



Getting to Know H₂O with Hands on Models

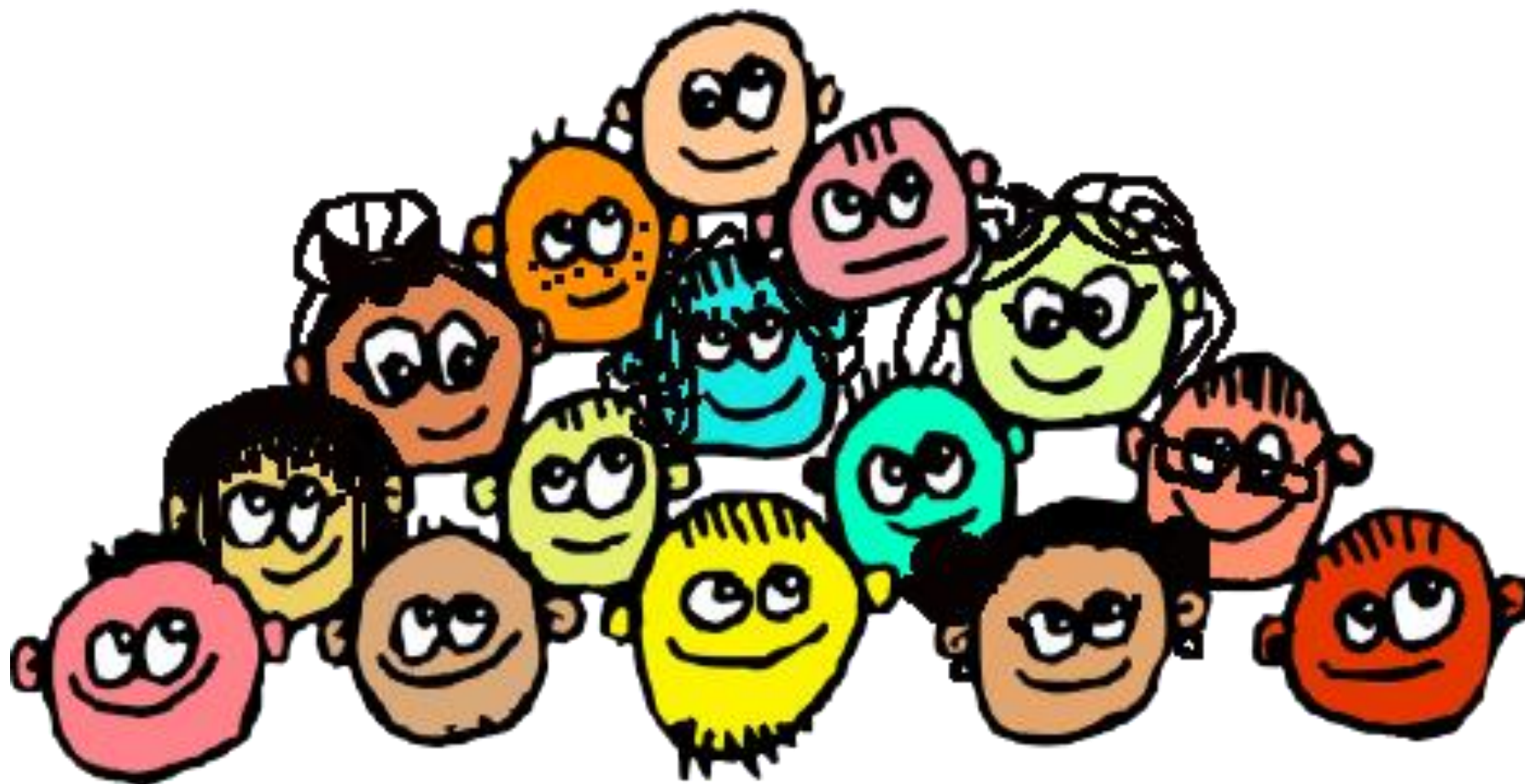
Keri Shingleton, Ph.D.
Holland Hall School
Tulsa, Oklahoma



Who am I?



Who are you?



In this workshop, you can expect to...

- Play!
- Discover!
- Think!
- Apply what you have learned to develop your own models!



What do our students NEED to know about water and **why**?



Let's Get Started...



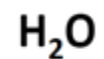
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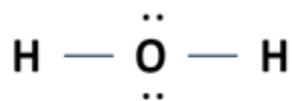
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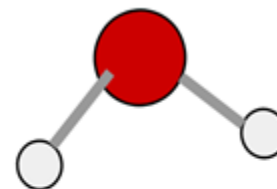
https://commons.wikimedia.org/wiki/File:Rain_on_the_field.jpg



Molecular
formula



Lewis
structure



Ball-and-stick
model



Space-fill
model





Let's Get Started...



Properties of water....

It is time to PLAY...

- RECORD your observations
- Allow yourself to be a learner! Suspend what you think you know... take the opportunity to wonder and question...





What did you notice?





What do you wonder?





What topics would this simple activity help you teach?



<https://www.brighton-science.com/blog/what-is-the-difference-between-surface-tension-and-surface-energy-1>





Develop a model that explains this. Go ahead... sketch it!



<https://uwm.edu/field-station/water-strider/>





Cohesion



COHESION



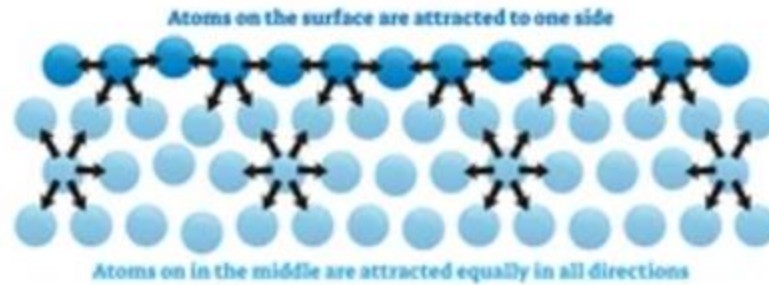
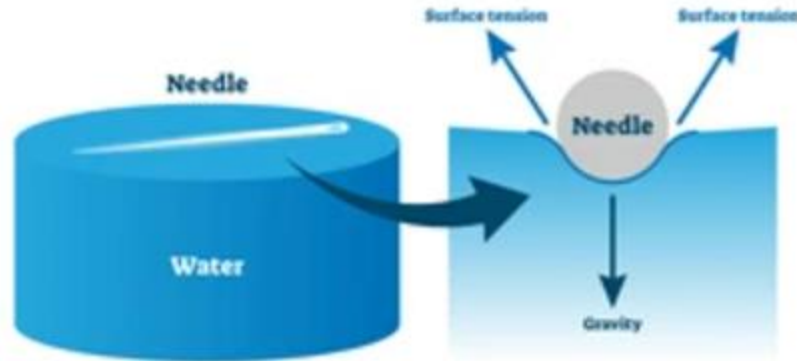
<https://www.usgs.gov/media/videos/adhesion-and-cohesion-water>





Cohesion

SURFACE TENSION



<https://www.shutterstock.com/search/surface-tension>

COHESION



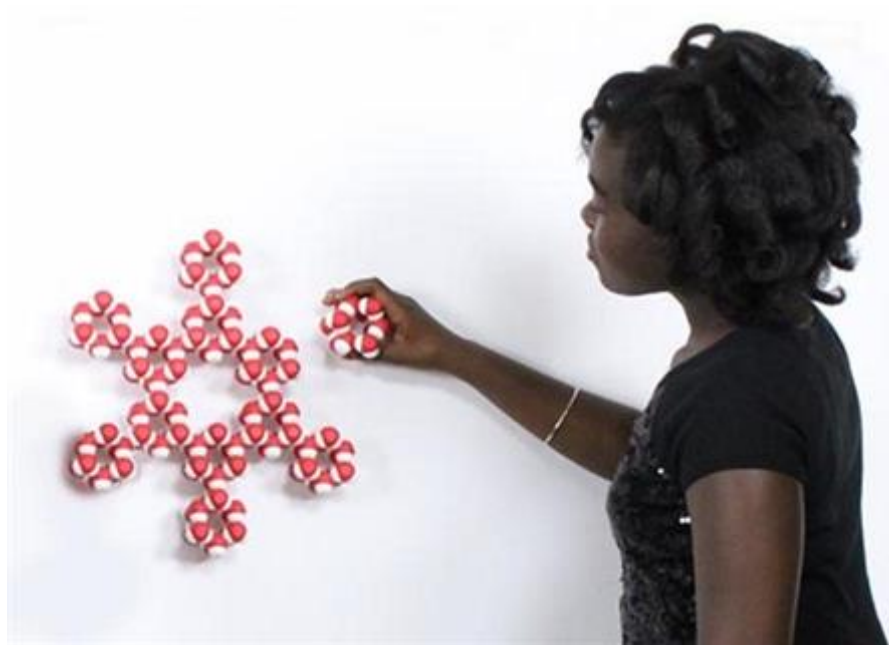
<https://www.usgs.gov/media/videos/adhesion-and-cohesion-water>





What about Adhesion?

ADHESION



<https://www.usgs.gov/media/videos/adhesion-and-cohesion-water>



ADHESION

COHESION



<https://www.usgs.gov/media/videos/adhesion-and-cohesion-water>

Shouldn't the water strider's legs stick to the water due to adhesion?



<https://i.imgur.com/jQCvEF2.jpg>



© CanStockPhoto.com



<https://pixabay.com/photos/bee-drowned-drown-float-up-insect-1139677/>





Let's explore some more!



+





What did you notice?





What do you wonder?





What does it mean to be... hydrophobic?



<https://www.thesun.co.uk/fabulous/5325697/what-is-aquaphobia-causes-treatment/>





What does it mean to be... hydrophobic?



<https://www.thesun.co.uk/fabulous/5325697/what-is-aquaphobia-causes-treatment/>





Can you revise your model?



<https://uwm.edu/field-station/water-strider/>





What is the “answer”?





What is solubility?



<https://jooinn.com/chemical-solution-3.html>





Give it a try! Dissolve some salt!



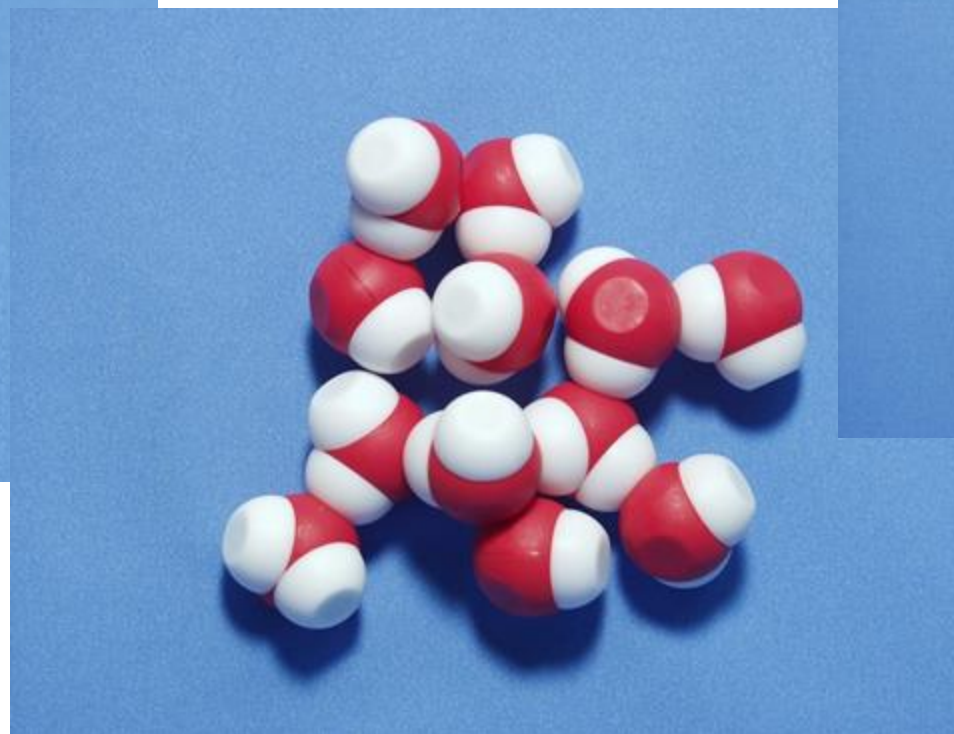
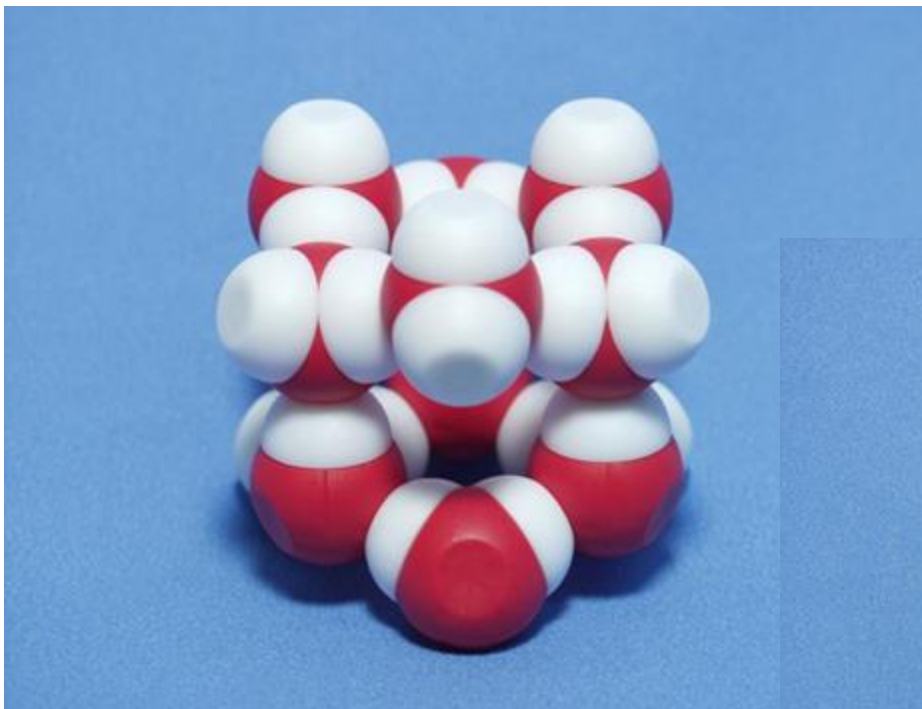


Give it a try! Dissolve some salt!





Phases







Speaking of ice!!!



<https://earthsky.org/earth/why-arctic-winter-sea-ice-stalled-2020/>



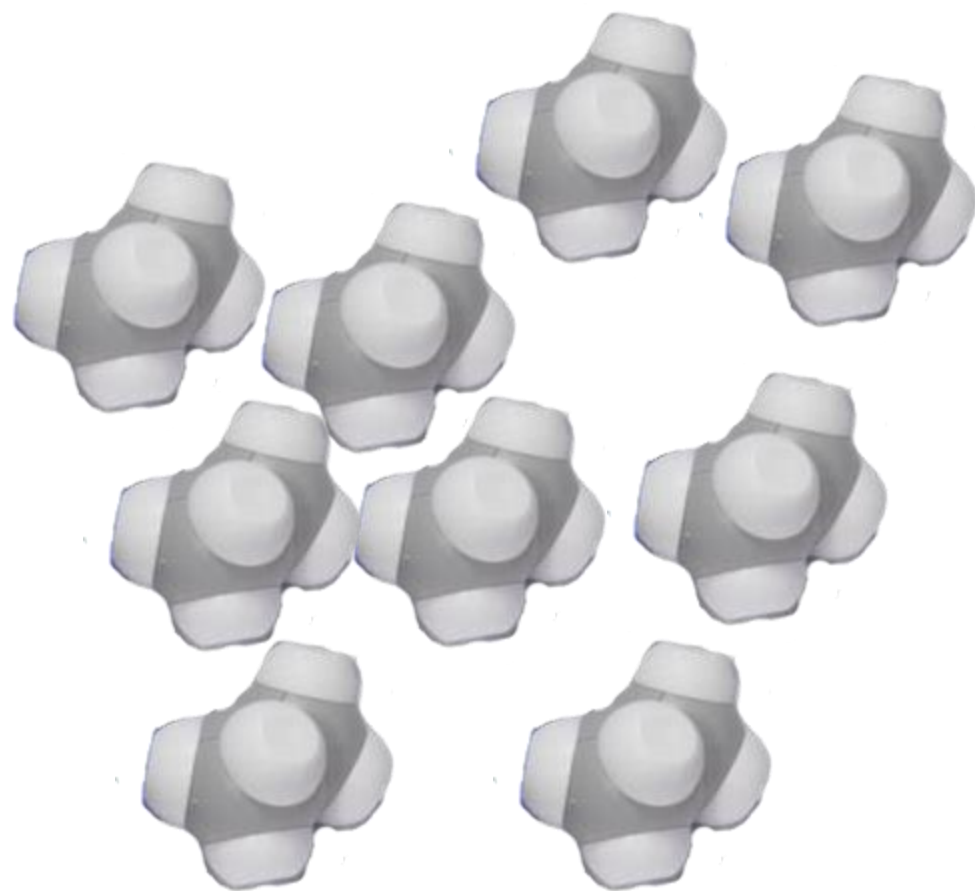


Density





What do you think would happen?



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Hydrophilic?
Hydrophobic?
Density?

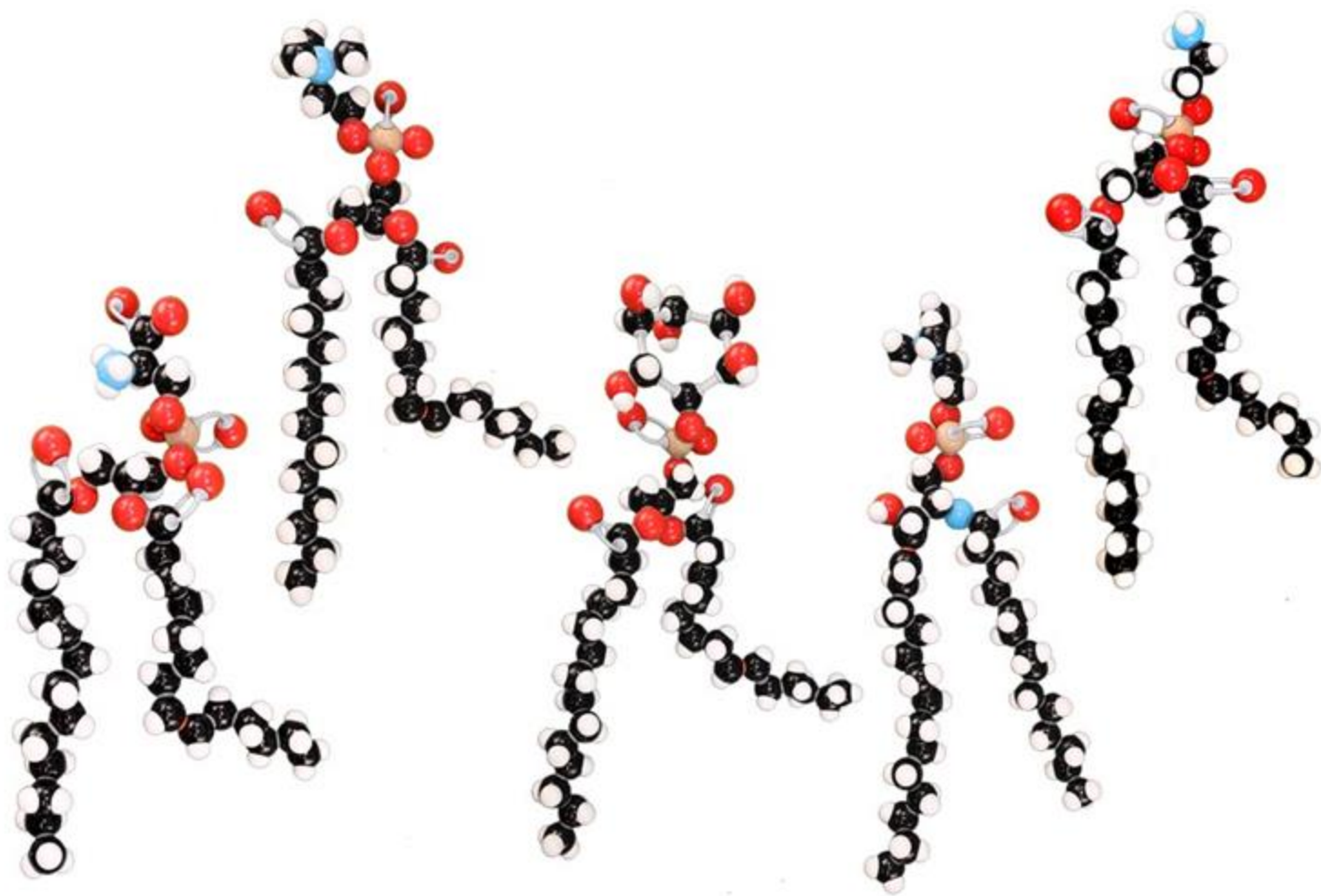


<http://www.todayifoundout.com/wp-content/uploads/2015/08/olive-oil-in-water.png>





What about....





Now Let's think about membranes...



what about
alcohols?





What if....



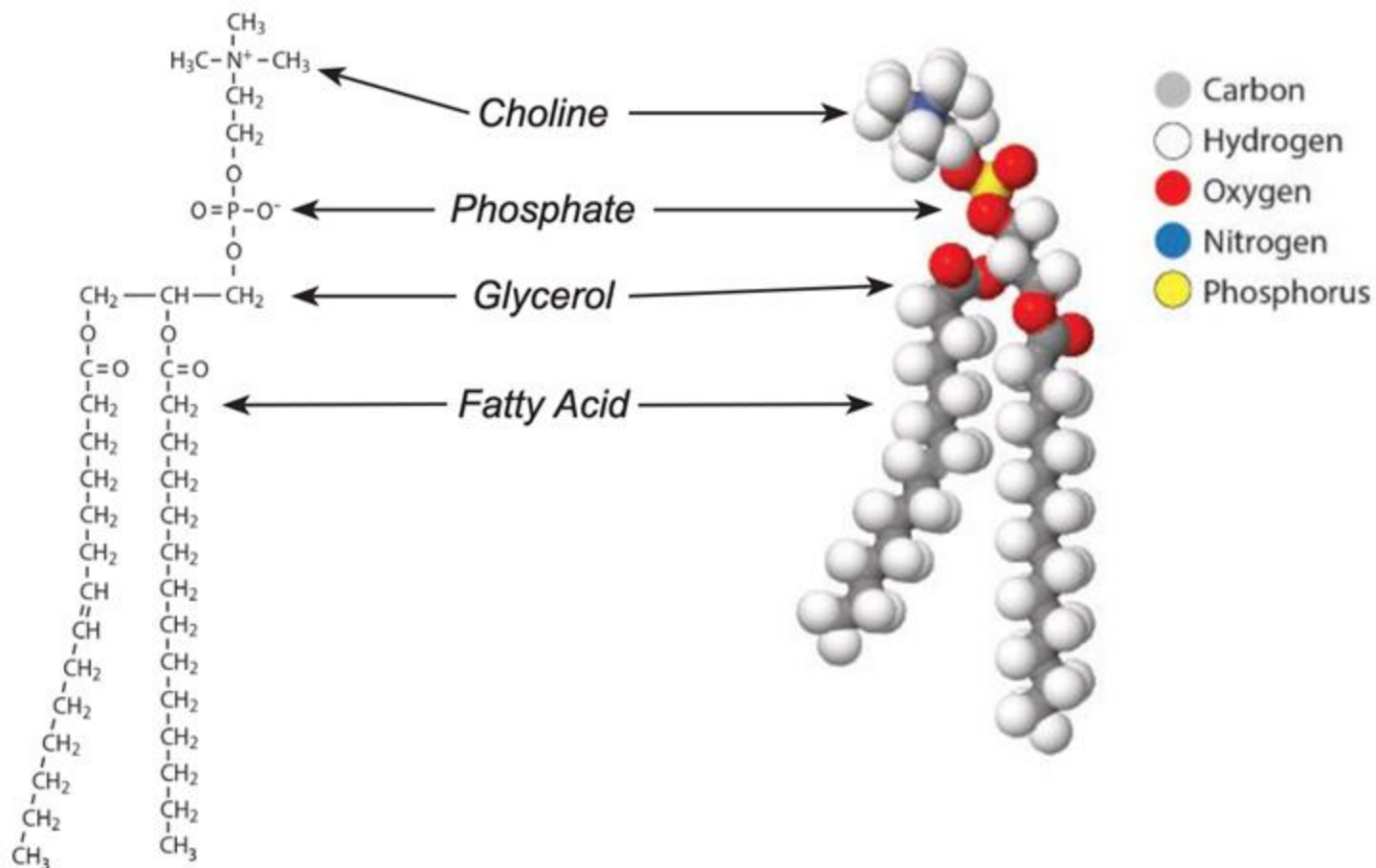


Now Let's think about membranes...



How does this
inform
students about
membranes?





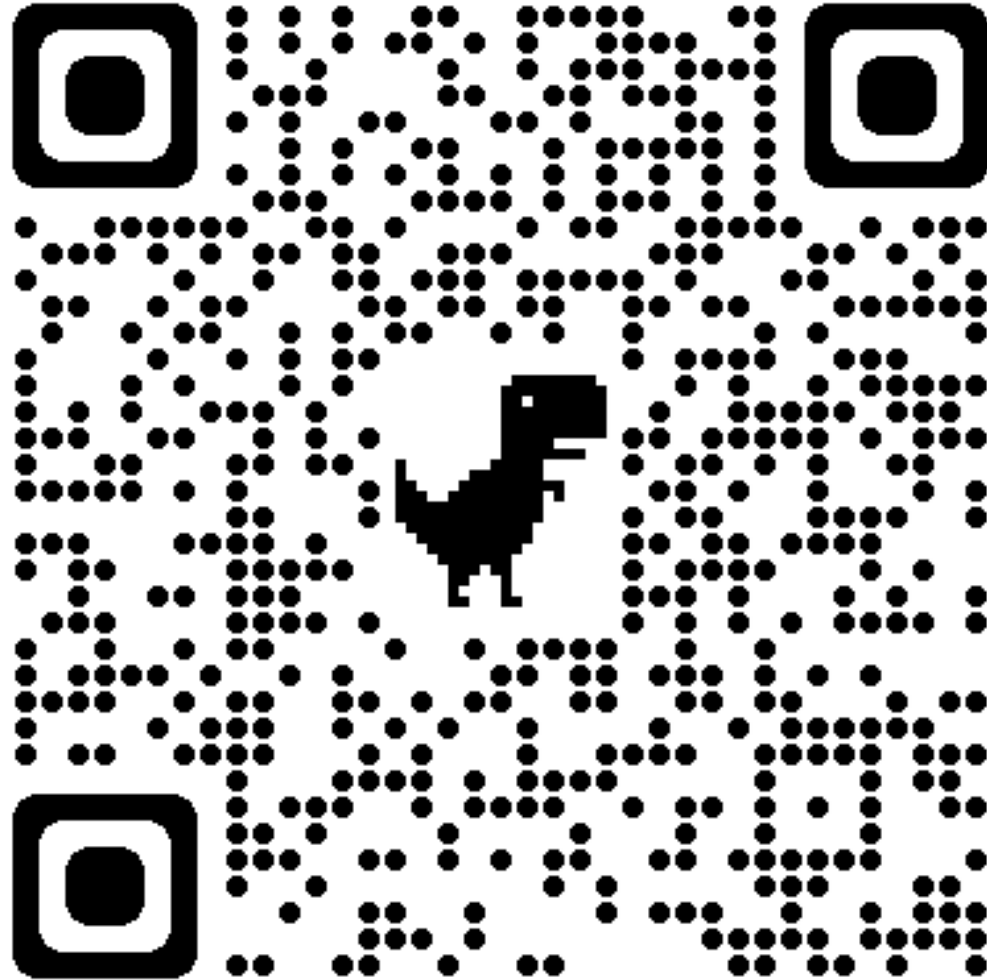


Questions I can help with?

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Summer Courses!

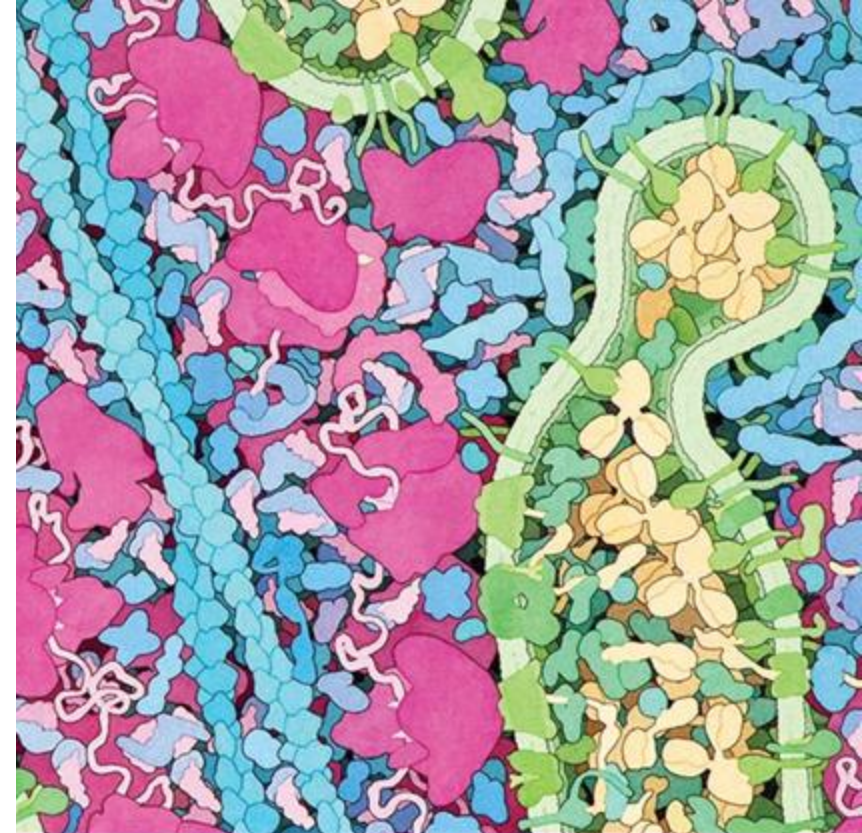
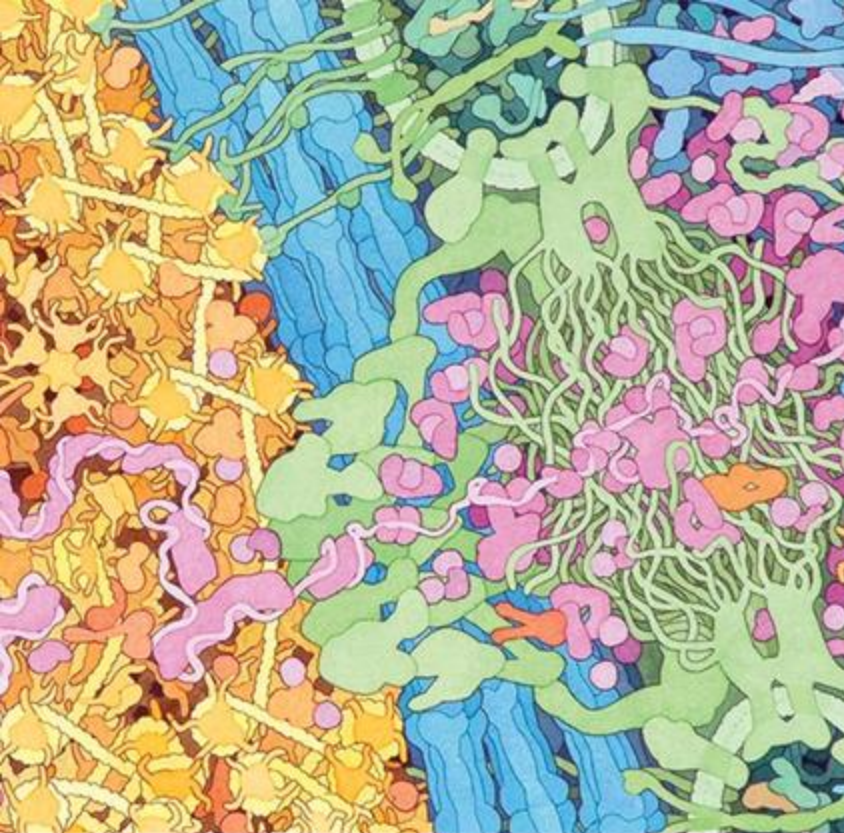




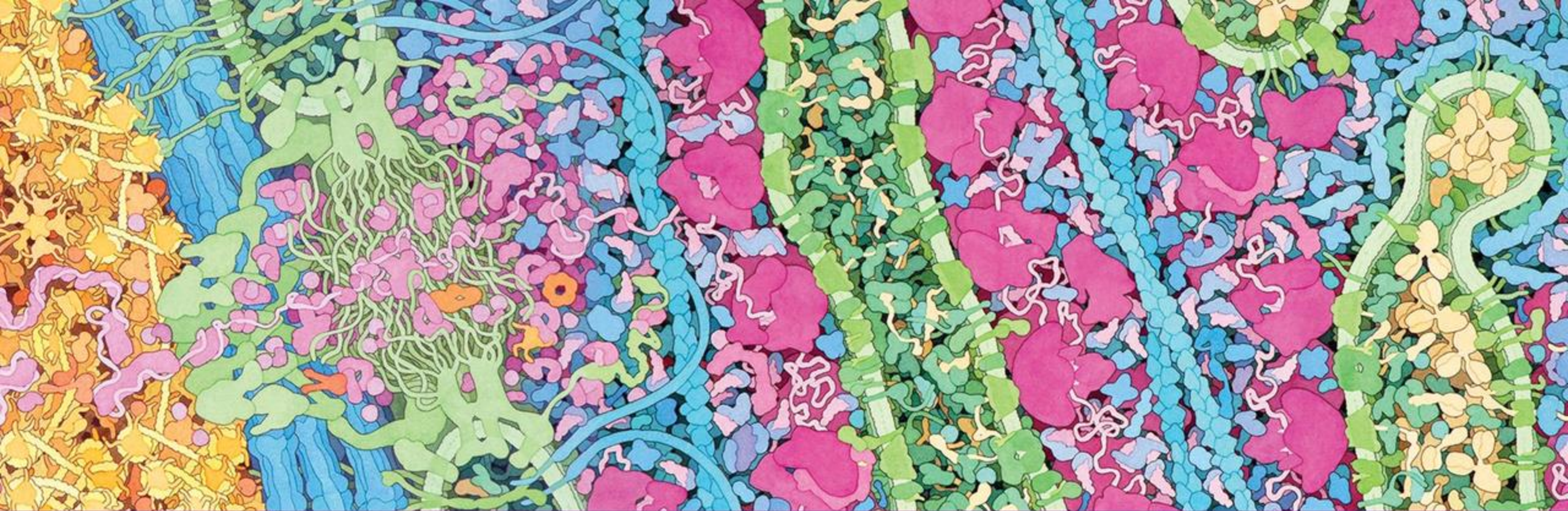
THANK YOU!!

Remember the
conference discount
code: **SC23**

Keri Shingleton
kerishingleton@gmail.com



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