

What is Picobiology?

I'll answer that question for you!

Who are you?

I'm Picolun! The Picobiology mascot!

Picobiology is...

An academic discipline that attempts to understand any biological phenomena as chemical reactions driven by proteins.

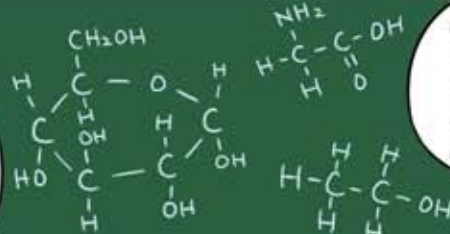
Driven by proteins? Chemical reactions?



Yeah, that's what most people think of when they hear 'proteins' and 'chemical reactions.'

Our bodies are made up of countless molecules that are always performing orderly chemical reactions.

That's what allows us to live and talk to each other like this.

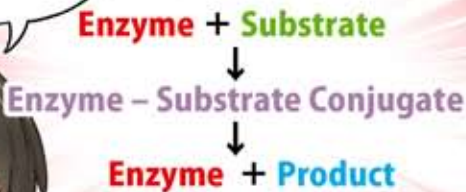


Now, there are proteins that get involved in those chemical reactions, aren't there?

Oh, I know! **Enzymes!**

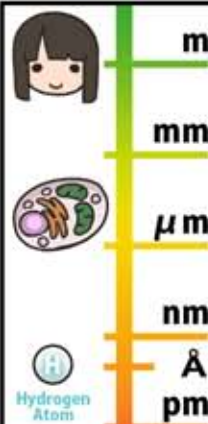
Enzymes are proteins too, right?

Yes. Chemical reactions require enzymes as catalysts in order to happen.



So that's what you meant by 'driven by proteins.'

But why is it called 'pico?'



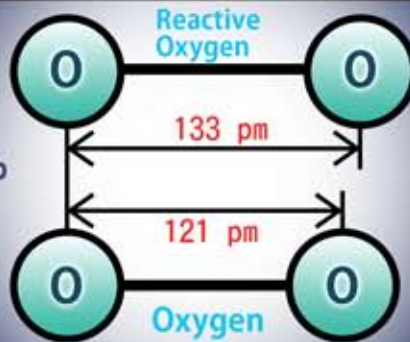
The pico in picobiology comes from picometers (pm). One picometer is 10⁻¹² meters.

Do you know about reactive oxygen?

The nemesis of all human skin! It's technically a super oxide created from two oxygen atoms, and written as O_2^- !!

Y-you really know a lot about it...

The difference between reactive oxygen and oxygen, which we all need to survive, is **only a 12 pm difference in bond distance between the two oxygen atoms.**



That's all it takes to make their chemical natures completely different.

I see! So the slightest little detail can completely change a chemical reaction, huh?



In picobiology, do they possibly check the makeup of proteins at pm levels?

That's right. Proteins are made up of a lot of amino acids, thousands and tens of thousands of atoms all accurately organized 3-dimensionally.

When certain molecules bind to the active sites,

At the active site, changes occur to **both the proteins and the molecules, at the pm level.**

The particularly important part is **the active site**, which drives the chemical reactions.

That's how the chemical reaction happens.

Which means that...

If we could accurately measure the differences in bond distances of atoms, we would be able to figure out how chemical reactions work?

Exactly!

But how can we measure them?

First, we need to look at the protein atoms' 3-dimensional positions.

In order to do that, we perform X-ray diffraction analysis. We can actually do it at just nearby facilities.



Infrared spectroscopy has been around for a while, right?

That's true. But back then, it was technologically difficult for it to be used on proteins.

After many years and lots of devising, it can finally be used in our department.

Oh. So other facilities can't do this sort of thing?

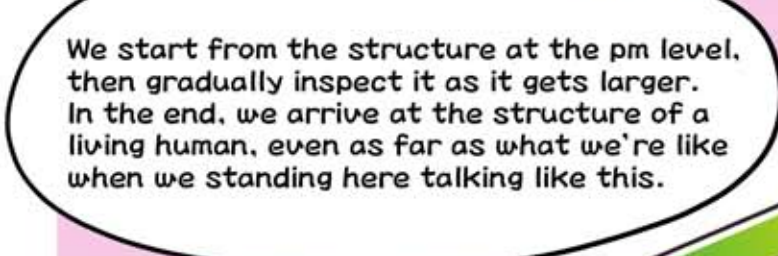
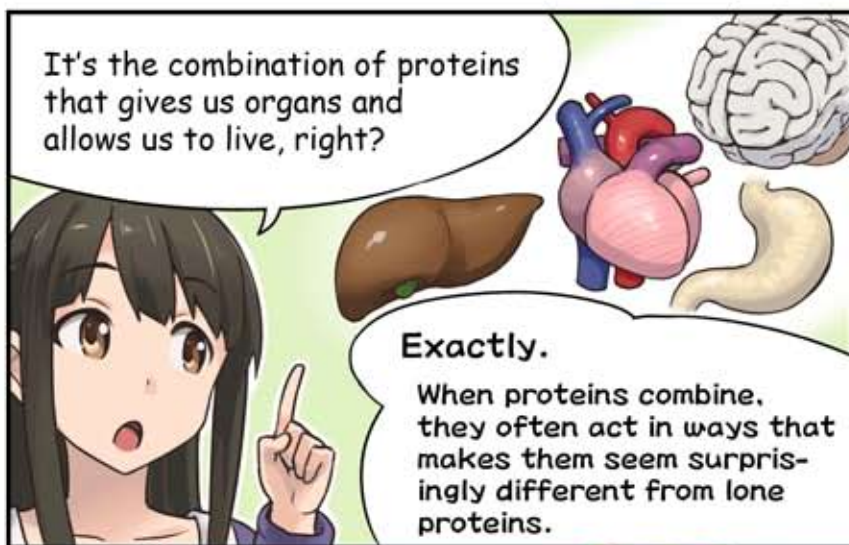
Right!

We use SPpring-8, SACLA and a uniquely-developed infrared device in combination to inspect the makeup of proteins at the pm level...

The University of Hyogo is the only place where it can be done!

I see... But Picolun.

Will learning about each protein's makeup really help us learn more about biology?



Gwoooooosh

