WHAT ARE METAZOA?

Metazoa is literally just another word for 'Animalia', the kingdom of animals. All of them are multi-cellular eukaryotes, and they share some common behaviours.

All metazoans...

> consume organic material (so they are *heterotrophic*)

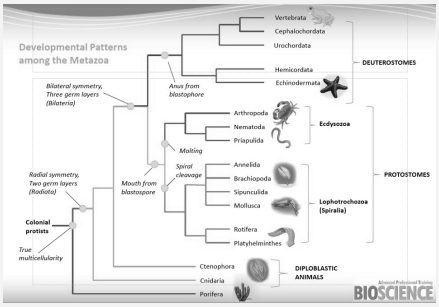
> breathe oxygen

> can move

> can reproduce sexually

> start off from a **blastula**

A Nice Diagram of the Metazoa



THE EUMETAZOA

How do you know that it's a Eumetazoan?

> It's an animal, and it's not a sponge. Thank God.

What groups is Eumetazoa split into?

> Checking the diagram about now would be a good idea.
>
> **Eumetazoa** can be radially symmetrical, at which point you also know that they are **diploblastic**.
>
> If they're not radially symmetrical, then they must be bilaterally symmetrical, and you know that they are **triploblastic**.

THE PROTOSTOMES

Protostomes (who develop a **mouth** from the blastopore) are actually subdivided *again* into either **Ecdysozoa**, or **Lophotrochozoa**.

How do you know it's an Ecdysozoan?

> **Ecdysozoans** undergo *ecdysis*, which is also more commonly known as **molting**. This is when they shed their skin in order to grow. They do not exhibit spiral cleavage.

How do you know it's a Lophotrochozoan?

> **Lophotrochozoans** (this clade is also known as **Spiralia**) display a 'spiral' cleavage pattern back in early embryonic development.

THE DEUTEROSTOMES

Deuterostomes (all of which develop an **anus** from the blastopore) are nice, because I don't think we have to know exactly how the group sub-divides any further.

They include all other kinds of animals, such as starfish(**Echinodermata**) and vertebrates(**Vertebrata**).

All **Deuterostomes** exhibit *radial* cleavage.

SPONGES ARE SILLY

Sponges are really very strange 'animals'.

They don't have any kind of symmetry. That is how you know it's a sponge, and that it also doesn't have a proper ectoderm or endoderm!

Consequently, a sponge does **not** develop a gastrula, unlike every other kind of animal. For this reason, all other animals are grouped into **Eumetazoa**.

SPONGES ARE SILLY (cont)

Optional Disclaimer: I looked into it and it turns out that sponge embryos are way more complicated than I thought. So I can't say that they're not dipoblastic, because it does have two germ layers present, but they're not called 'ectoderm' and 'endoderm'. If you want to know, they're called the 'pinnacoderm', the 'choanoderm', and then a weird non-cellular layer of gunk in between those two called the 'mesenchyma'.

The take-away here is that sponges are weird and **don't develop a gastrula at all**.

WHAT ARE DIPLOBLASTS?

A **diploblast** is an organism that forms two distinct germ layers:

> **Endoderm:** This is the inside of the gastrula. It forms the digestive system.
> **Ectoderm:** This is the outside of the gastrula. This forms the outside of the body, and the 'nervous tissue'.

Examples of diploblastic animals include the **Cnidaria** (jellyfish, coral, etc) and the **Ctenophora** (rotifers, various other semi-obscure marine invertebrates).

WHAT ARE TRIPLOBLASTS?

The **triploblasts** are IMO where all the cool animals are. They're all **bilaterally symmetrical**, unlike the radially symmetrical diploblasts mentioned above.

WHAT ARE TRIPLOBLASTS? (cont)

How are triploblasts divided into smaller groups?

Triploblasts can be either grouped into **Deuterostomes** or **Protostomes**. This is based on the way that the blastopore is incorporated into the rest of the organism as it grows.
In case you don't remember, the **blastopore** is the first 'pore' created during gastrulation, the inside of which is called the *endoderm*.
Usually this pore penetrates through the whole organism to create the 'tube' that makes up the digestive system.

What is a Protostome?

Protostomes are all the species which develop a **mouth** out of the blastopore.

What is a Deuterostome?

Deuterostomes are all the species which develop an **anus** out of the blastopore. This is the one that we *Homo sapiens* are a part of.

WHAT IS EMBRYONIC DEVELOPMENT?

What?

Embryonic development is what happens when two sex cells come together to produce a creature.
This is only a very 'generic' overview of the whole process.
Slight variations in certain parts of this process help us to determine what the evolutionary tree for metazoans would look like.

How does it start?

At first, there's just a **zygote**. A zygote is a single *diploid* cell that has been fertilized and is now ready to start growing into a creature.

WHAT IS EMBRYONIC DEVELOPMENT? (cont)

How does a zygote grow?

The zygote starts off by 'cleaving' itself into more cells through **mitosis**. This doesn't make it much bigger just yet, since it's literally just splitting itself into more cells, and not really adding much mass.

Eventually, the zygote ends up as a ball of several cells, now known as a **morula**.

What is blastulation?

The next thing that happens is called **blastulation**, which is just when a morula becomes a blastula. This involves creating a hollow space inside the morula known as a **blastocoel**.

At this point, the blastula is only made of a **single layer** of cells.

What happens next?

A blastula then becomes a **gastrula**, which is when some cells move inwards to make a cavity, which will be either the mouth or anus of the growing lil creature.

At this point, some cells have started to differentiate and become either the *ectoderm*(outside), the *endoderm*(inside), or the *mesoderm*(in the middle). Not all types of animal have all three at this stage!!

After that, organs start to develop, and it becomes much more specific to the species.

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