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Hello, I'm Dr Alex Lathbridge and this is Bitesize Biology.

In this podcast I'm going to take you through the main things you need to know for your GCSE Biology exam.

I'm going to be talking about things as small as cells, as big as rainforests and everything in-between.

There's going to be a lot for you to remember. And as we go through all of the topics, there will be a few key terms that you're going to need to learn off by heart. But don't worry, I did it, you can do it too.

This is the first episode of a nine-part series on The Cell, let's go.

All living things are made of cells, which is why they're called the building blocks of life.

Plants are made of cells, animals are made of cells, humans are animals so even you, yes you, are made of cells.

In fact, right now, you are a giant, complex container made out of trillions of cells all working together, to learn about cells.

Anyway, today we're going to take it back to basics and find out about the structure of the cell and the two main types that you are going to need to know.

The thing about cells is that they are small, like really, really small.

Anything between 0.01 and 0.1mm across.

This means they are too small to see with the naked eye. In order to study them properly, scientists first had to invent really powerful microscopes in order to see what's inside them.

If this is all new to you, don't worry, scientists like me are learning stuff all the time too.

Nearly all cells have four key things in common:

1. They have a membrane. This holds the cell together, keeps its contents inside and controls what can enter and exit the cell. Think of it like a balloon that can let things in and out.
2. They have a cytoplasm, which is kind of like a really useful jelly. It's where all the chemical reactions take place in the cell. Think of it like water inside that balloon.
3. They have DNA. DNA is genetic material. And it contains all the information that tells the cell what to do, your cells following all these instructions is how you develop and grow.
4. They have ribosomes. These are sort of like mini-robots which make proteins based on the instructions found in DNA.

So, you could say that a simple cell is just a tiny water balloon, filled with instructions and little protein-making robots.

Or, if you want to pass your exams, you could say that a cell is between 0.01 and 0.1mm across and made of a cell membrane containing cytoplasm, DNA and ribosomes.

Now, there are two types of cells you'll need to know about:

Eukaryotic and prokaryotic cells.

You are a eukaryotic organism. This means that you are made up of lots of different types of cells, most of which have a nucleus.

These kinds of cells, the ones that work together with lots of other kinds of cells to make up a plant or animal or human, are called eukaryotic. Easy to remember: because you are eukaryotic.

Let's think about most eukaryotic animal cells. As well as the stuff we've just talked about (that water balloon) most eukaryotic cells also have a nucleus.

Remember that cells always contain DNA? Well, in eukaryotic cells, the genetic material is kept inside a nucleus. Think of it like a little folder.

And they have Mitochondria. This is where cells release the energy they need, that's where respiration takes place. Think of them like little batteries.

So, when it comes to most eukaryotic animal cells, we've got our water balloon (a membrane filled with cytoplasm), containing instructions to make proteins inside a little folder (DNA inside a nucleus), robots to synthesise the proteins (ribosomes) and batteries to power the whole thing (or mitochondria).

And just because things are never that simple, in animals red blood cells are the exception because they don't have a nucleus.

It's worth drawing it out, I've always found it useful, even just a quick doodle. Remember, there are lots of diagrams on the Bitesize website. It might be useful to look at those while you listen.

Now, although you might think you are a little bit more interesting than a lettuce, most eukaryotic cells in plants have some extra stuff on top of all that. So, plant cells have a membrane, cytoplasm, DNA, a nucleus and mitochondria and:

1. They have an extra layer outside of the cell membrane called the cell wall. Plants need a cell wall because they need to stand up straight, but they don't have a skeleton, and this is where the cell wall comes in, it helps keep plants upright.
2. Green cells in plants' stems and leaves have chloroplasts, which contain chlorophyll and the enzymes needed for photosynthesis. Photosynthesis is really important and we're going to come back to it later in the series, but for now what you need to know is that chloroplasts contain the stuff that plant cells use to store energy from sunlight. Think of it like a little solar panel.
3. They also have a permanent vacuole. You can basically think of it like a little pocket inside of the cell, filled with something called cell sap that helps to keep the cell in shape.

And remember how red blood cells don't have a nucleus? Most plant root cells don't have chloroplasts, so they're white not green.

Ok, so that was eukaryotic cells. Now let's look at prokaryotic cells

Prokaryotic cells are always single celled organisms.

Like bacteria. The whole organism is just one tiny cell that does it all.

But just because it's small doesn't mean it's not important. We need bacteria in our guts, to help us break down food and the environment is the same, the life cycle of things dying, and their nutrients being returned to the earth depends on bacteria.

This is why you should be very pro prokaryotic cells.

Like all cells, prokaryotes have a cell membrane, cytoplasm, DNA, and ribosomes.

However, there are two main differences:

1. Firstly, the DNA isn't inside a nucleus, instead it floats free inside the cytoplasm in a single circular loop of DNA, with some extra little bits of circular DNA called plasmids.
2. Secondly, prokaryotes also have a cell wall, outside of the membrane.

And yeah, all cells are microscopic but there's a big difference between eukaryotic cells and prokaryotic cells.

So eukaryotic cells, plant cells and animal cells, can be anything from 10 to 100x larger than prokaryotic cells, found in single celled organisms like bacteria.

I'm Dr Alex Lathbridge and this is Bitesize Biology. To hear more, search Bitesize Biology on BBC Sounds.