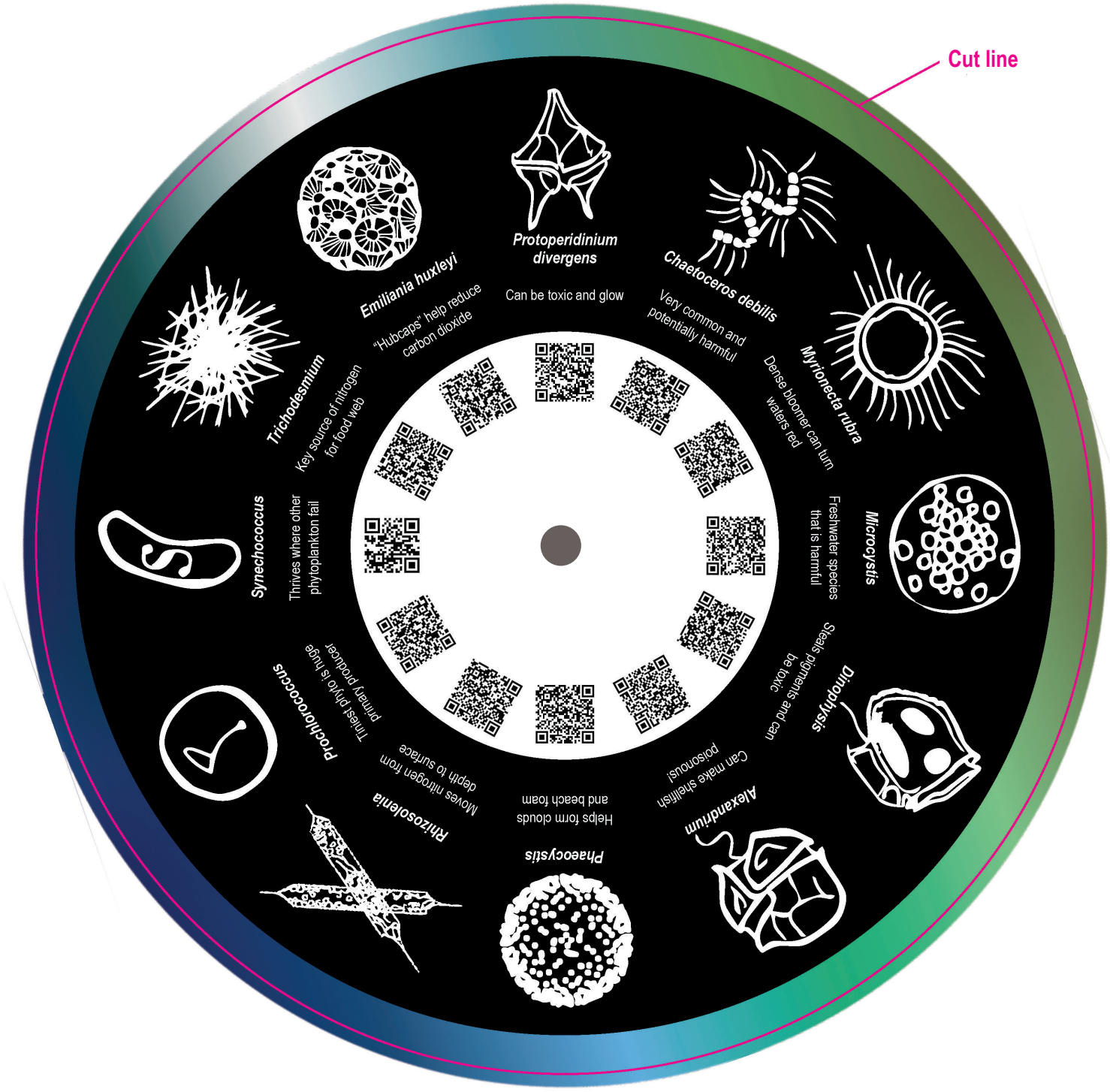
Assembly Instructions:

1) Print all pages single-sided on card stock or thick paper.
2) Cut out the three wheels (top, center, back) using the pink solid lines as a guide.
3) Cut out the windows on "top" wheel using the dashed lines as your guide.
4) Carefully punch a small hole through the center of the top and center wheels.
5) Attach page the center wheel behind the top wheel with the fastener so that the round head is on the front.
6) Glue the back of the wheel to the blank side of the center wheel.



Page 1: Top wheel, with cut out windows.

Page 2: Center wheel. Attach to the top wheel (page 1) in the center using the round head fastener. The information on the center should align with the windows on the front wheel as it is turned.



Page 3: Bottom wheel should be glued to the back of the center wheel (page 2).

Cut line

Plankton, Aerosol, Cloud, ocean Ecosystem (PACE)

If the ocean were empty of life, it would be blue. Sunlight is made up of a rainbow of colors. When it enters the ocean, water strongly absorbs red and scatters blue. The result? A big, empty blue sea.

Thankfully, our ocean is full of life and color. Its largest inhabitants depend on its tiniest ones: microscopic algae known as "phytoplankton." Why? Phytoplankton are the building blocks of the marine food web. This means they feed larger organisms who then are eaten by even larger ones... all the way up to whales! If this weren't enough, there's another reason to be grateful for phytoplankton. Like plants on land, they convert carbon dioxide into oxygen. In fact, they produce about half the oxygen on Earth.

Phytoplankton come in a variety of shapes, sizes, and colors. They also play diverse roles in our ocean. Some species bloom quickly, some produce toxins, some move carbon to the deep ocean, and some even help to produce clouds!

Like water, phytoplankton absorb and scatter sunlight. So, the ocean's color depends on the type of phytoplankton suspended in seawater. PACE will carry NASA's most advanced color sensor ever, designed to help identify phytoplankton communities from space! It will improve our ability to understand Earth's changing marine ecosystems, manage fisheries and detect harmful algal blooms.

Want to learn more?
Answer four questions to discover which of these diverse organisms is most like you!

pace.gsfc.nasa.gov

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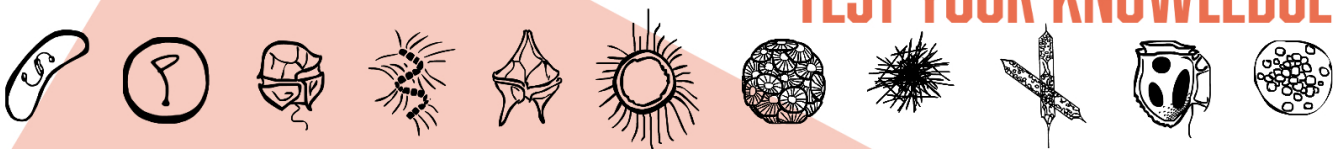
PHYTO CARDS

TEST YOUR KNOWLEDGE



GAME INSTRUCTIONS

SNAP

Players: 2-4

Aim: To win the snap pot until you hold all the cards

Print a minimum of 2 sets of phyto cards. You can print as many as you like for a longer game.

- Evenly deal the cards face down one at a time to each player.
- Players do not look at their cards.
- One at a time, each player takes their turn. Turn a card upright into the middle of the table (the snap pot).
- If two of the same cards are revealed on top of each other, the fastest player calls "snap" and slaps their hand down on the cards in the snap pot.
- In the case of a tie, the person with their hand on the snap pot first is the winner.
- The winner gets to pick up the snap pot to add to their own deck.
- Play continues until only one player holds all the cards, or there are no more matches.

GO FISH

Players: 2-4

Aim: To collect as many sets of 4 as possible

- Print a minimum of 4 sets of phyto cards, or more for a longer game.
- Use standard Go Fish card game rules [for example: https://www.dltk-kids.com/games/go-fish.htm].

CELEBRITY HEADS/20 Questions

Players: Whole class activity

Aim: To deduce which phyto card you have by asking 20 or less yes/no questions.

- Print one set of cards (You may wish to print them on A4)
- Choose 2-4 students to sit at the front of the class in front of the white board.
- Stick phyto cards above the student's heads, so they can't see them, but the rest of the class can.
- Each student takes their turn to ask a question in order to deduce which phyto card they have. Eg, "Am I a dinoflagellate? Yes/No" or "Am I toxic?" Yes/No.
- Students are given two chances at a final answer.
- Can be played one-on-one or in small groups as a game of 20 Questions.

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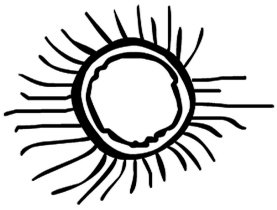
MYRIONECTA RUBRA

Meer-ree-oh-neck-tah Roo-bruh



I am the Ian Thorpe of phytoplankton;
I swim FAST.
My blooms look red and nasty, but they're harmless.
I steal chloroplasts from other algae.

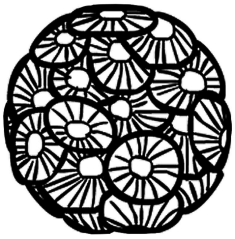
PROCHLOROCOCCUS

Pro-claw-row-coc-us

I am bright green.
I love warm tropical water.
I am the smallest phytoplankton.

EMILIANIA HUXLEYI

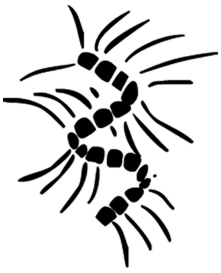
Em-mir-lee-ah-knee-ah Hux-lee-eye



I am covered in chalky scales.
I can turn water milky white.
I built the white cliffs of Dover.

CHAETOCEROS DEBILIS

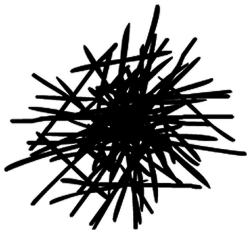
Key-to-sair-rose dib-bill-iss



I especially like mild temperatures.
I'm very close with my friends; we cling together in a spiral shaped colony.
I'm a fish murderer!

TRICHODESMIUM

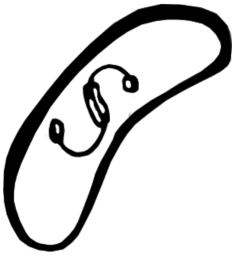
Trick-oh-des-me-um



I am brown.
I can be very stinky.
Just like a peanut, I take nitrogen out of the air.

SYNECHOCOCCUS

Sin-ec-ca-coc-us



I am a bacteria.
I love the deep ocean.
My colours are vivid and I can change them like a chameleon.

ALEXANDRIUM

Al-ex-zan-dree-um

Wow I am nasty! My toxins can cause Paralytic Shellfish Poisoning.
I have whip-like tales (flagella) for swimming.

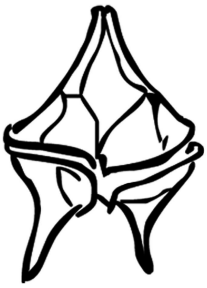
DINOPHYSIS

Die-no-fye-sis

I'm covered in a protective armour.
Steer clear of oysters that have eaten me; you might get diarrhea!
I can swim using my two whip-like tails (aka flagella).

PROTOPERIDINIUM DIVERGENS

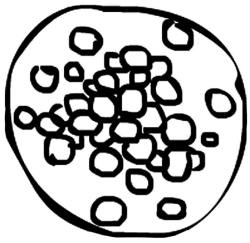
Pro-toe-pear-a-din-knee-um Die-ver-jens



I live by the coast.
I am often a cannibal and can be toxic (eep!).
I glow in the dark (aka bioluminescence).

MICROCYSTIS

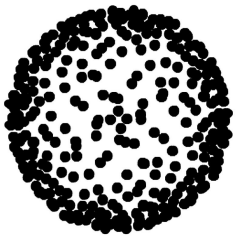
My-crow-sis-tis



I love fresh water.
I make toxins that can be dangerous.
My blooms look like fluorescent green slime.

PHAEOCYSTIS

Fay-oh-sis-tis



I love cold water.
I make fluffy beach foam.
I help form clouds.

RHIZOSOLENIA

Rye-zho-so-len-ee-ah

I move nitrogen from the deep ocean to the surface.
I provide nutrients for surface dwellers.
I get together with my mates to form huge floating mats.