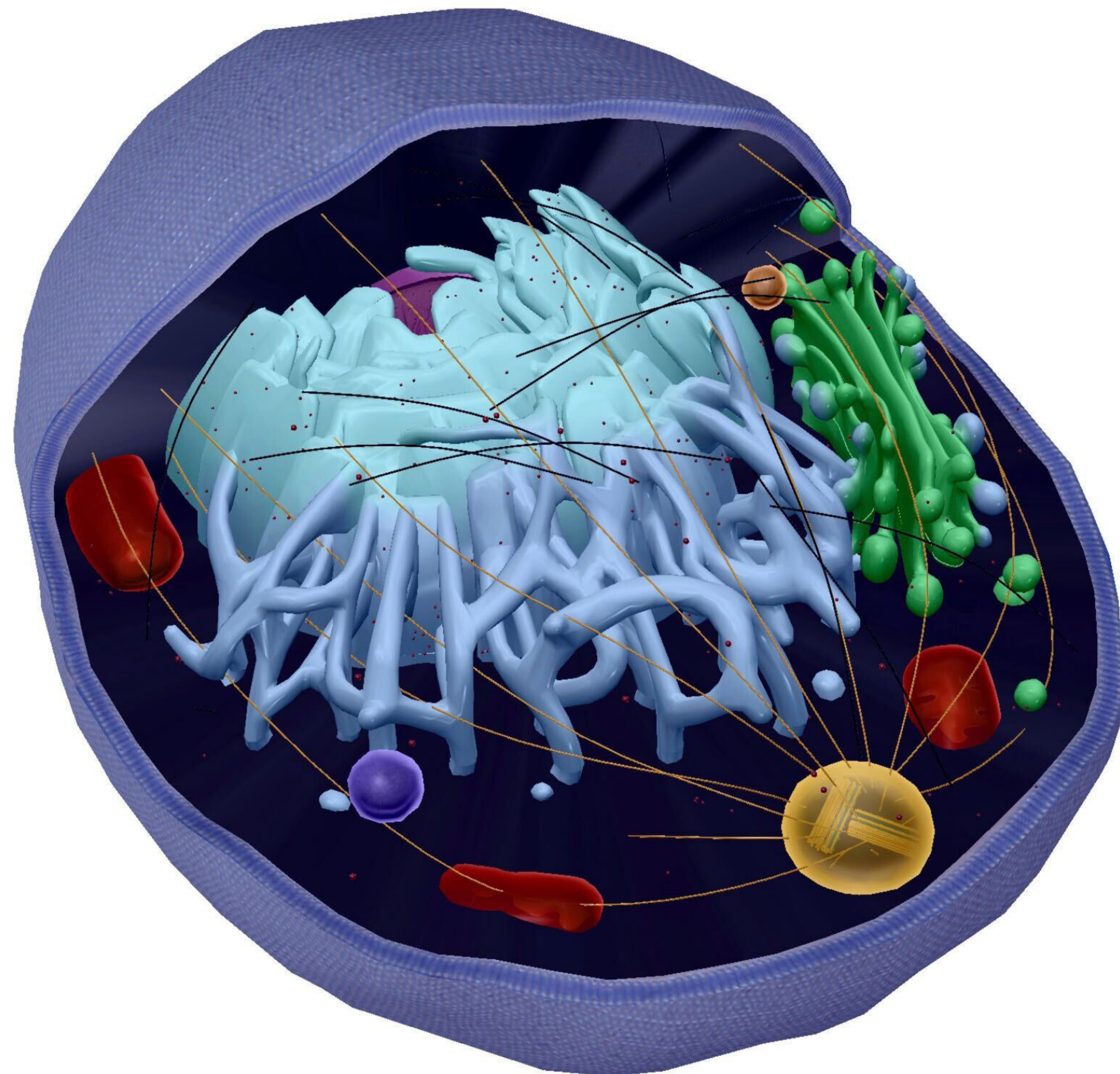


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# Back to Basics: The Human Cell

Sweat the small stuff with this study guide on the various parts and functions of a eukaryotic cell.



There's a great line in the 1992 animated movie *Fern Gully* that really encompasses this eBook:

**"We're worlds within worlds."**

Despite their small size (you'd need a microscope to get a good look), cells are amazingly complex and constantly busy.

Your entire body is made up of cells, all programmed to perform specific functions.

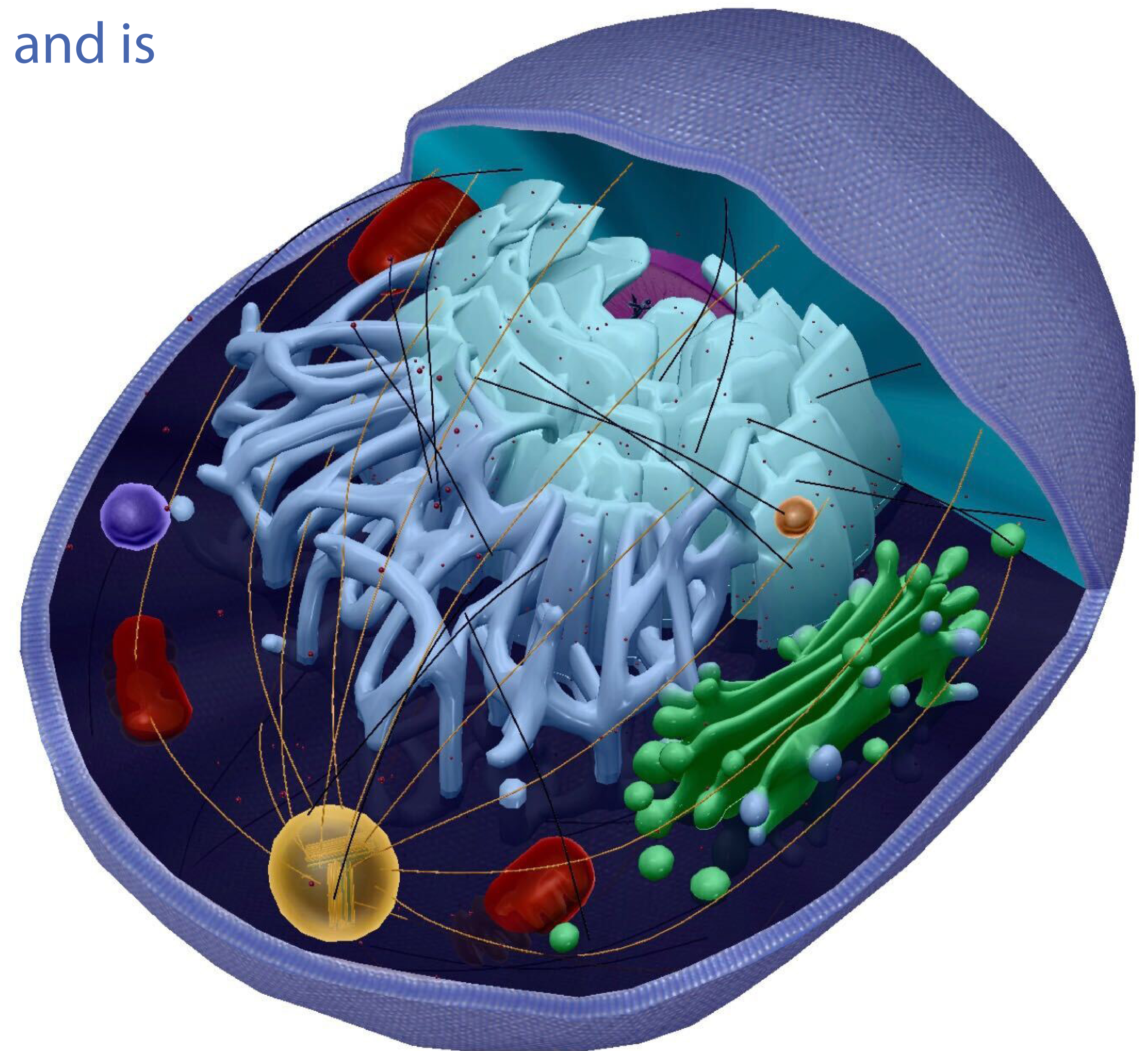
**Let's take a look at the inner workings of one!**

Let's begin with **cytosol**, which is a gel-like substance that is mostly water, with various dissolved and suspended components, like glucose, proteins, and amino acids.

Cytosol is also known as **intracellular fluid (ICF)** and is the fluid component of cytoplasm.

### Fun Fact:

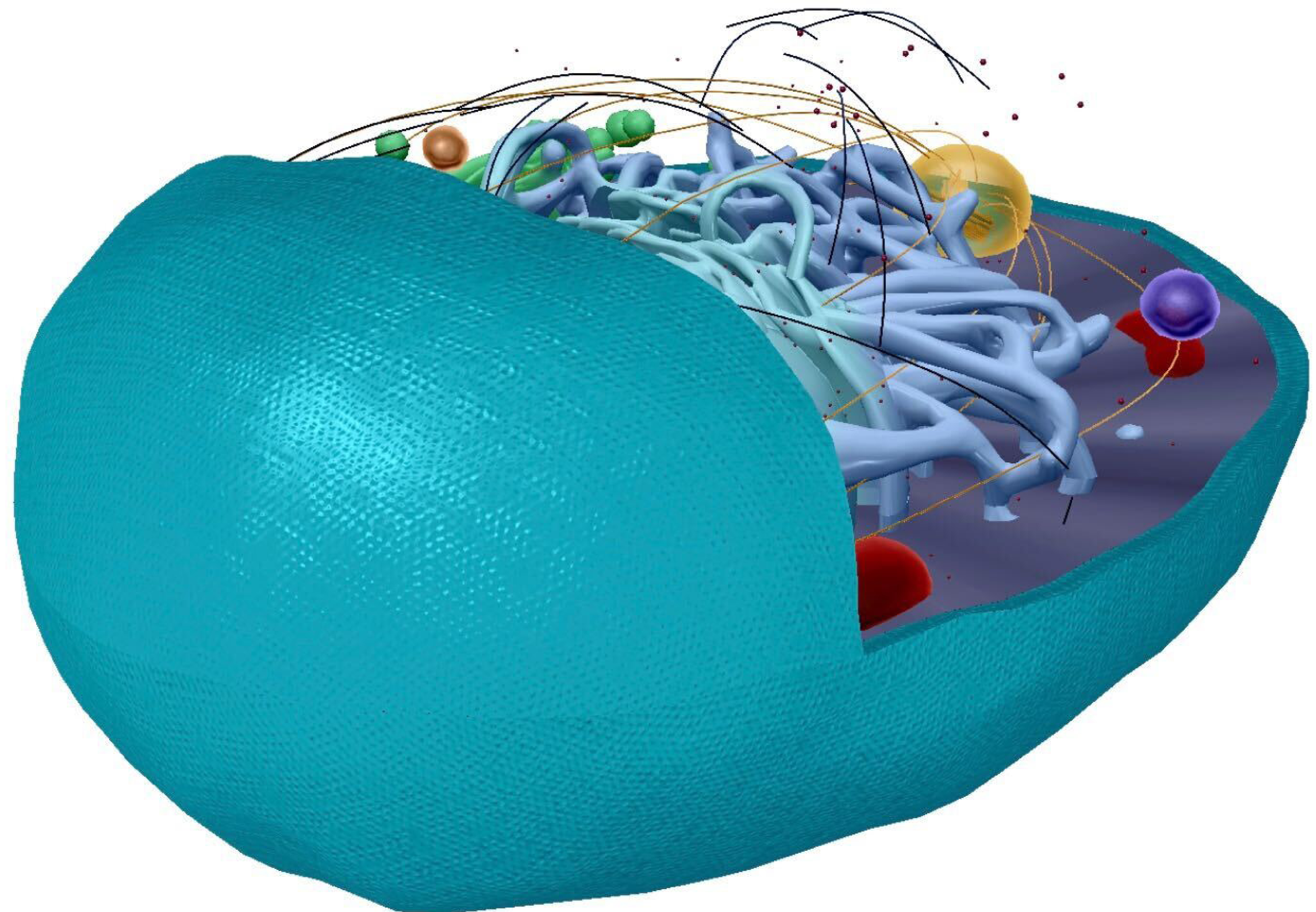
While it is known that cytosol is mostly water, what isn't known is its structure and properties within cells.



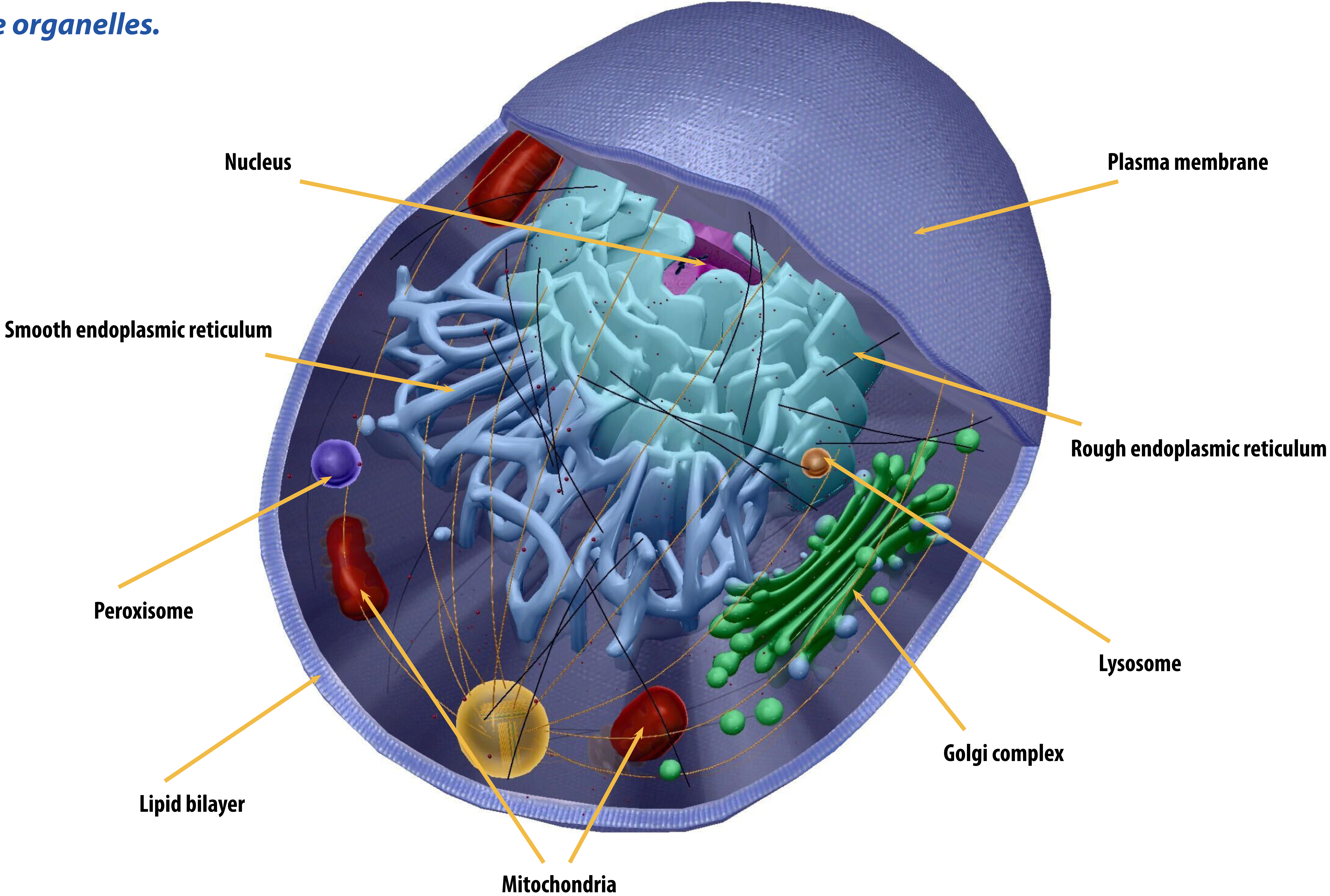
The **plasma membrane** is a flexible, semi-permeable barrier that separates the cell interior from its surroundings.

The barrier is constructed of a phospholipid bilayer, and its components allow for certain materials to pass in and out of the cell.

Proteins embedded within the phospholipid bilayer carry out the specific functions of the plasma membrane, including selective transport of molecules and cell-cell recognition.



*The organelles.*



The **nucleus** is a large organelle that contains the cell's genetic information.

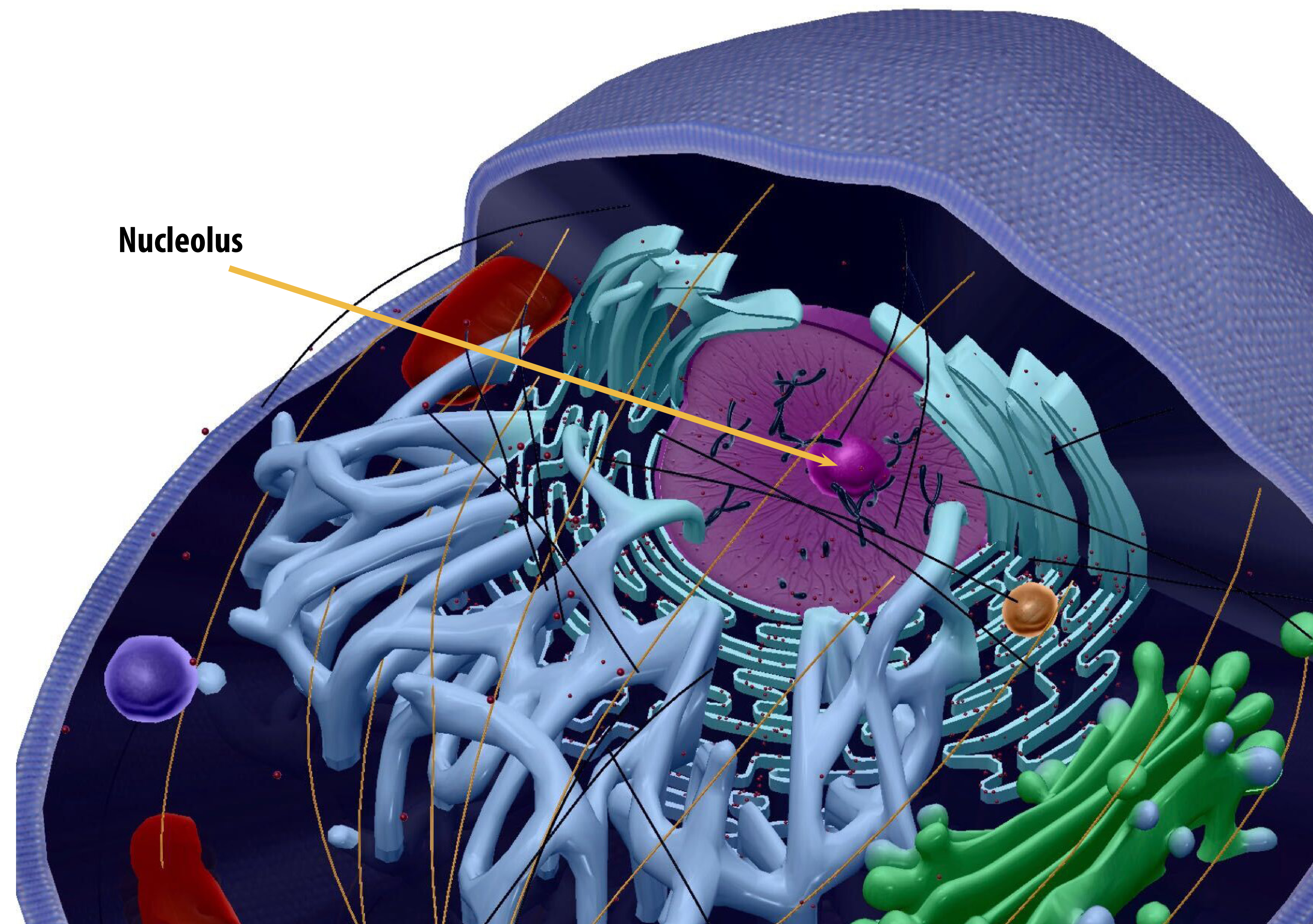
The **nucleolus** is the largest structure within a nucleus, and contains a cluster of protein and ribonucleic acid (RNA). It is involved with ribosome formation and the ribosomal RNA synthesis.

## Fun Fact #1:

Most cells have at least one nucleus, and some (like mature red blood cells) have none at all!

## Fun Fact #2:

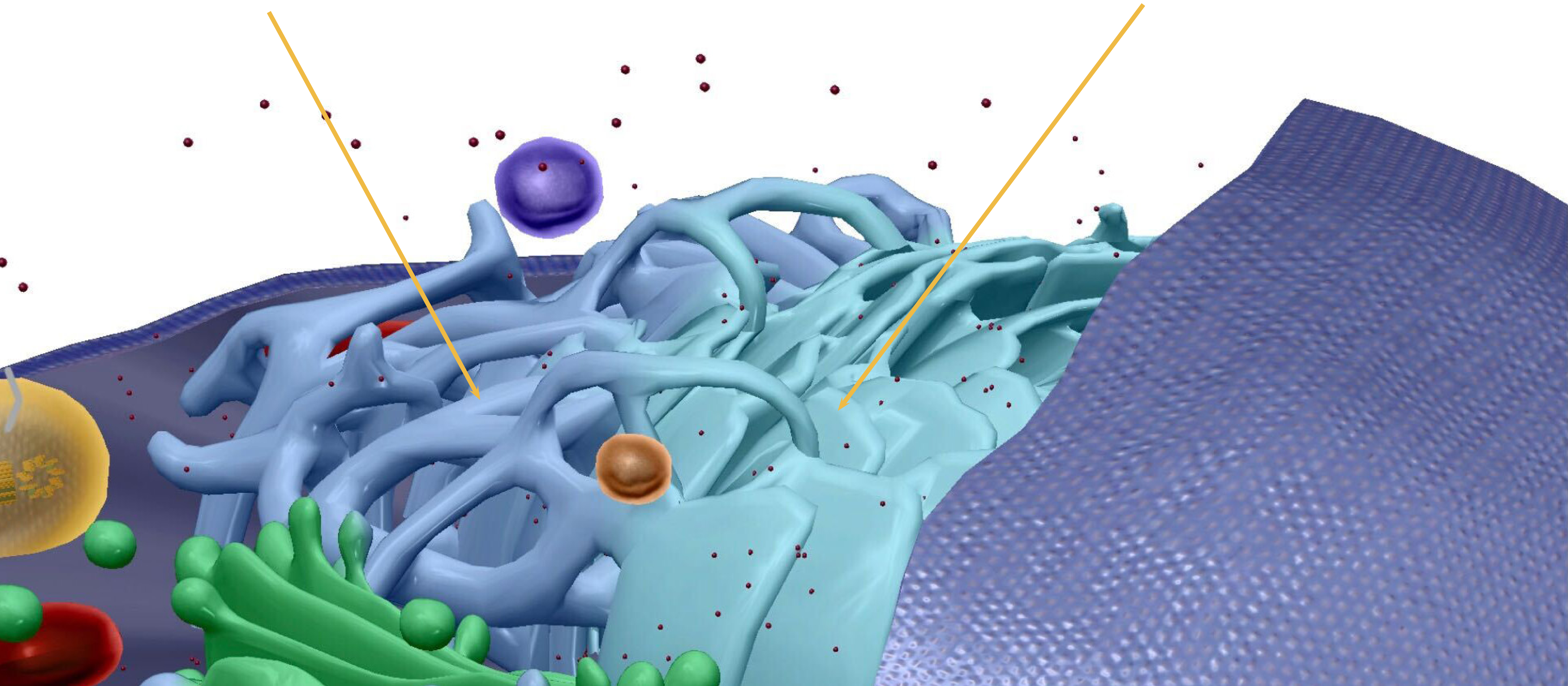
Nucleus is Latin for "little kernel" and its first recorded use in terms of cells was in 1831.

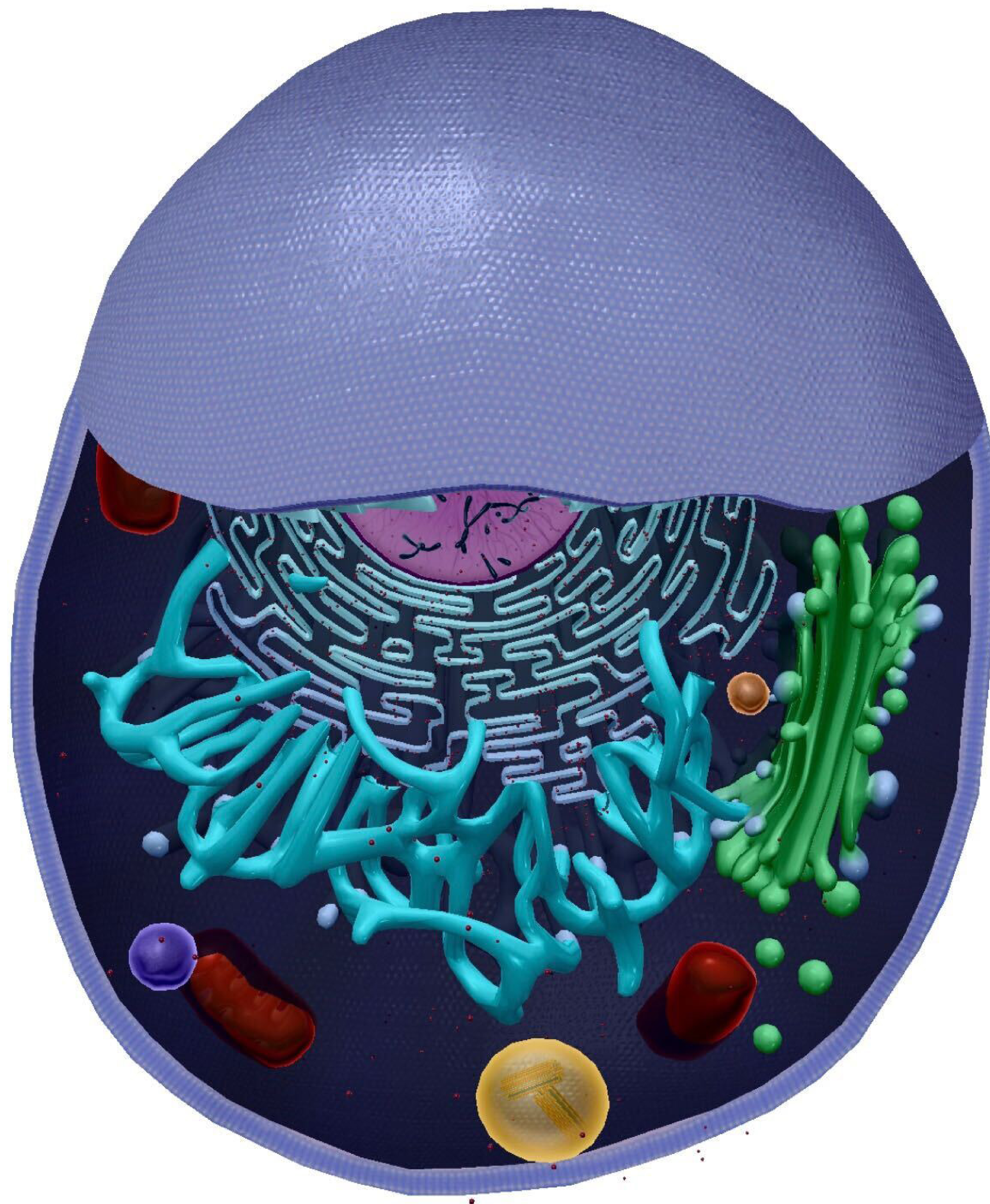


The **endoplasmic reticulum (ER)** is a network of membrane-enclosed sacs that package and transport materials for cellular growth and other functions.

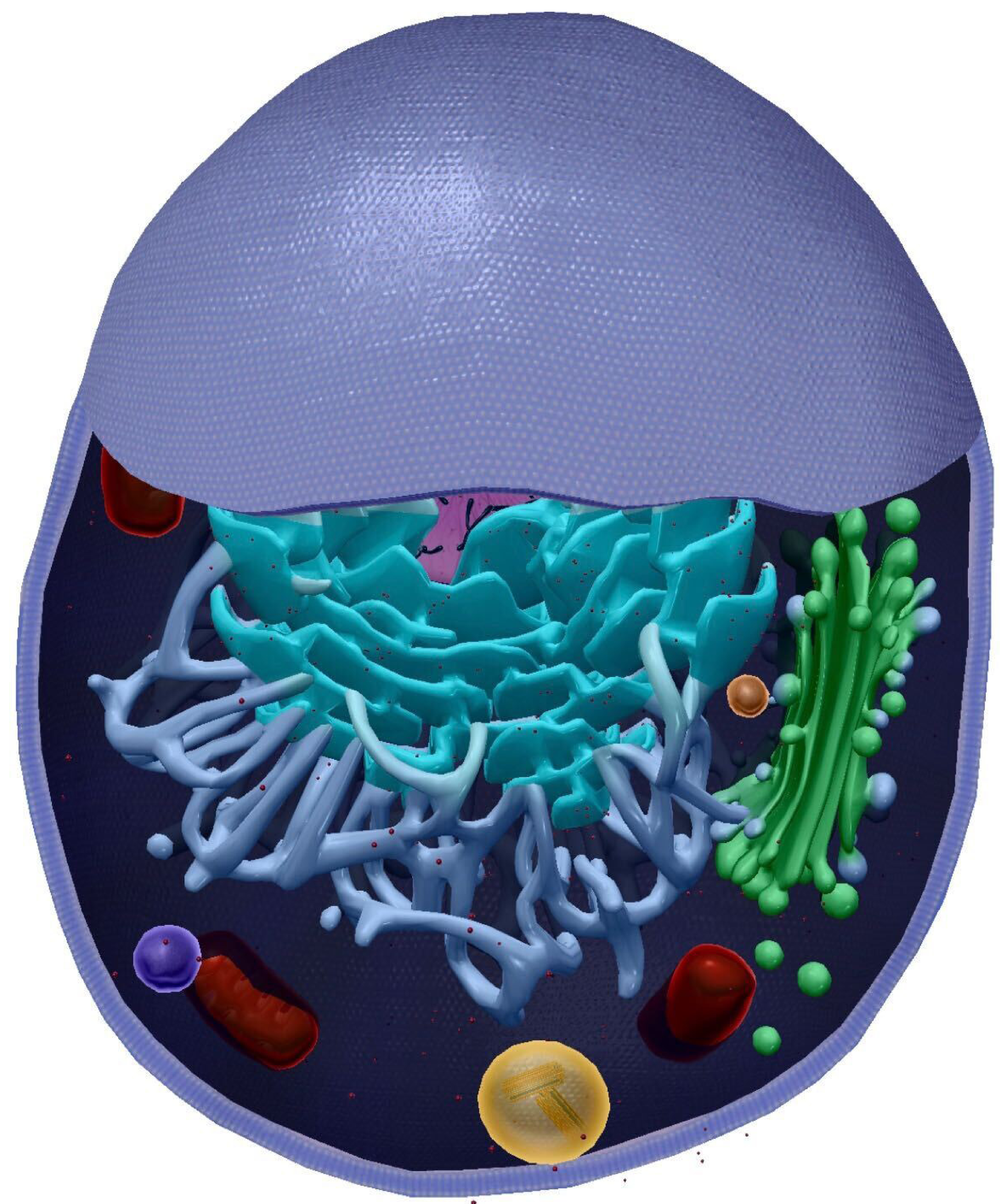
Smooth endoplasmic reticulum

Rough endoplasmic reticulum





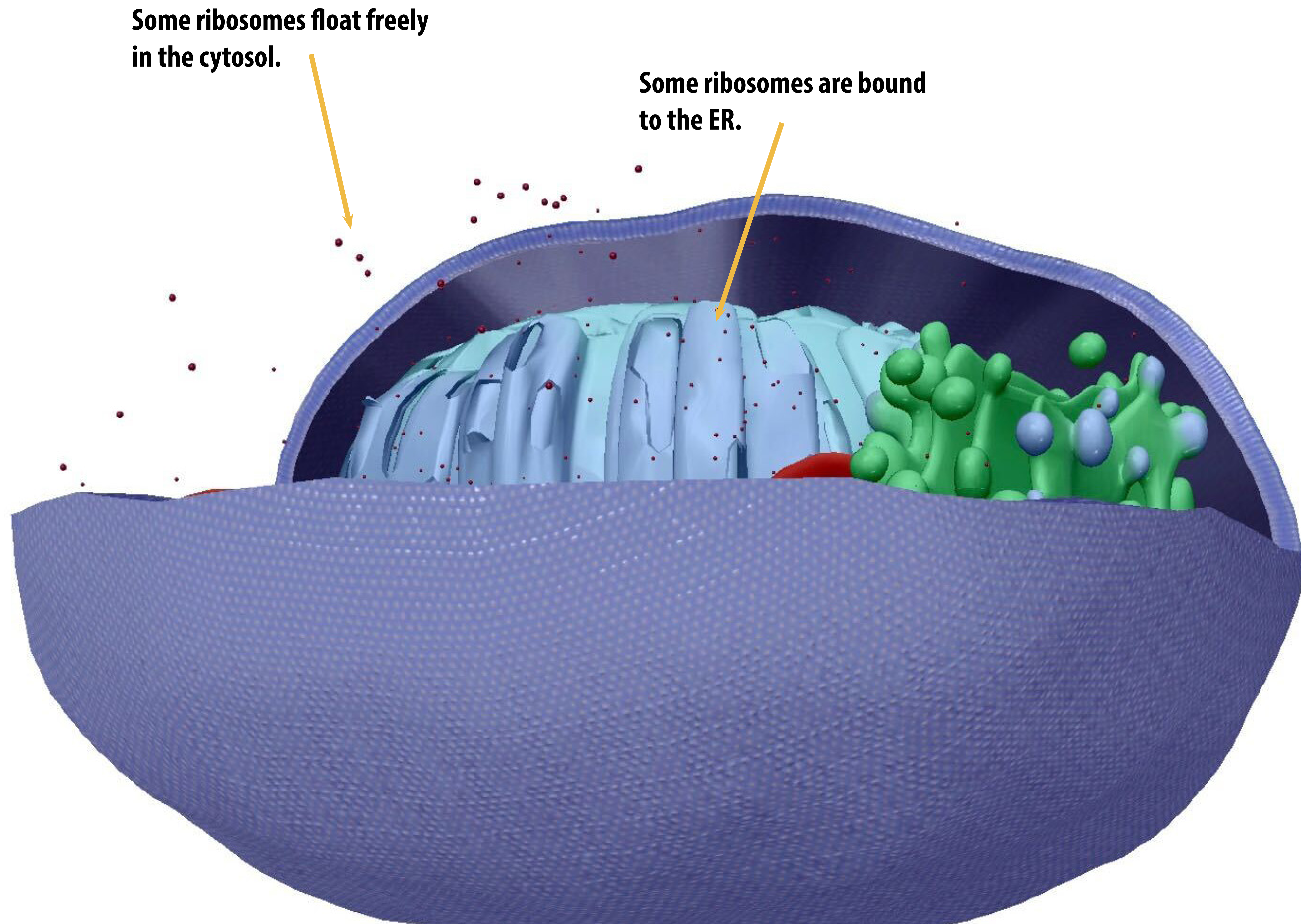
**Smooth ER** extends from the rough ER and synthesizes lipids, steroids, and phospholipids, as well as many other metabolic processes.



**Rough ER** plays an important role in the packaging and synthesis of proteins. It is “rough” due to the ribosomes that stud the ER membrane.

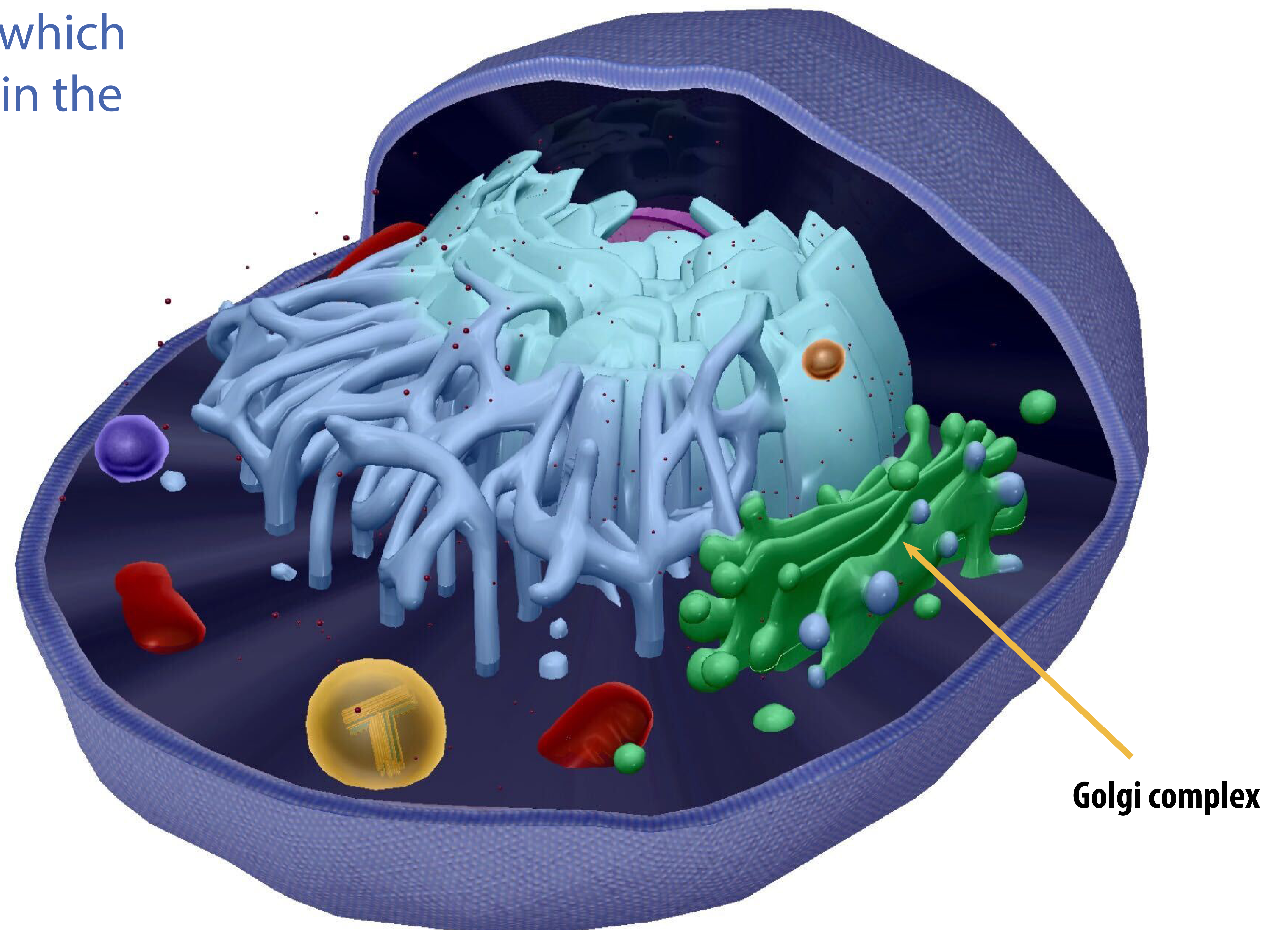


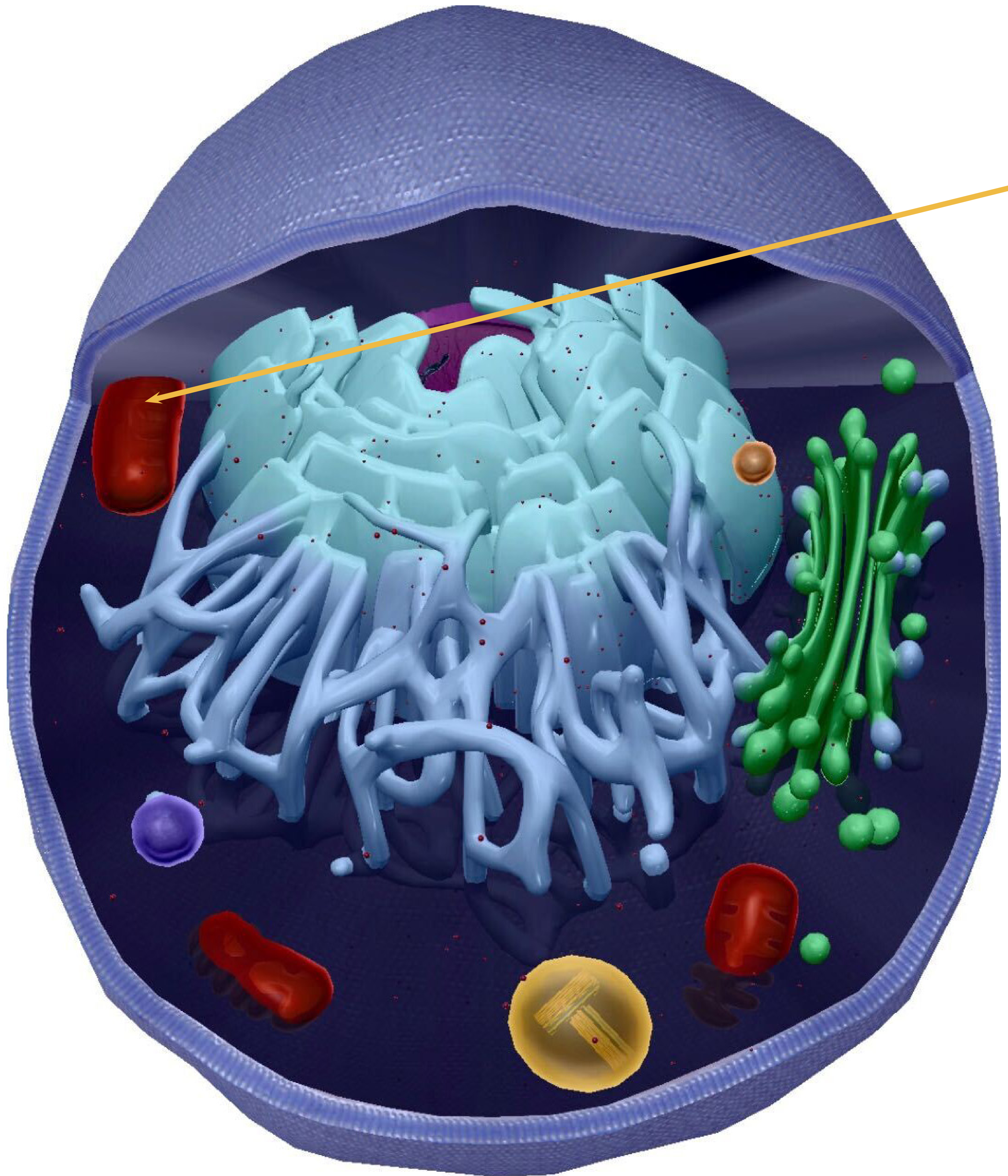
**Ribosomes** contain more than 50 proteins and a high concentration of ribosomal RNA. Their main function is protein synthesis; these proteins are used by the cell, the plasma membrane, or structures outside the cell.



The **Golgi complex** consists of 3 to 20 curved cisternae (flattened, membranous sacs), and it acts as a processing hub for proteins produced in the endoplasmic reticulum.

Enzymes in the cisternae modify the proteins and pack them into **transfer vesicles**, which then transport them to different areas in the cell.



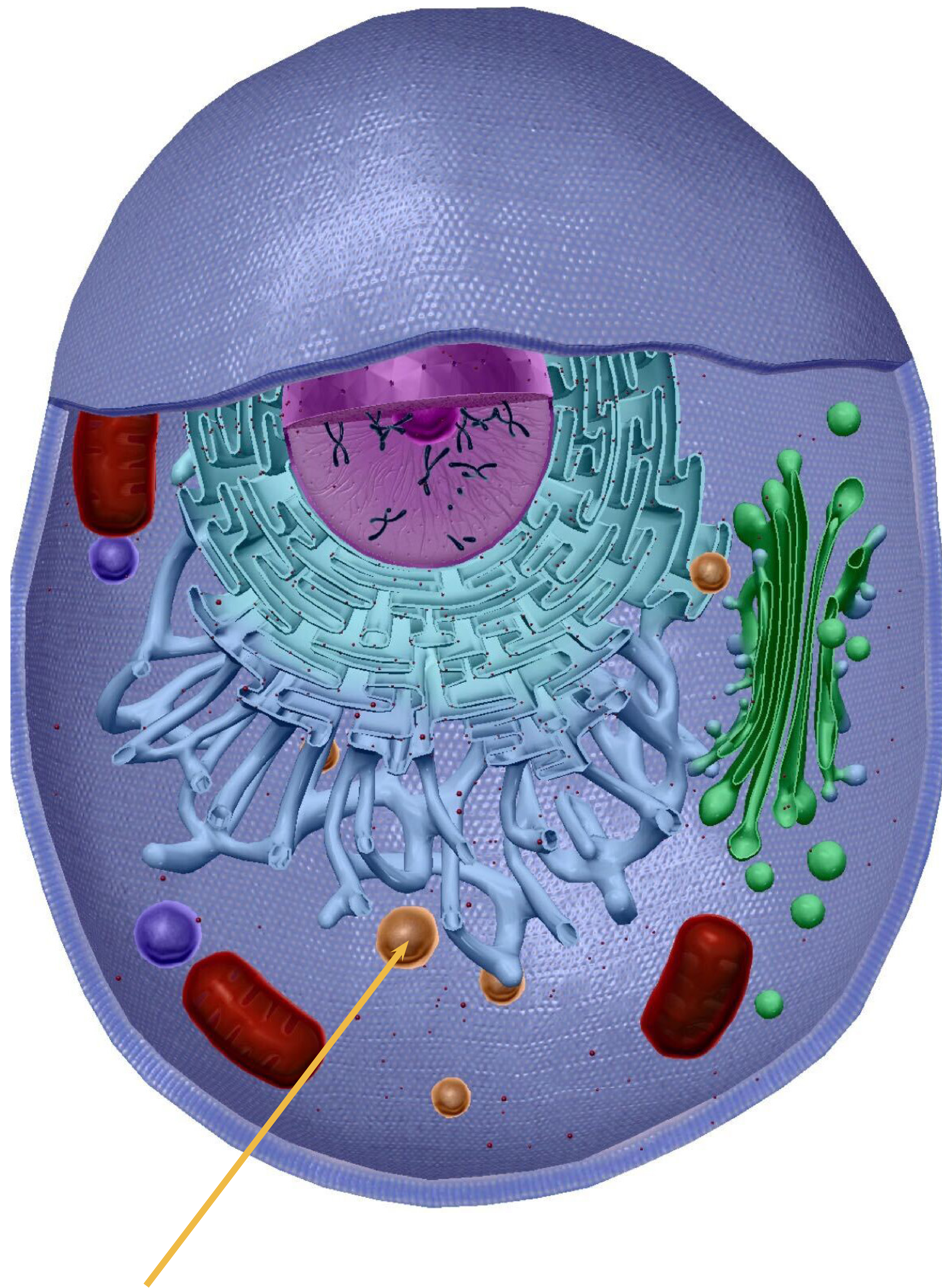


**Mitochondria** (sing. mitochondrion) are famously known as the powerhouses of a cell. Using the oxygen taken in by the cell, mitochondria produce ATP, a molecule used as fuel for energy.

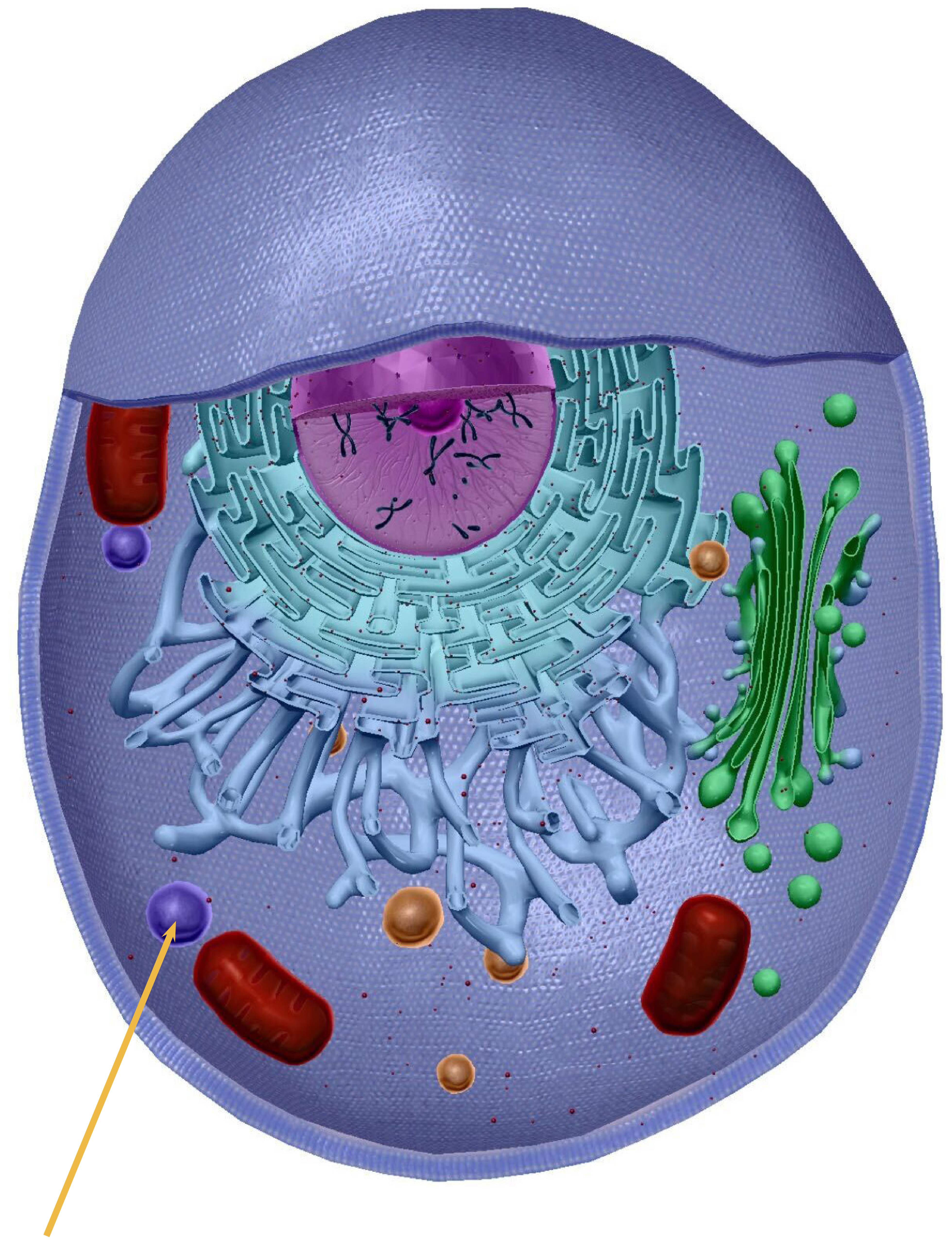
Depending on the type of cell and its function, there can be anywhere from a few hundred mitochondria to several thousand.

### **Fun Fact:**

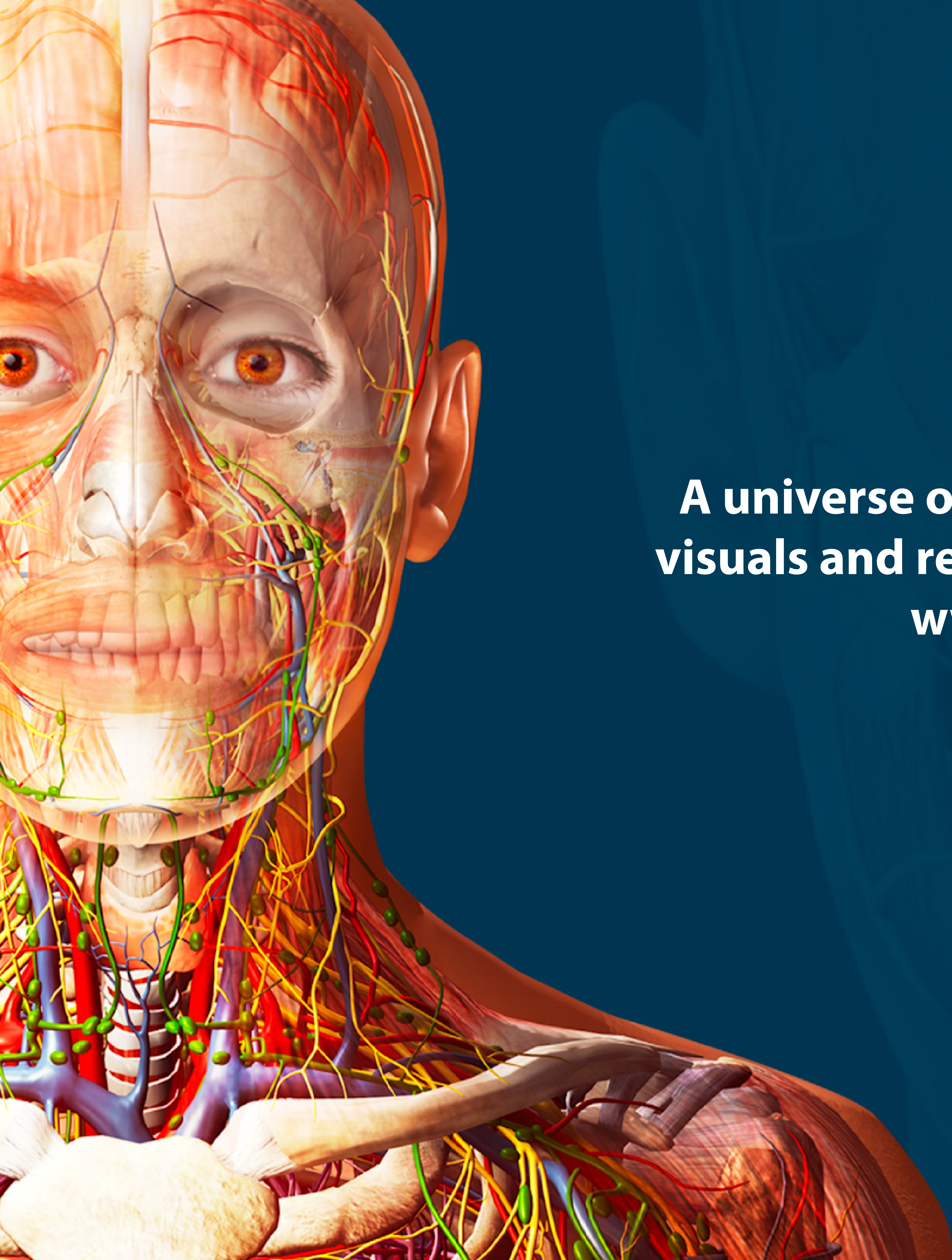
In Madeleine L'Engle's 1973 young adult novel *A Wind in the Door*, the main characters travel inside a mitochondrion named Yadah, and interact with fictional sentient structures called "farandolae."



**Lysosomes** contain digestive enzymes that break down substances consumed by the cell and recycle waste.



**Peroxisomes** process and neutralize toxins within the cell.



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