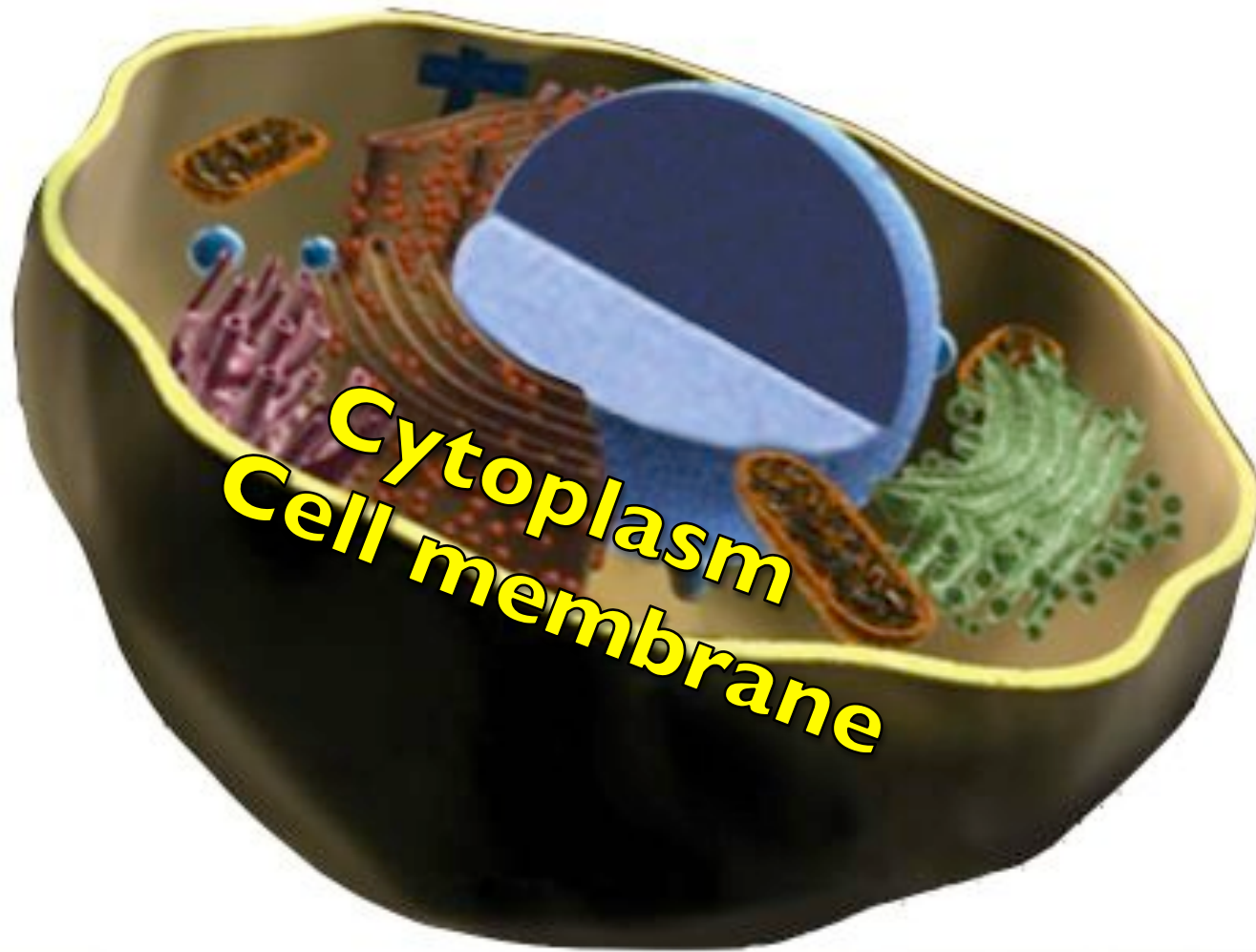


# Membranes

A rap lecture by

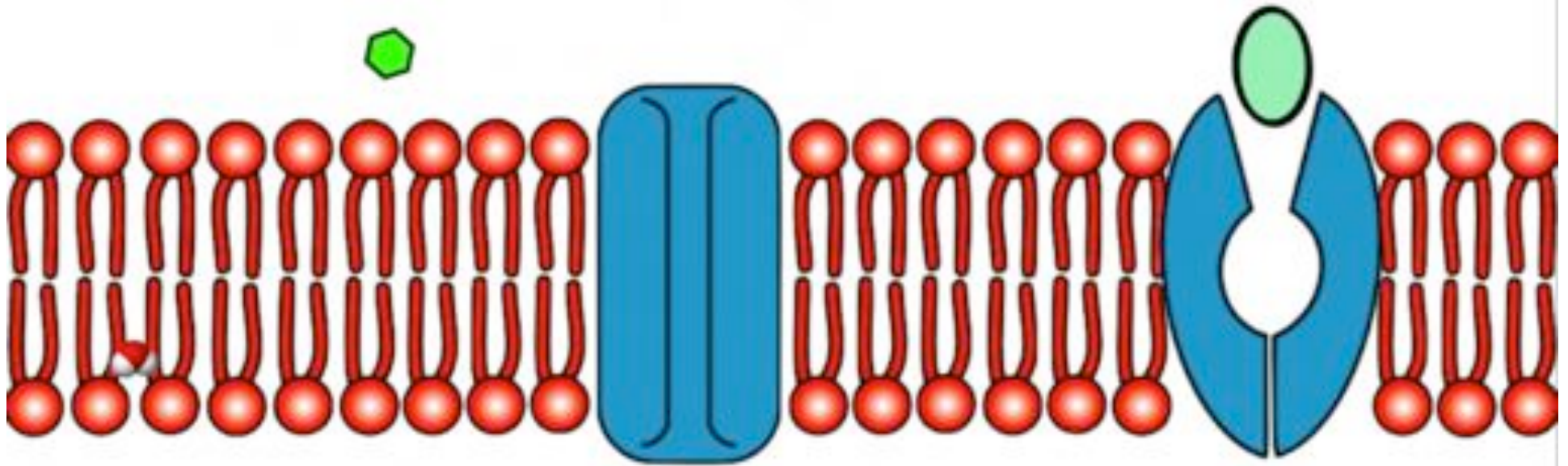
**Glenn Wolkenfeld**

[www.sciencemusicvideos.com](http://www.sciencemusicvideos.com)



If you're in a cell's cytoplasm heading outside,  
Your last stop's a barrier 8 nanometers wide  
The cell membrane, our subject for today  
It's as basic to life as DNA

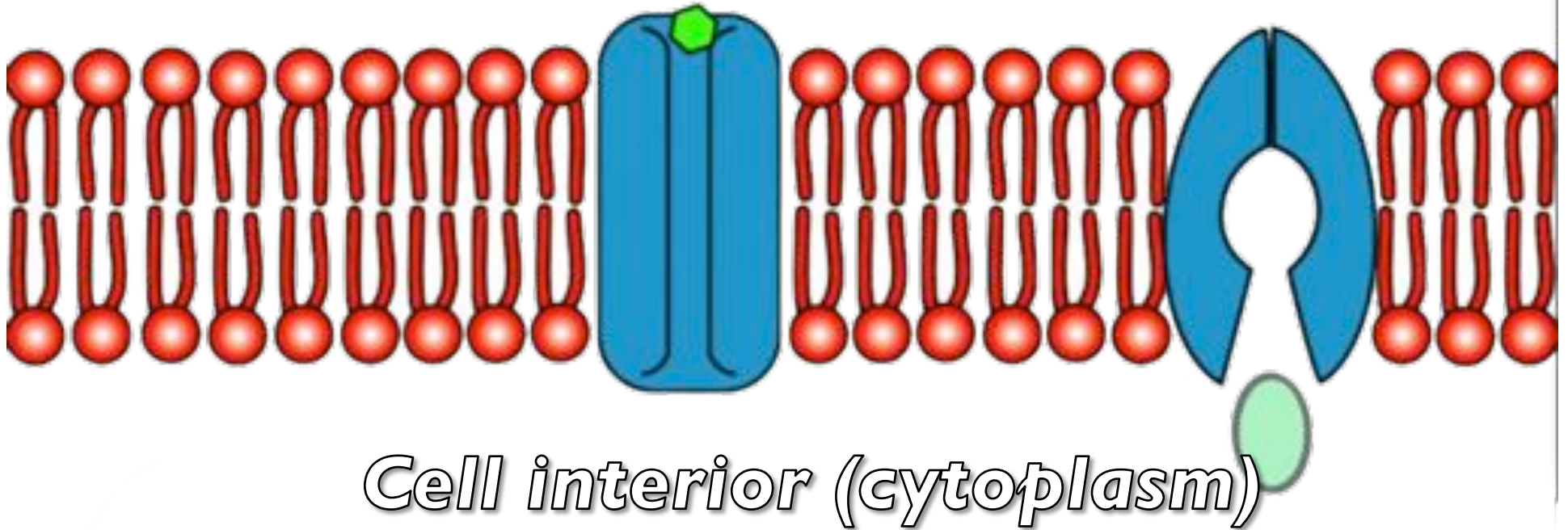
*Cell exterior*



*Cell interior (cytoplasm)*

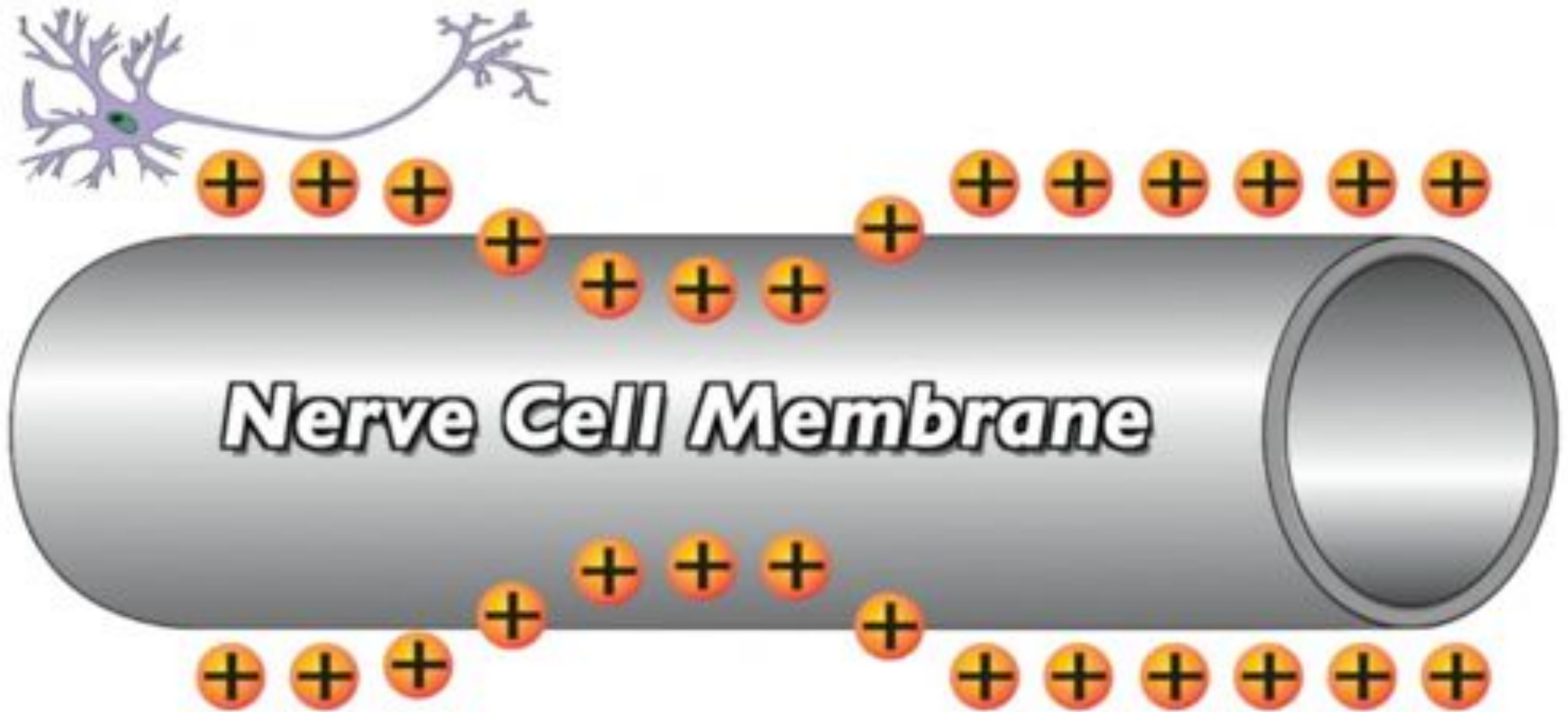
It's selectively permeable (like a border patrol)  
Of a country it maintains control

*Cell exterior*

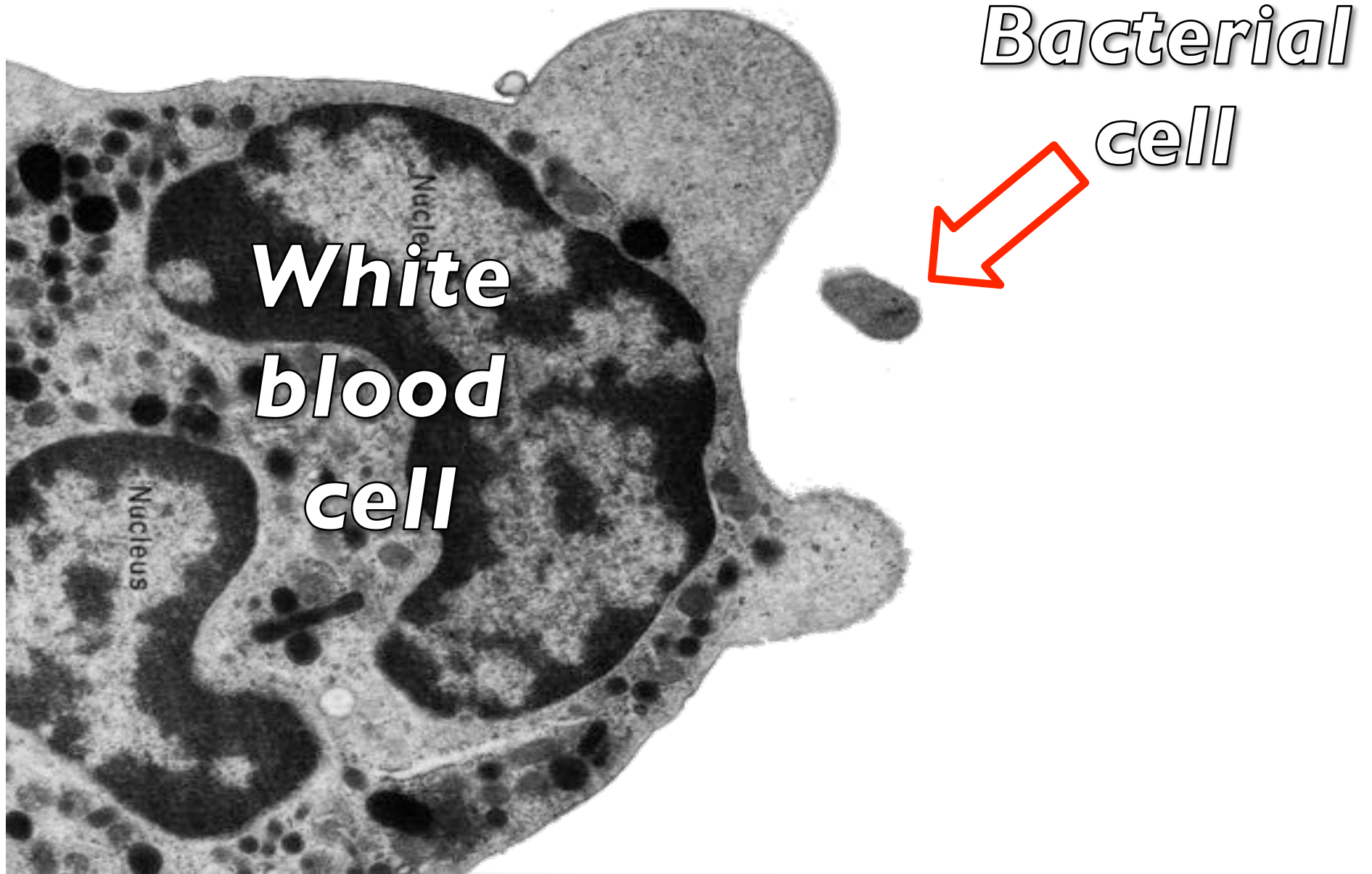


*Cell interior (cytoplasm)*

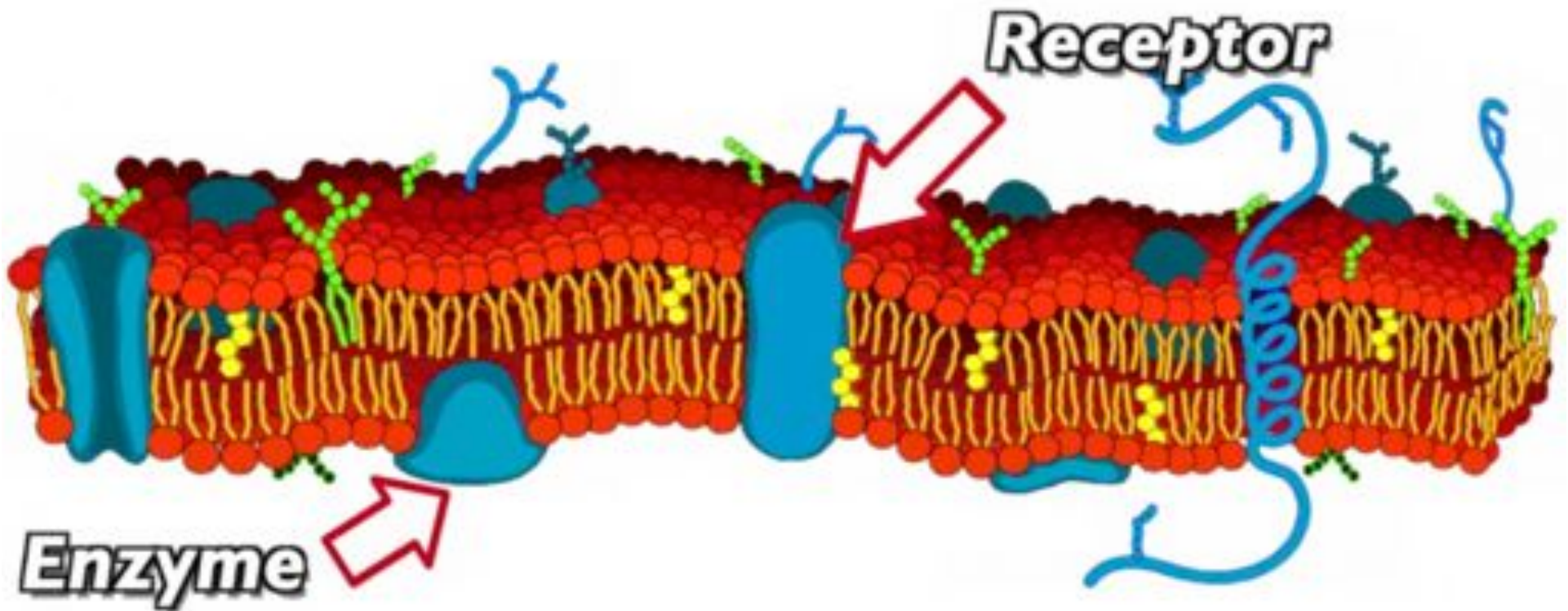
Selecting what leaves,  
and what gains entry,  
It's a guard, bouncer, watchman,  
patrolman or sentry



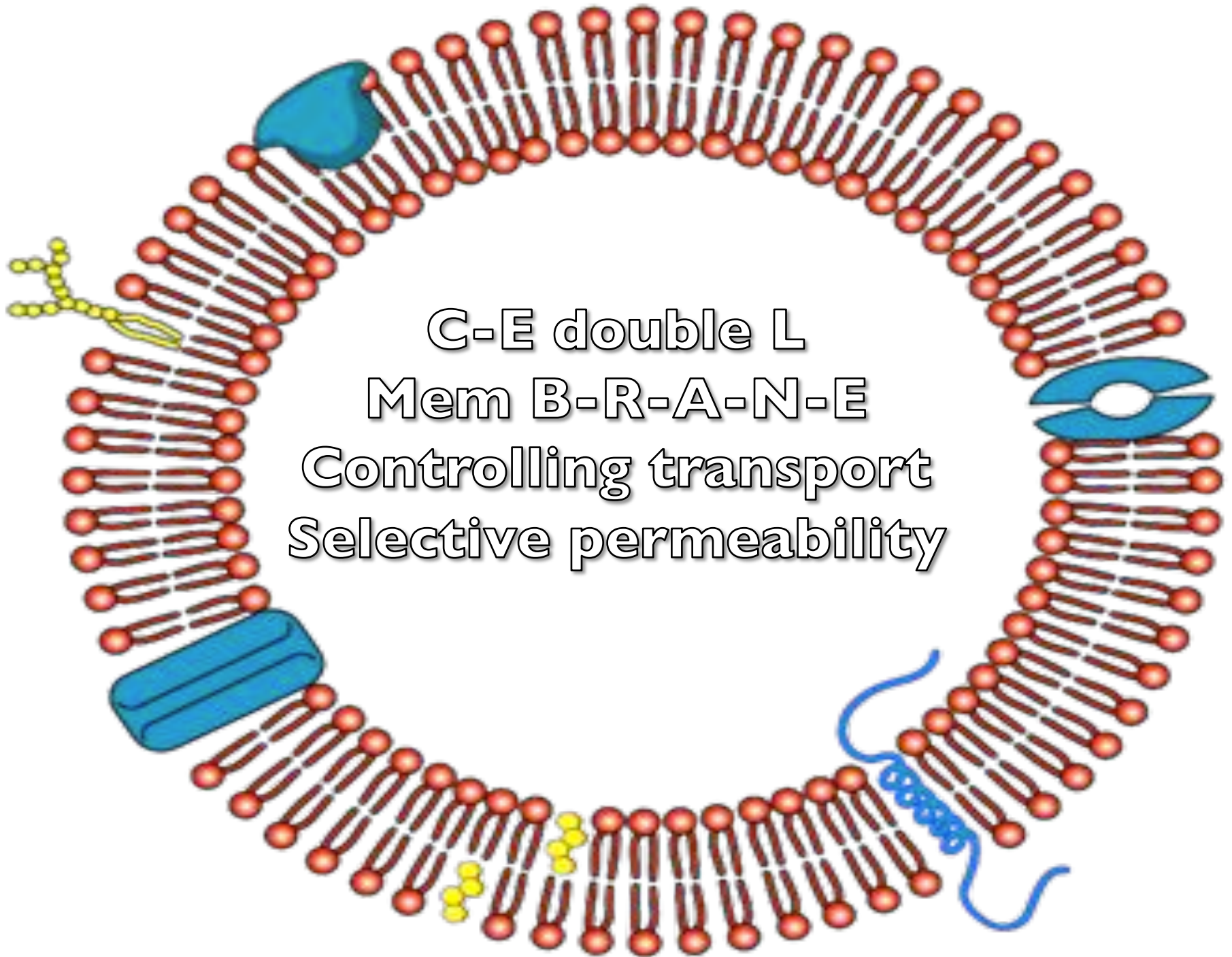
But not just a guard,  
It sends signals in nerves



White blood cells use their membranes  
To eat germs like hors d'oeuvres

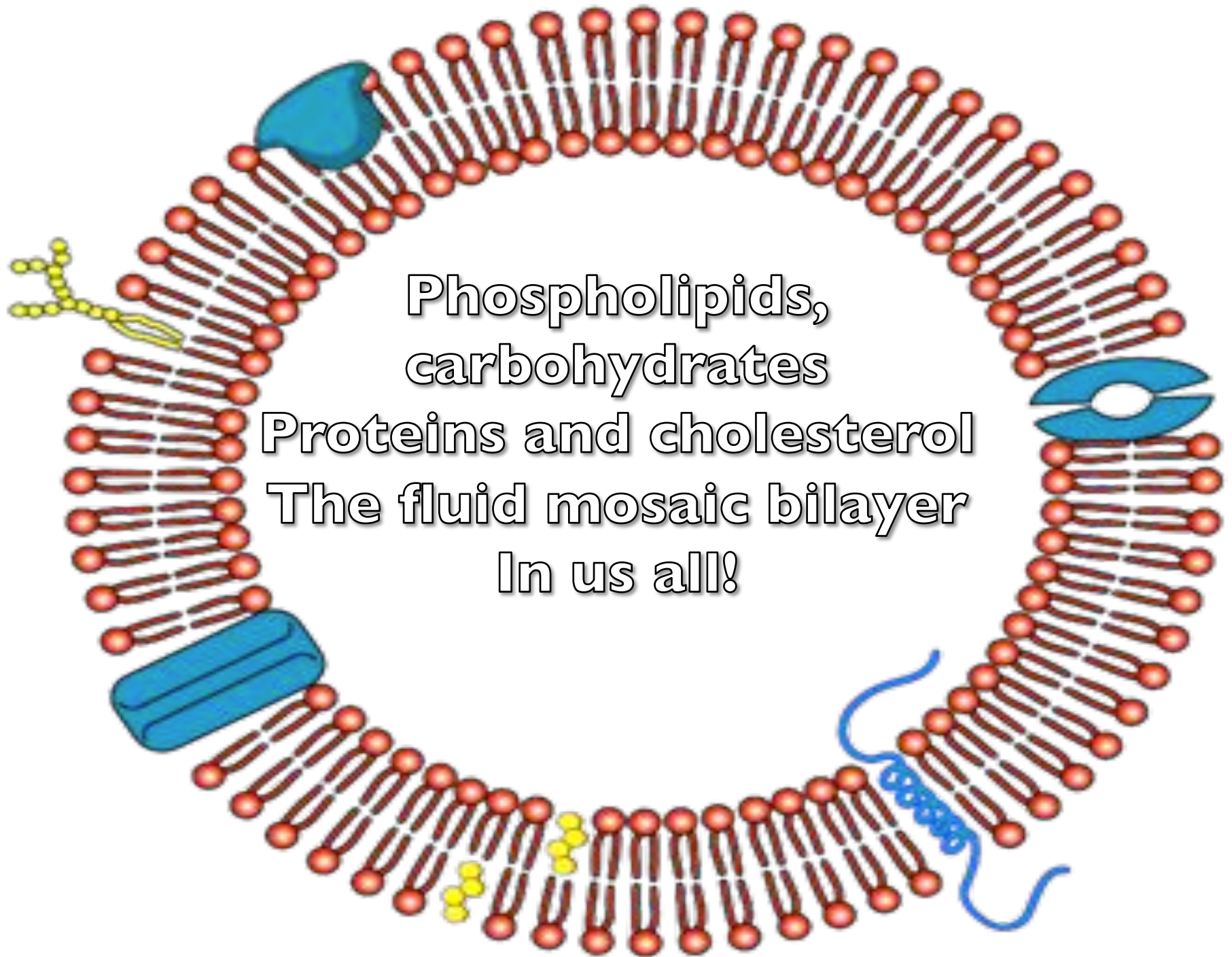


Enzymes have receptors,  
enzymes and junctions,  
So what kind of structure  
can have all these functions?



C-E double L  
Mem B-R-A-N-E  
Controlling transport  
Selective permeability





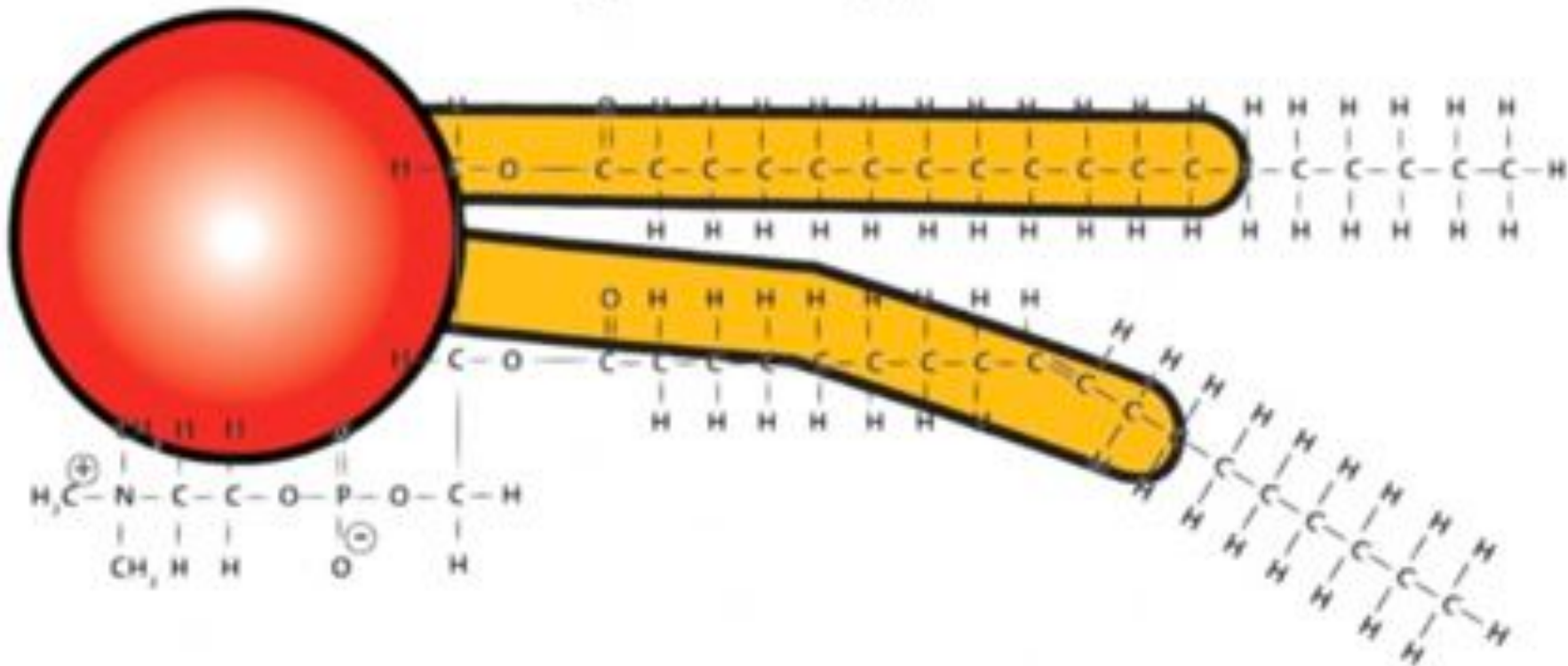
Phospholipids,  
carbohydrates

Proteins and cholesterol

The fluid mosaic bilayer

In us all!

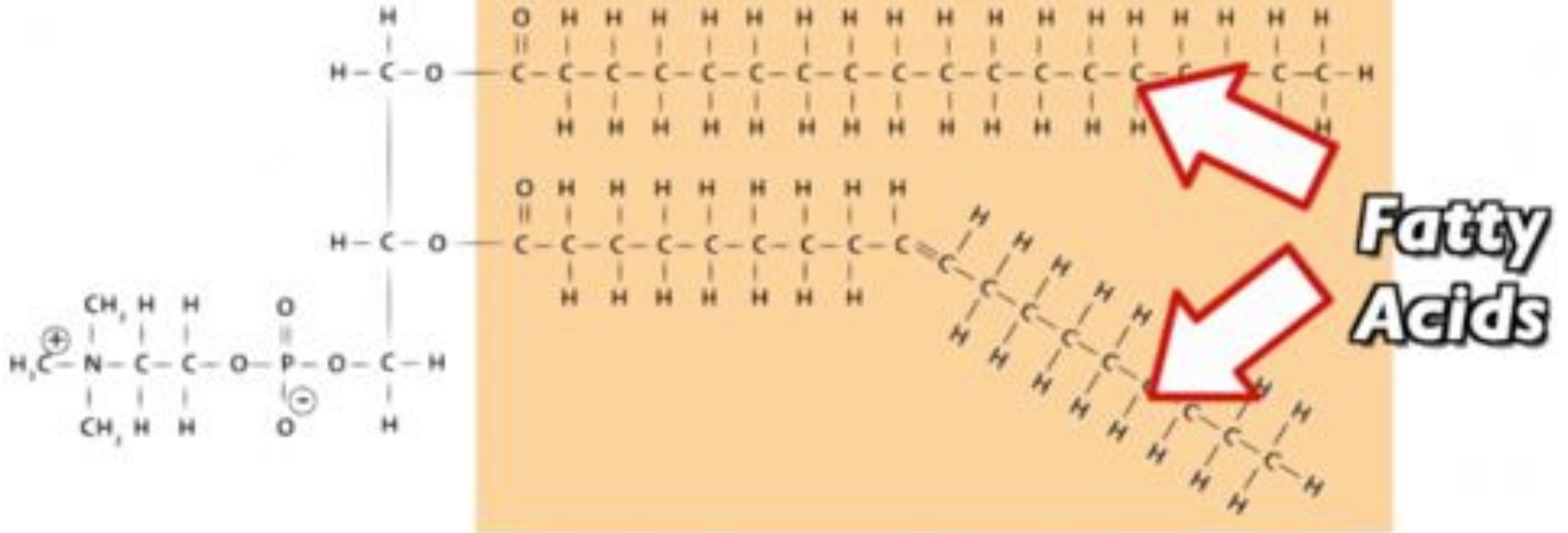
# Phospholipid



So let's take a look at what makes up the membrane  
Phospholipids rule in this domain  
In fact membrane structure emerges directly  
From phospholipids' chemical properties.

**HEAD**

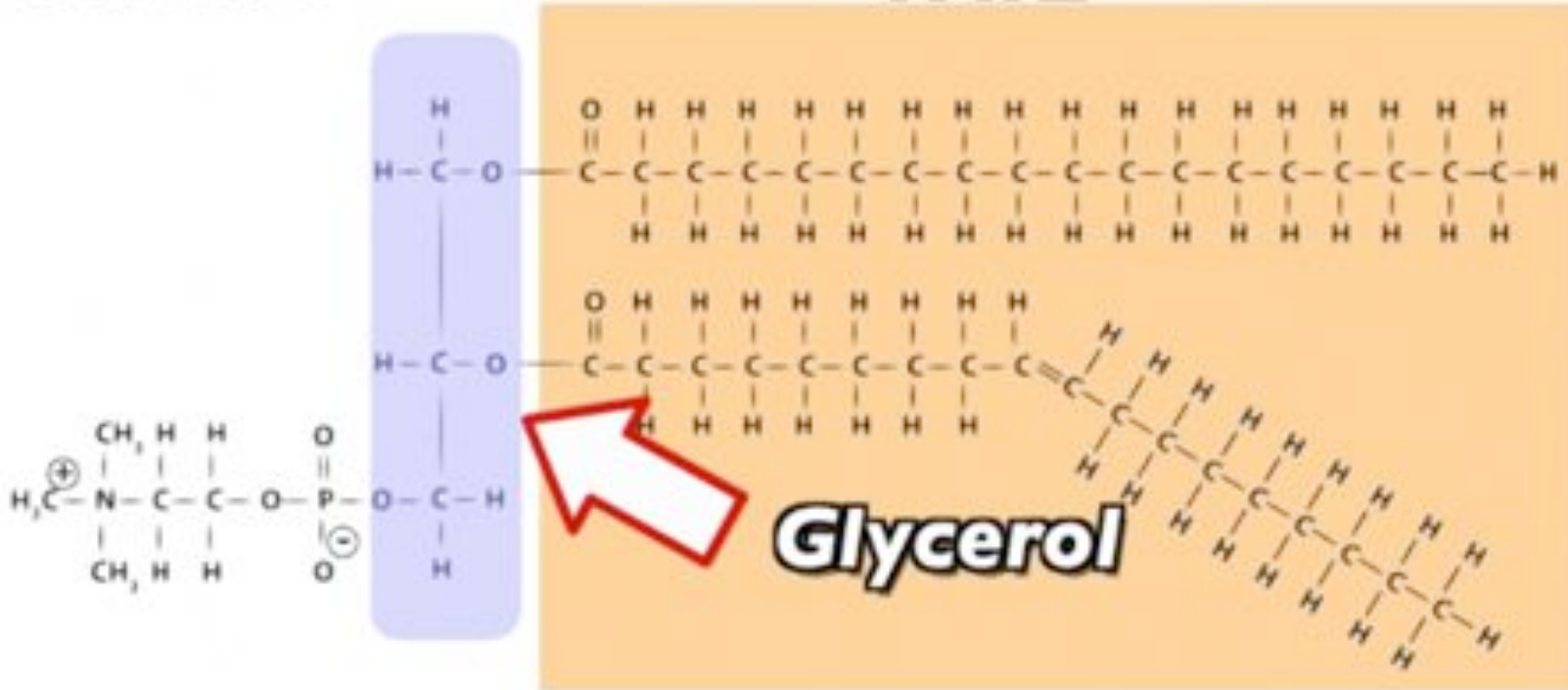
**TAIL**



There's a head and a tail on every phospholipid  
The tail's two long chain fatty acids

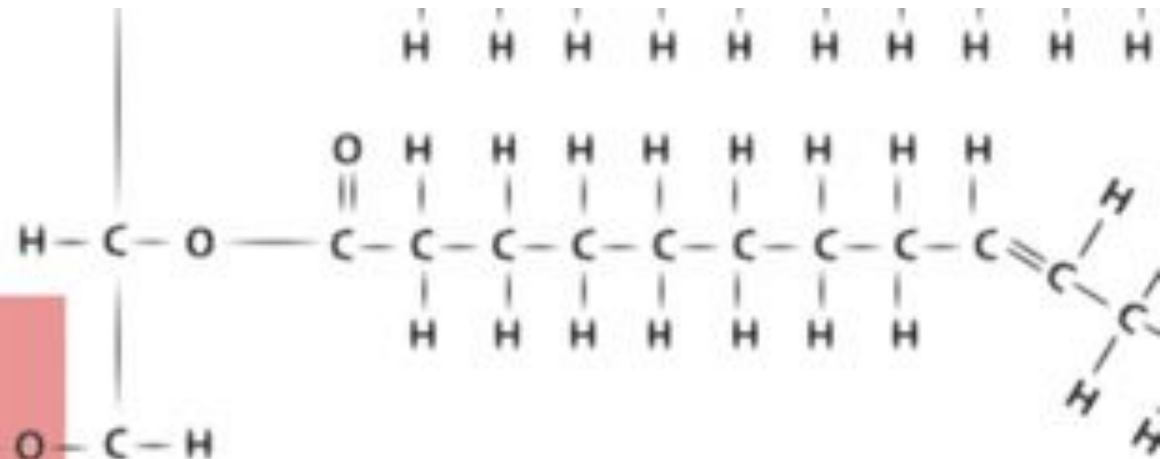
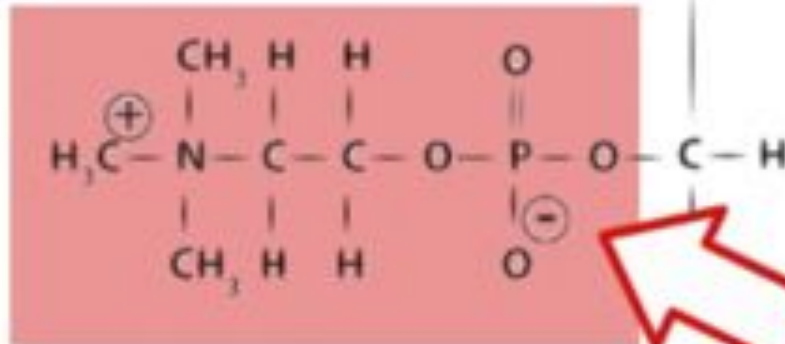
**HEAD**

**TAIL**



Bound to a glycerol it's made to order  
The tail's non-polar hydrophobic fears water

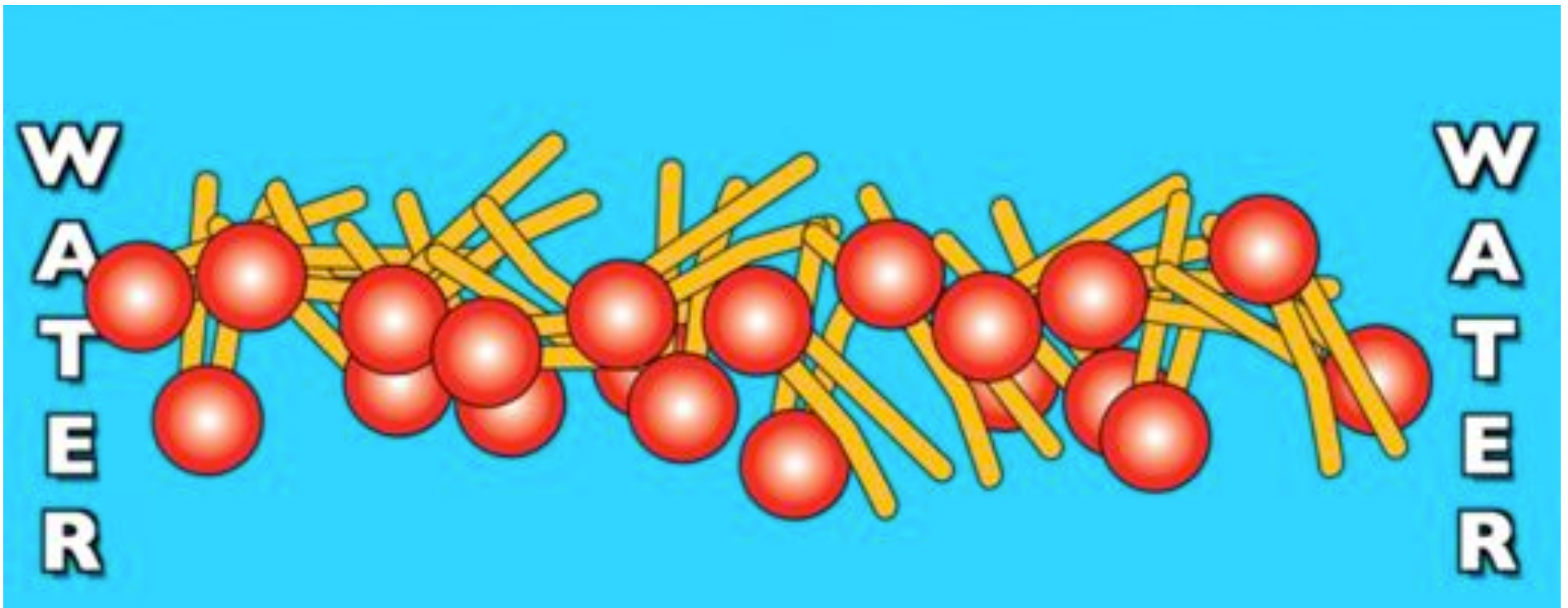
**HEAD**



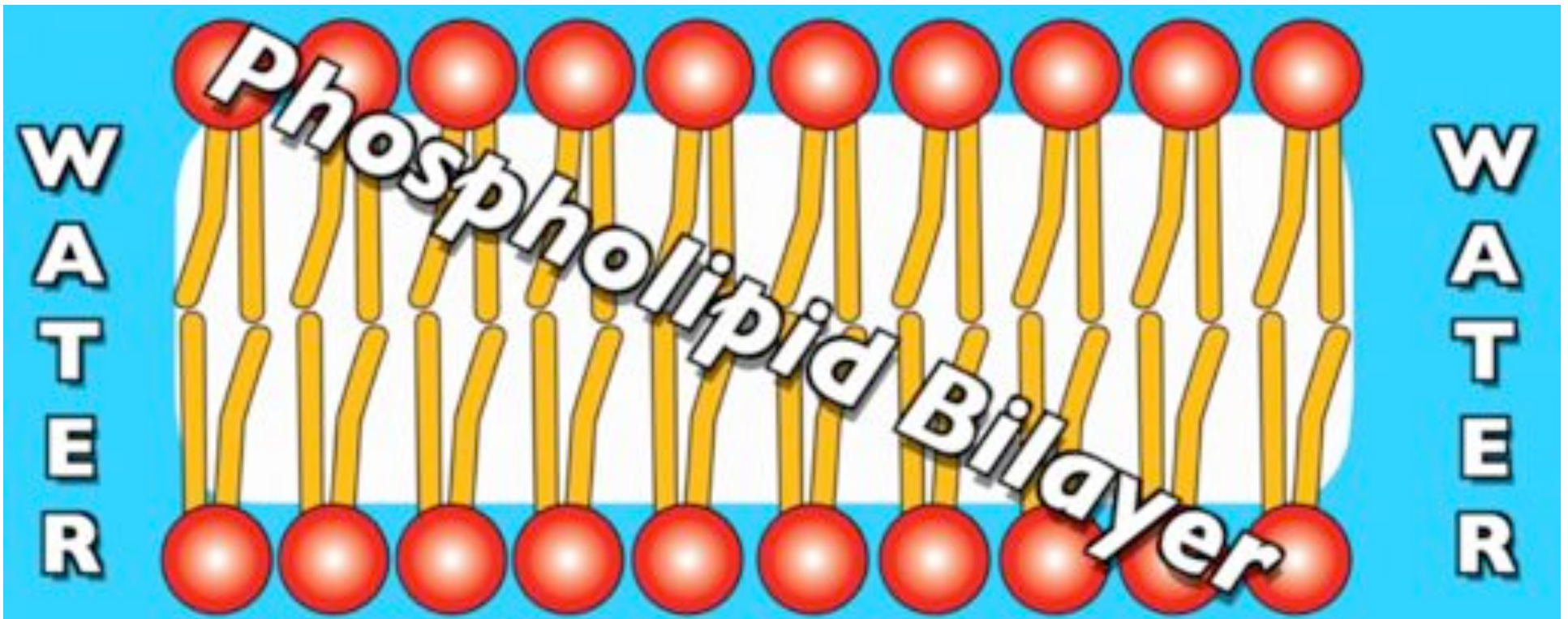
**Phosphate**

The head's got a phosphate  
it's charged negatively  
Makes the head hydrophilic,  
Plays in water happily





‘Cause when phospholipids into  
water get submerged  
A phospholipid bilayer structure  
will emerge

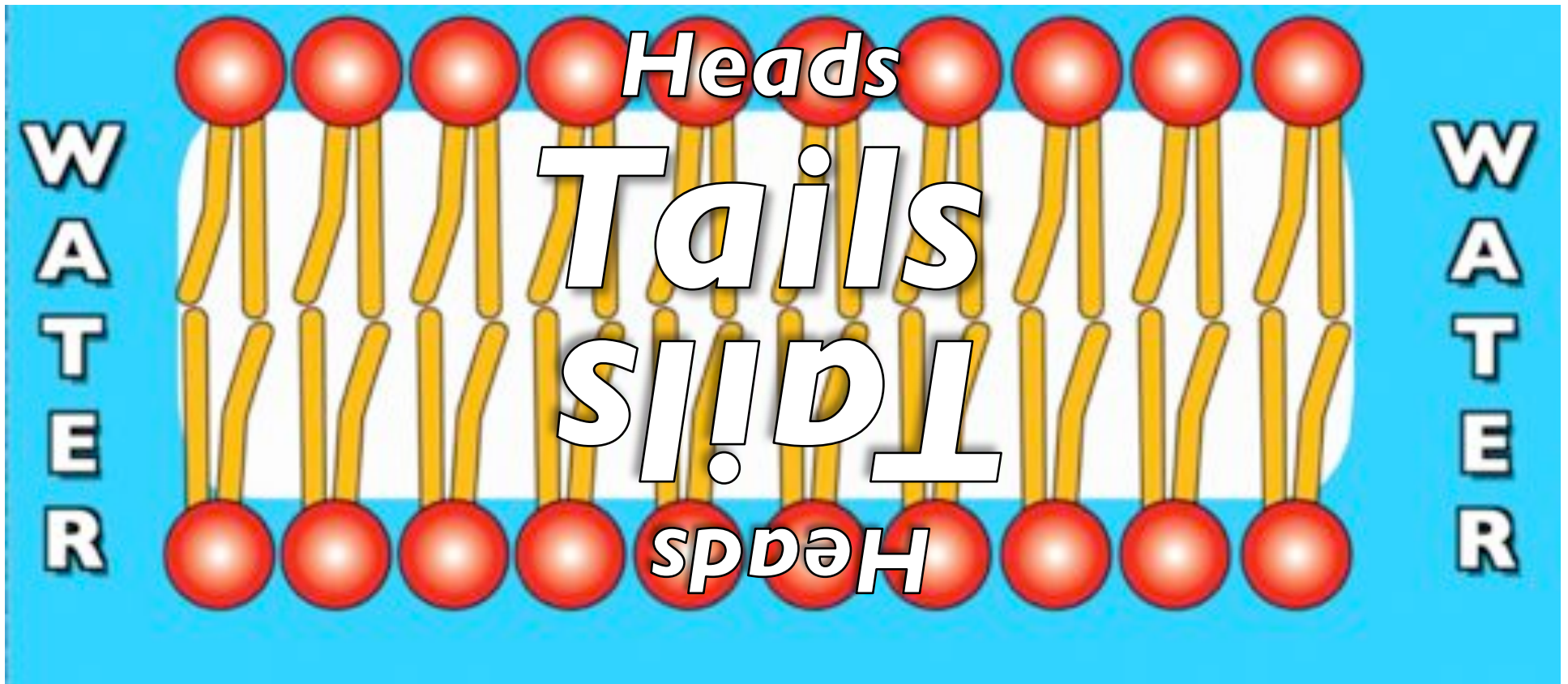


The tails hang together  
in a water free zone,  
Hear their hydrophobic moan,  
“Water leave me alone!”

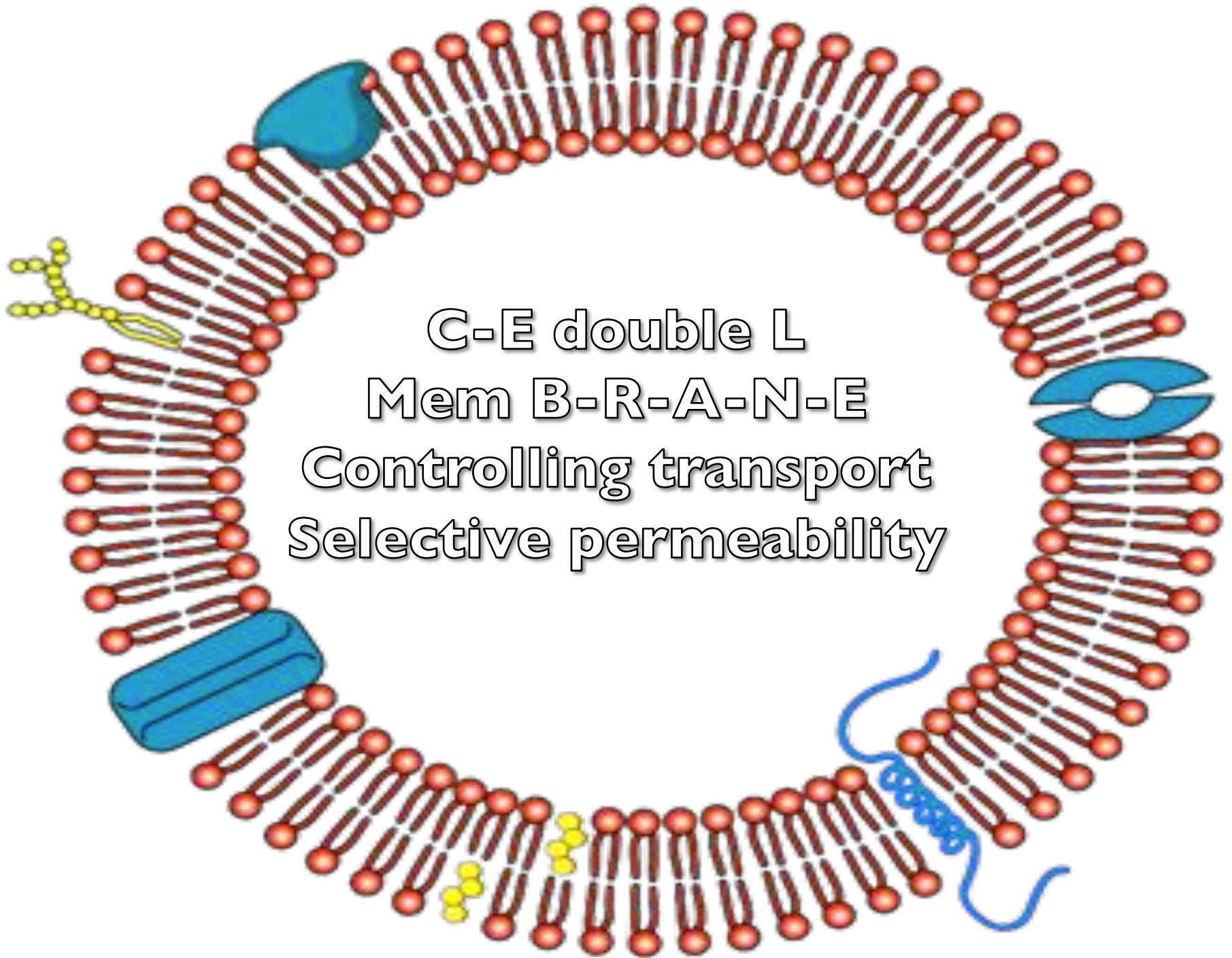




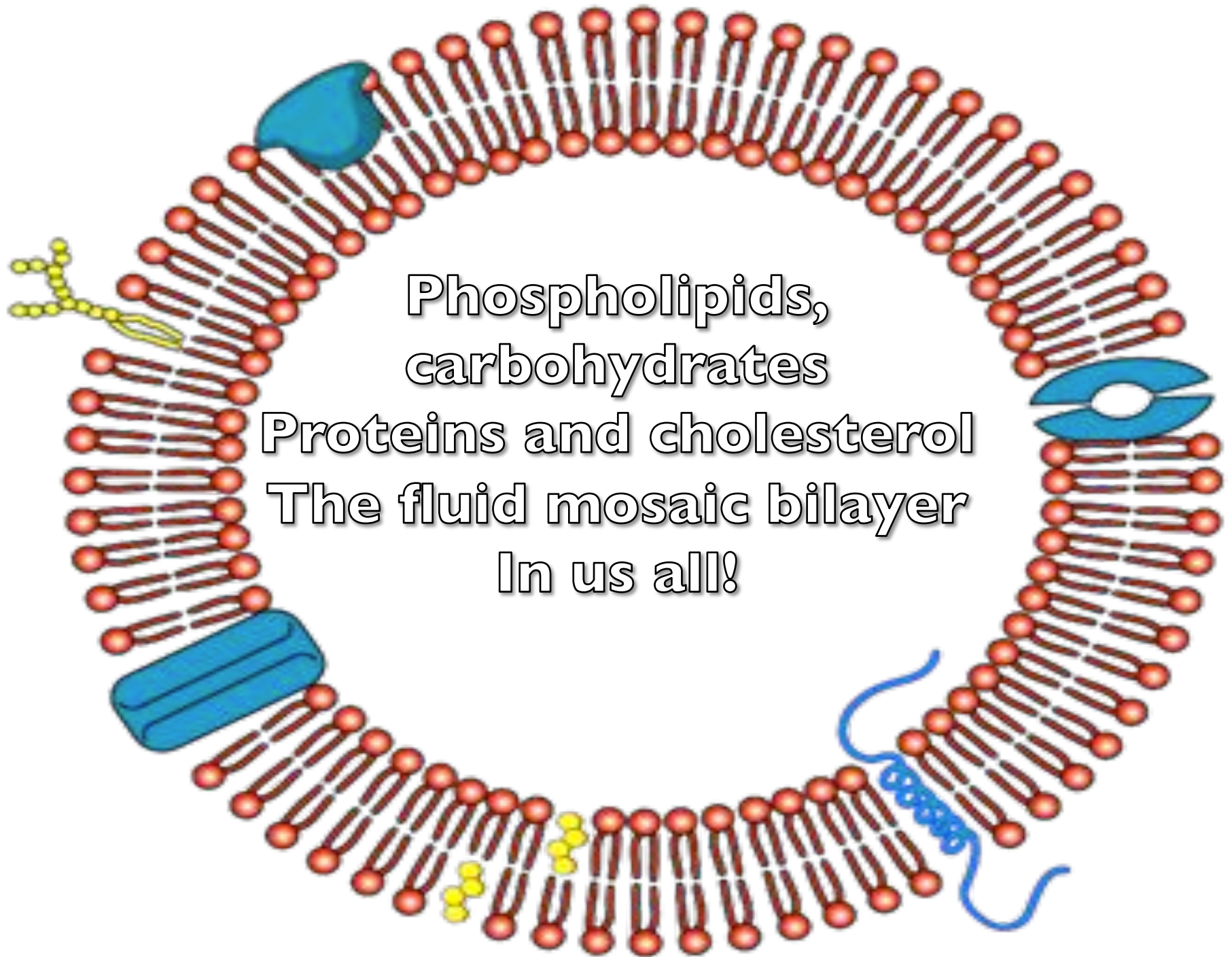
While the heads are sticking out,  
Touching all those  $H_2O$ s  
Tails in, heads out,  
It's how every membrane goes



Tails in, heads out  
In a cellular sphere  
It's the bilayered basis  
Of membranes everywhere



C-E double L  
Mem B-R-A-N-E  
Controlling transport  
Selective permeability

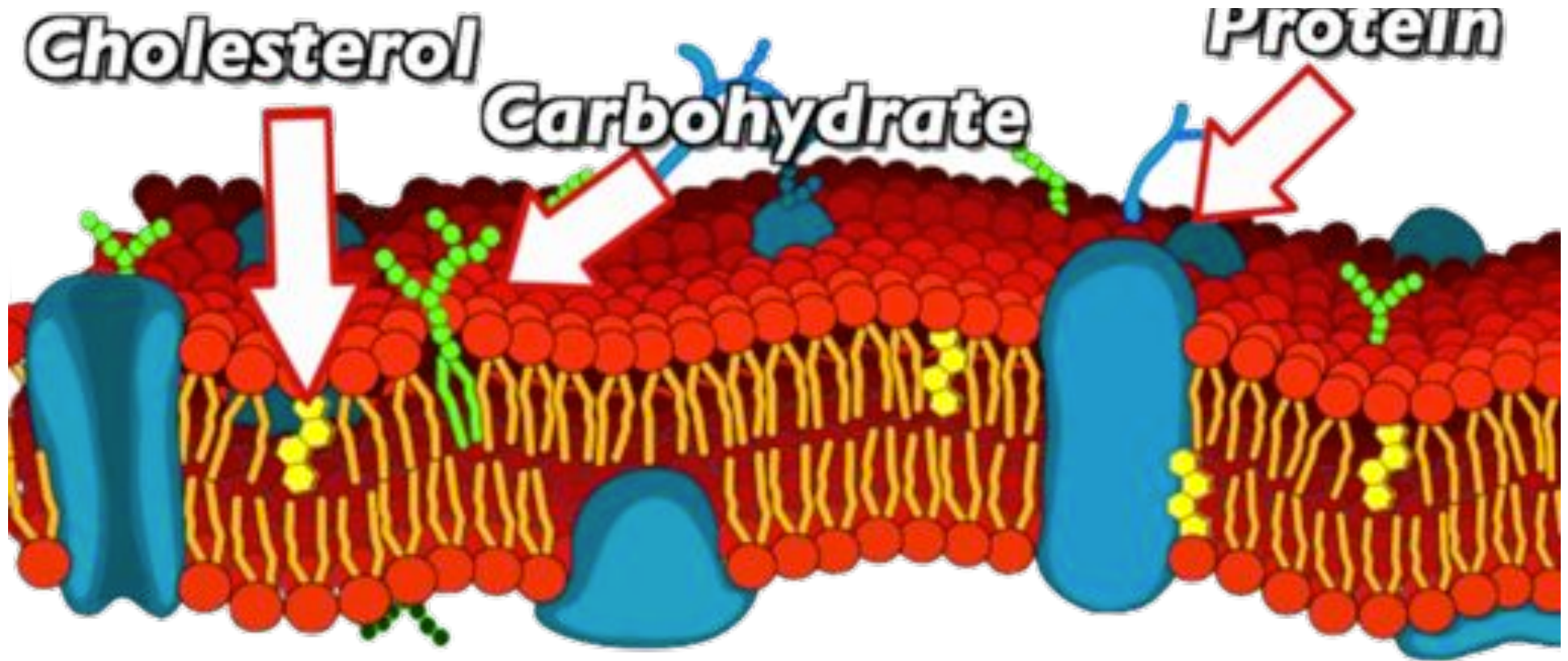


Phospholipids,  
carbohydrates

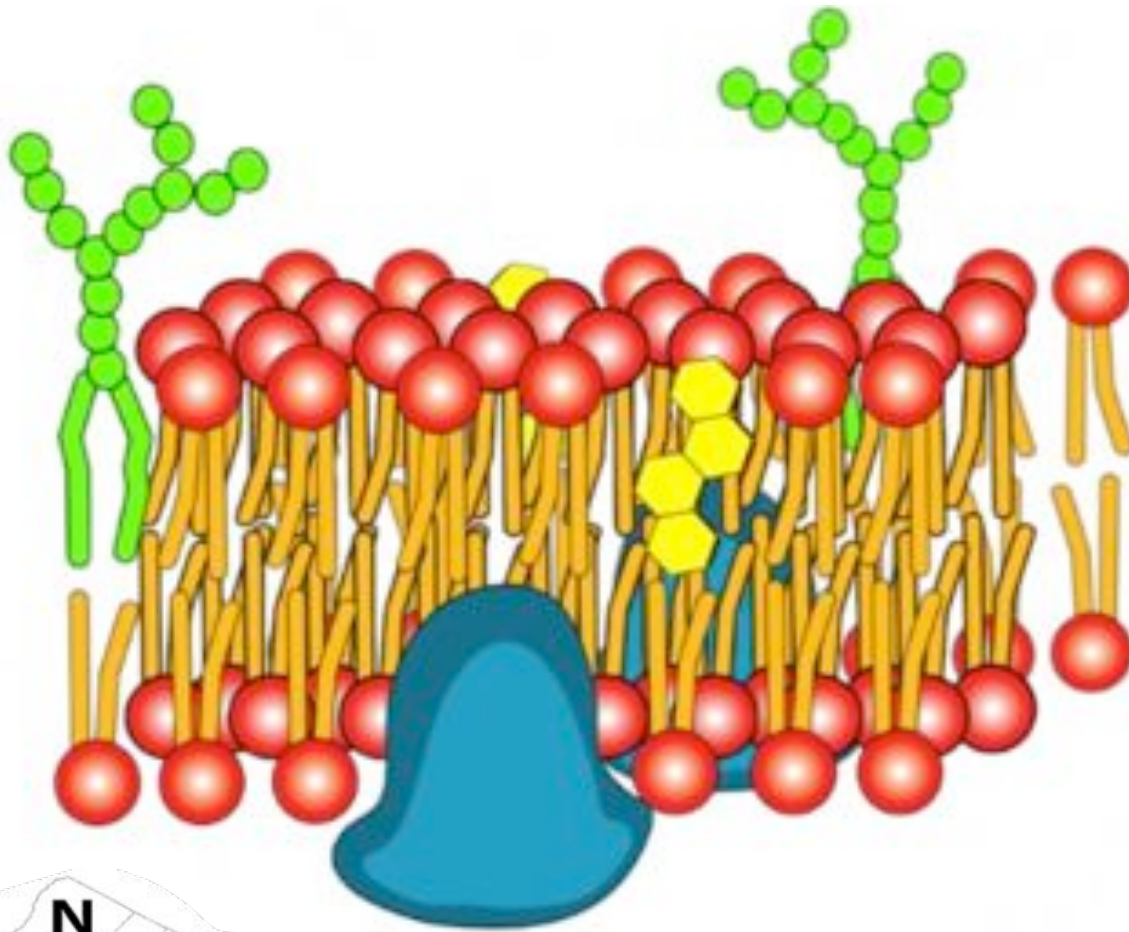
Proteins and cholesterol

The fluid mosaic bilayer

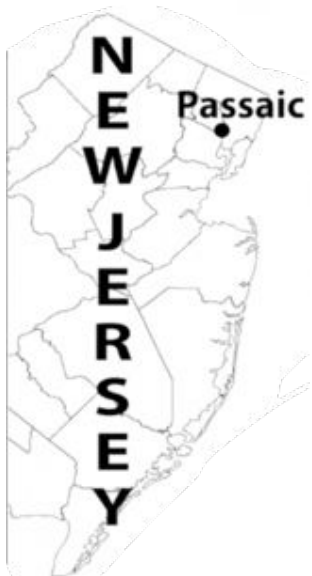
In us all!



But a cell membrane's not  
Just a phospholipid scene  
There's cholesterol, carbohydrate  
Lots of protein  
In fact membrane proteins  
Have a presence so great  
They often exceed  
the phospholipids by weight



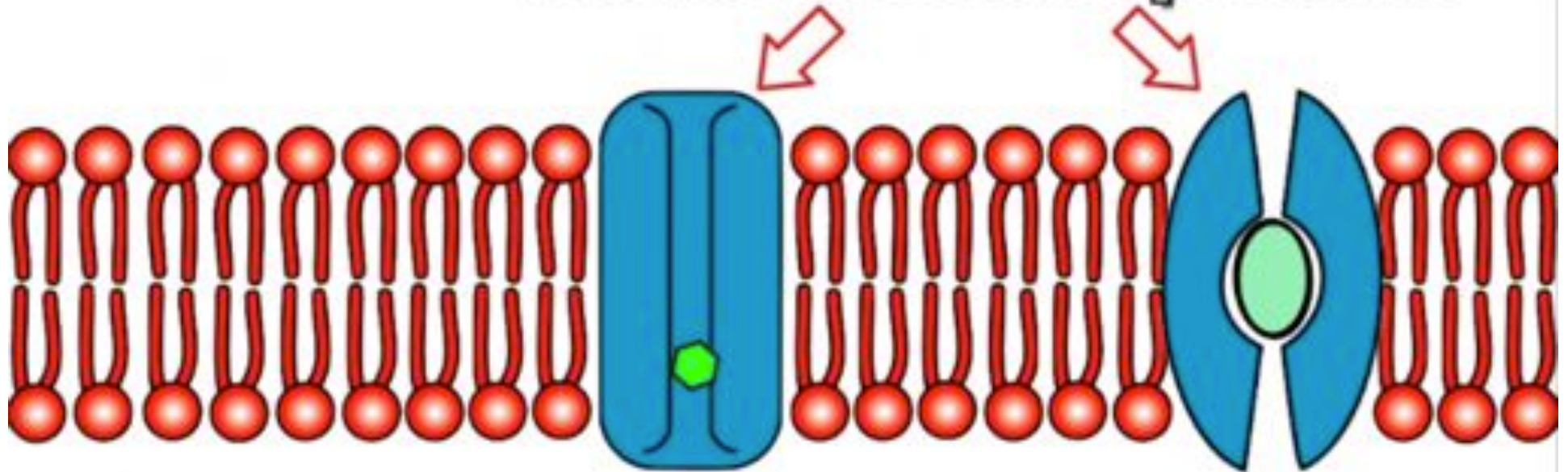
And all of these  
components  
Are in constant  
motion  
Moving, mixing  
Like a boiling  
potion



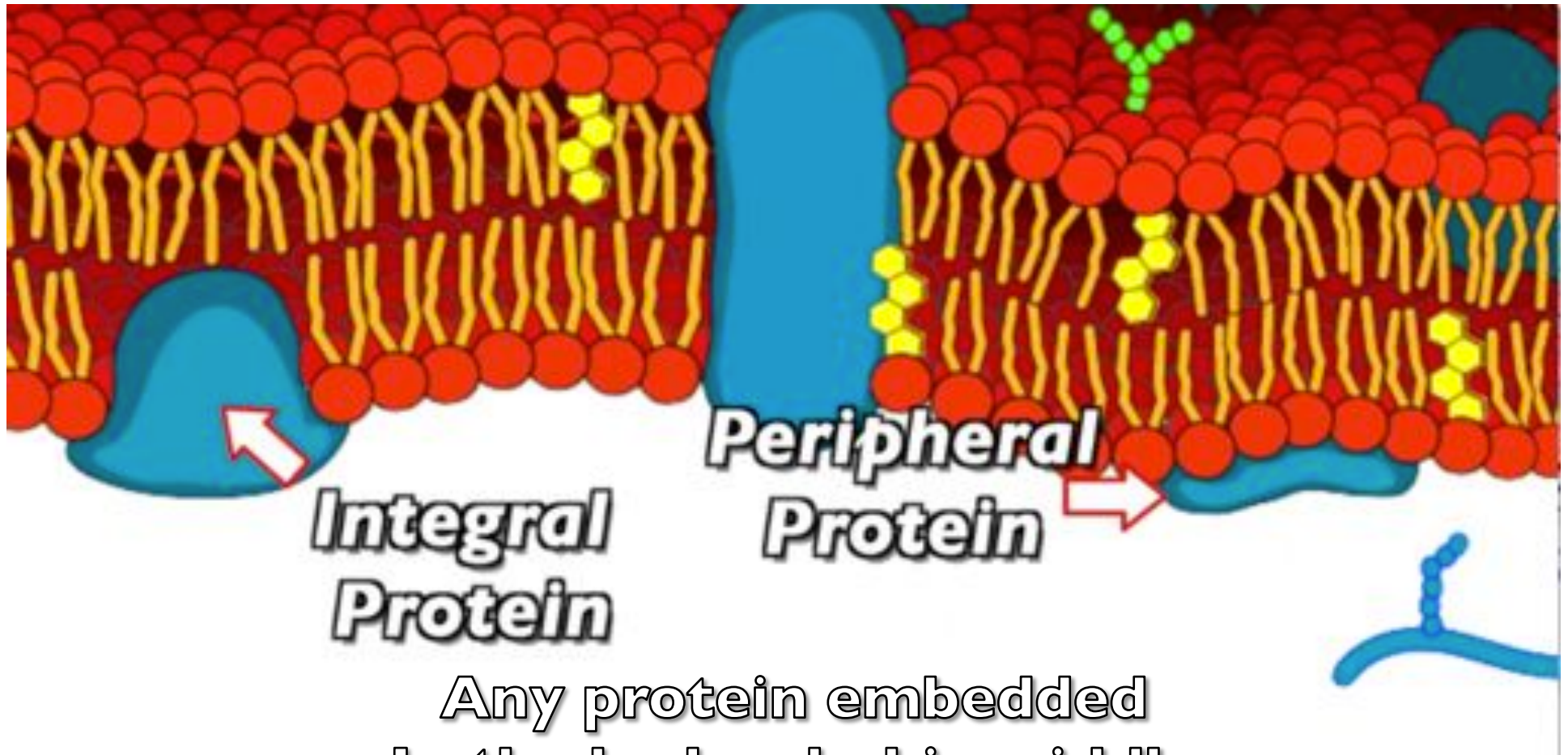
Flowing like dancers in a party  
in Passaic

That's why the membrane's  
thought of as a fluid mosaic

# Transmembrane proteins

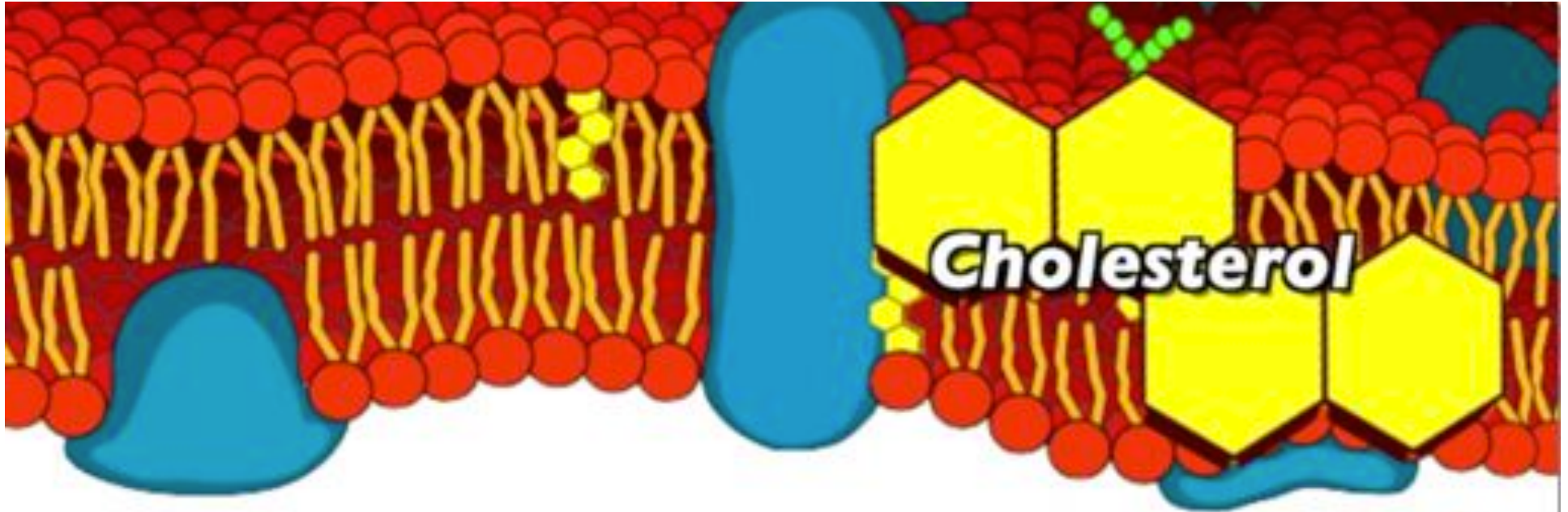


Let's start with the proteins  
Since they're key in this mix  
Transmembrane proteins  
span the entire width  
Typical they're ports  
Think of channels or conveyers  
For things that won't go through  
the lipid bilayer



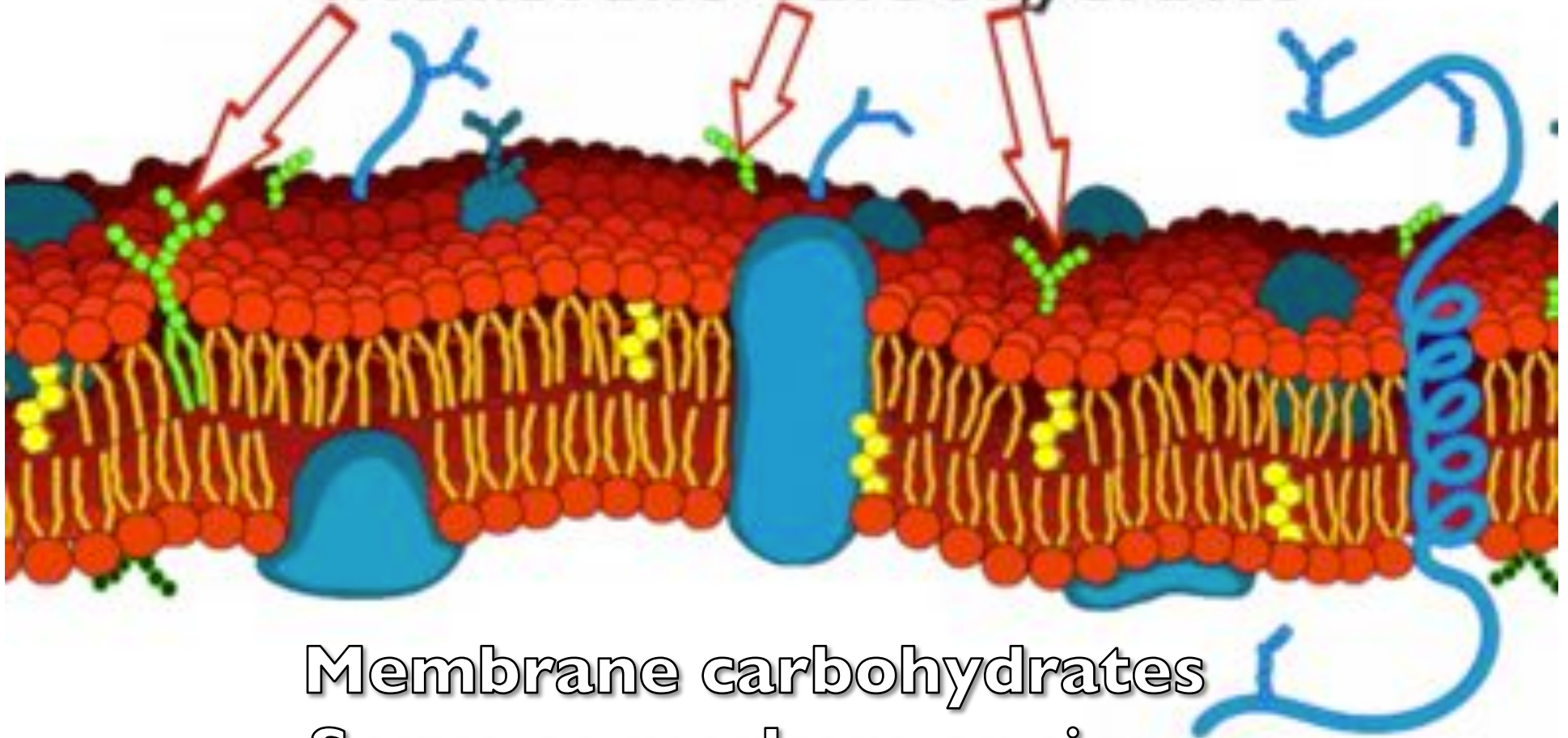
Any protein embedded  
In the hydrophobic middle  
Built right into the inside  
Is considered integral  
While peripheral proteins either  
Hang on the exterior  
Or on the cytoplasmic interior



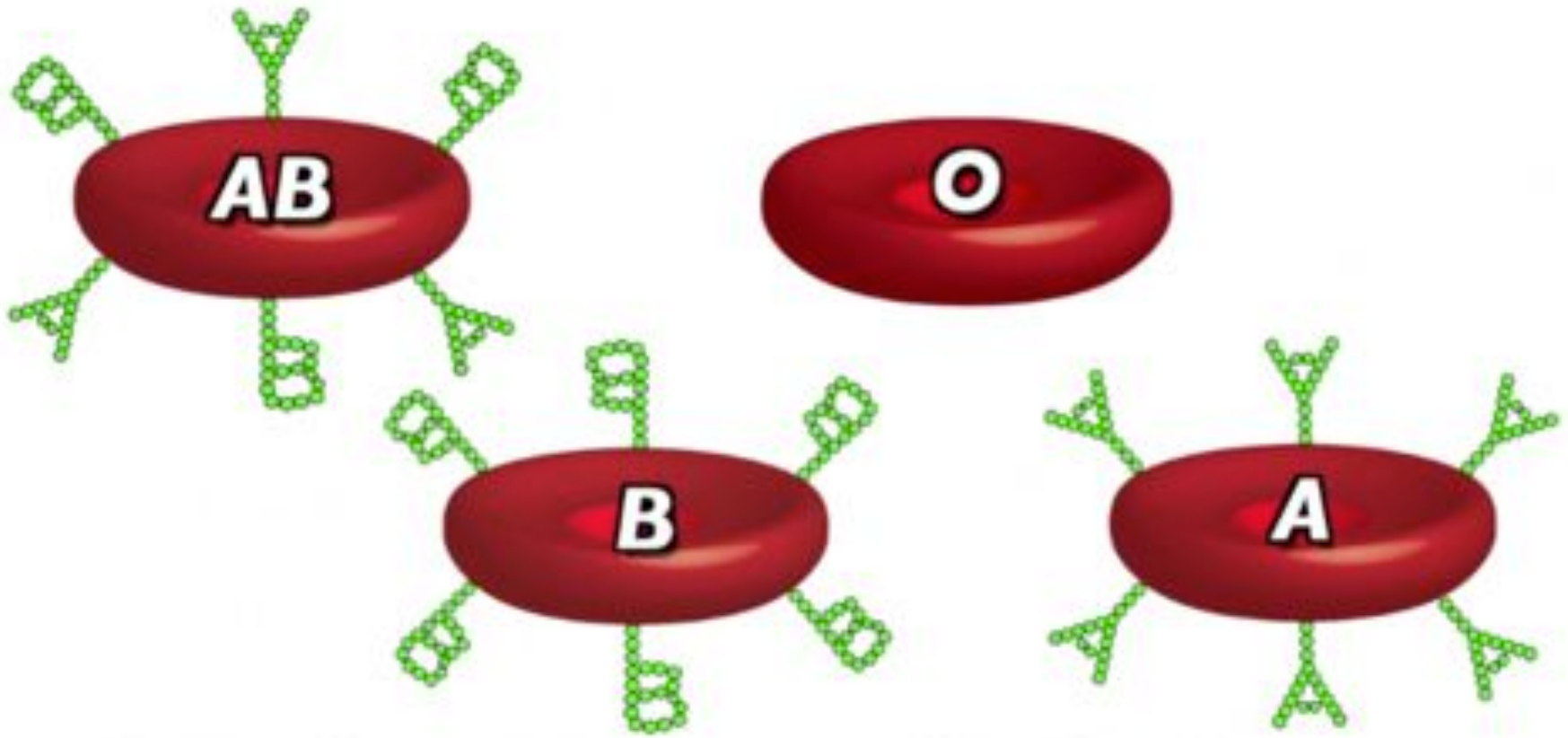


Cholesterol keeps membranes  
flowing with ease  
In cold it keeps the lipids moving  
So they don't freeze  
In heat it slows the lipids down  
Limiting their traveling  
Cholesterol keeps membranes  
from unraveling

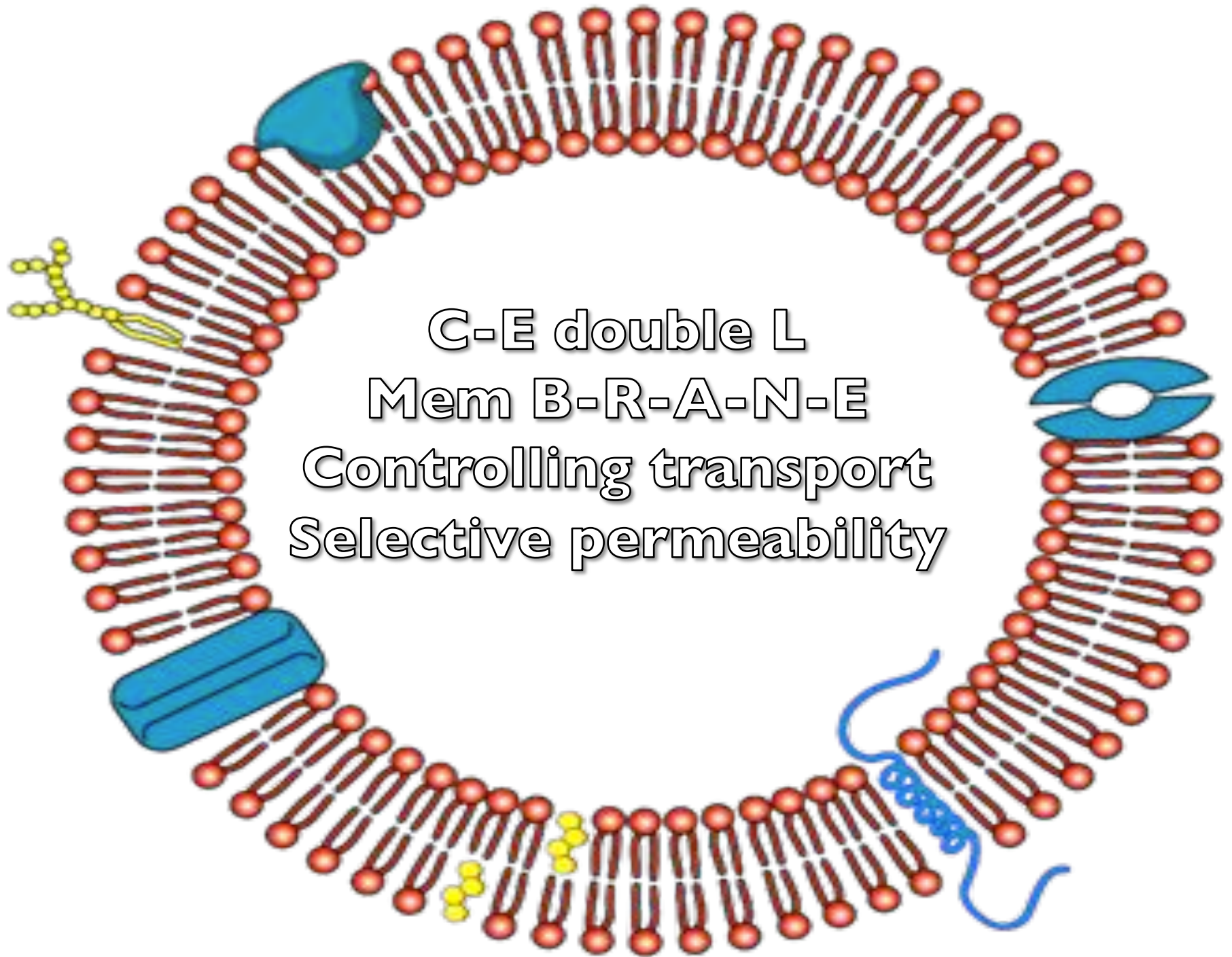
# Membrane Carbohydrates



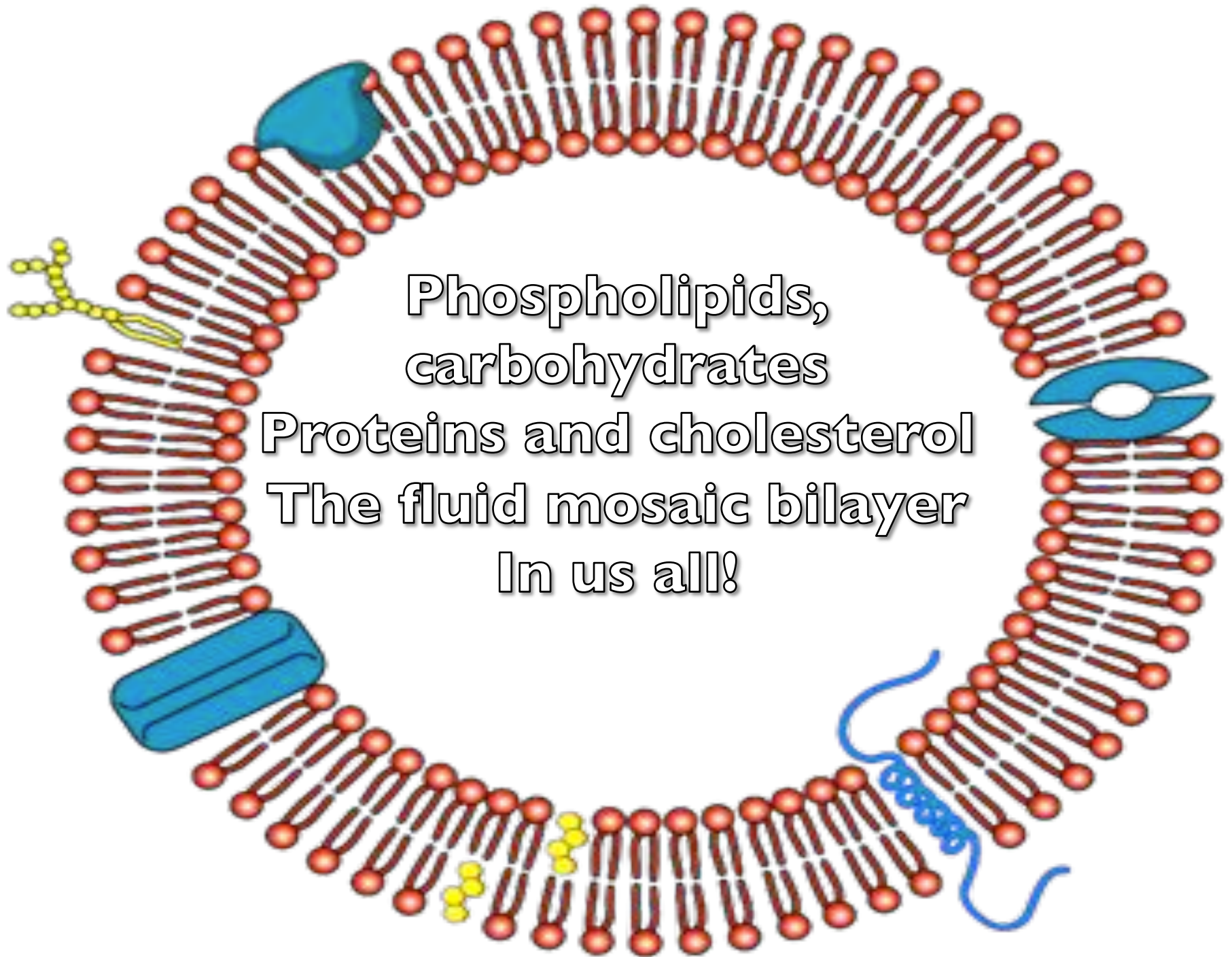
Membrane carbohydrates  
Serve as markers or signs  
So your immune system knows  
Which flag your cells are flying



The blood types AB, O  
And B and A  
Are about the carbohydrates on  
Red blood cell membranes



C-E double L  
Mem B-R-A-N-E  
Controlling transport  
Selective permeability



Phospholipids,  
carbohydrates

Proteins and cholesterol

The fluid mosaic bilayer

In us all!

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get curriculum at**

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