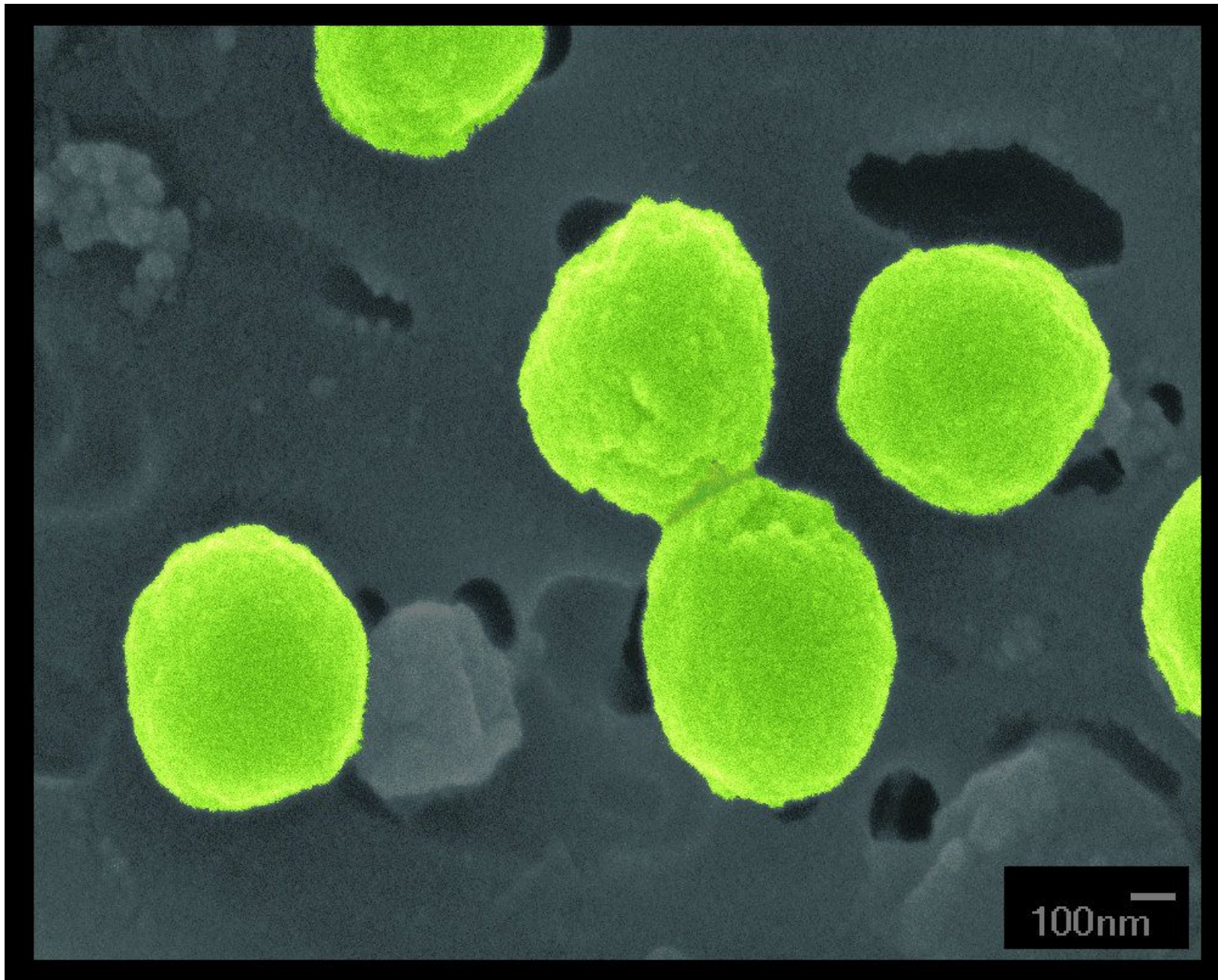
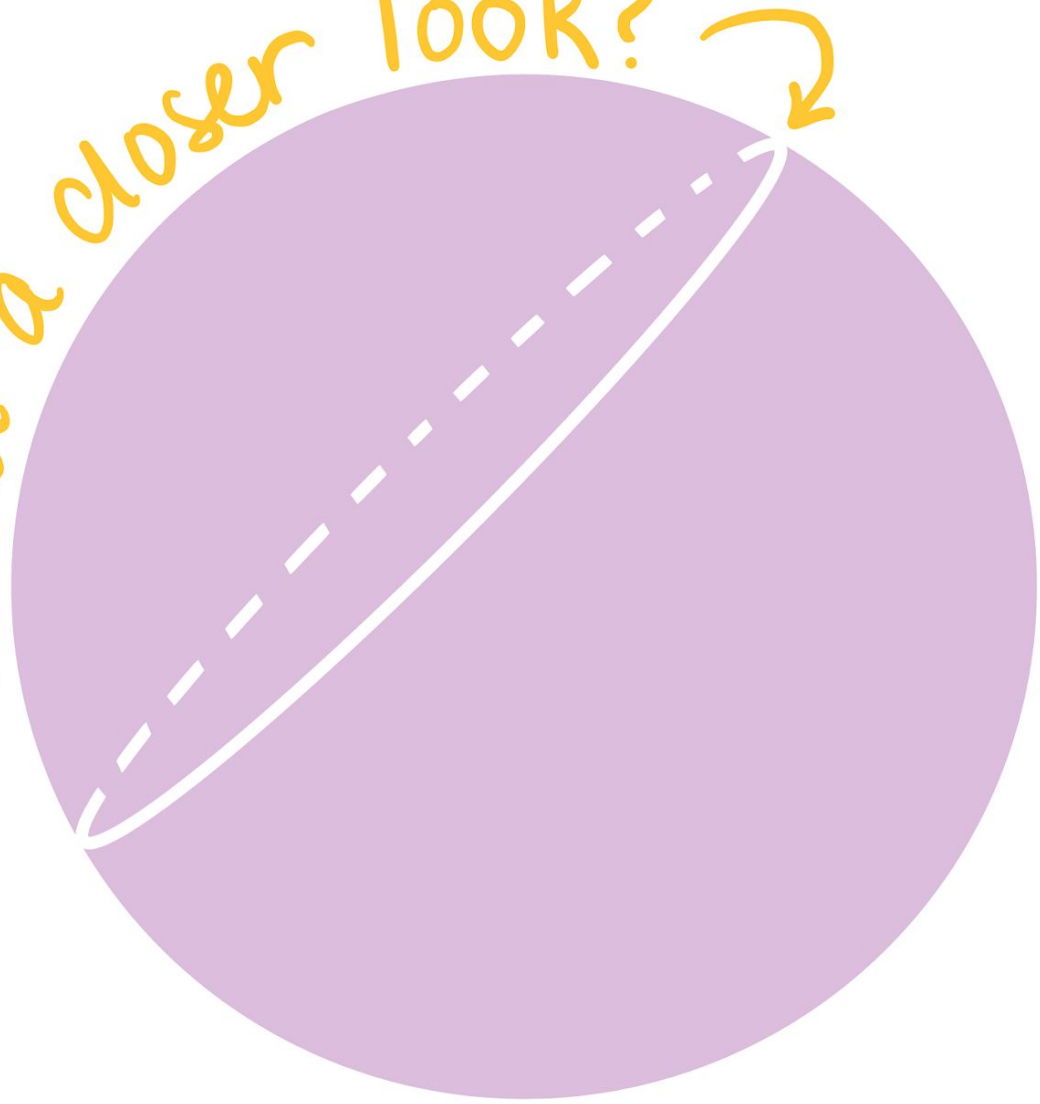


Invisible Forest
Lesson 2: Pro Anatomy

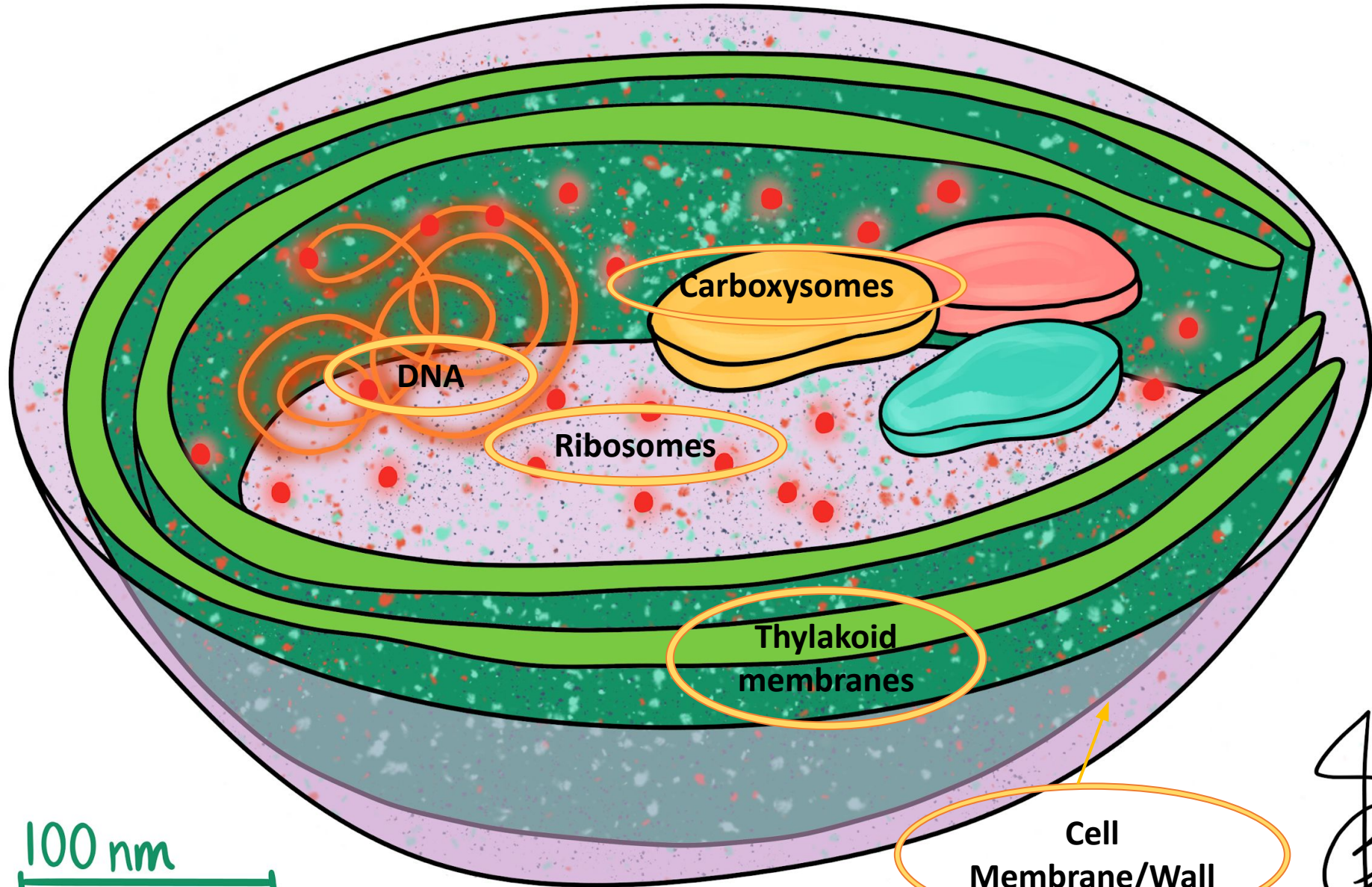


Prochlorococcus marinus colorized electron microscope image, Anne Thompson, Chisholm Lab, MIT

want a closer look?



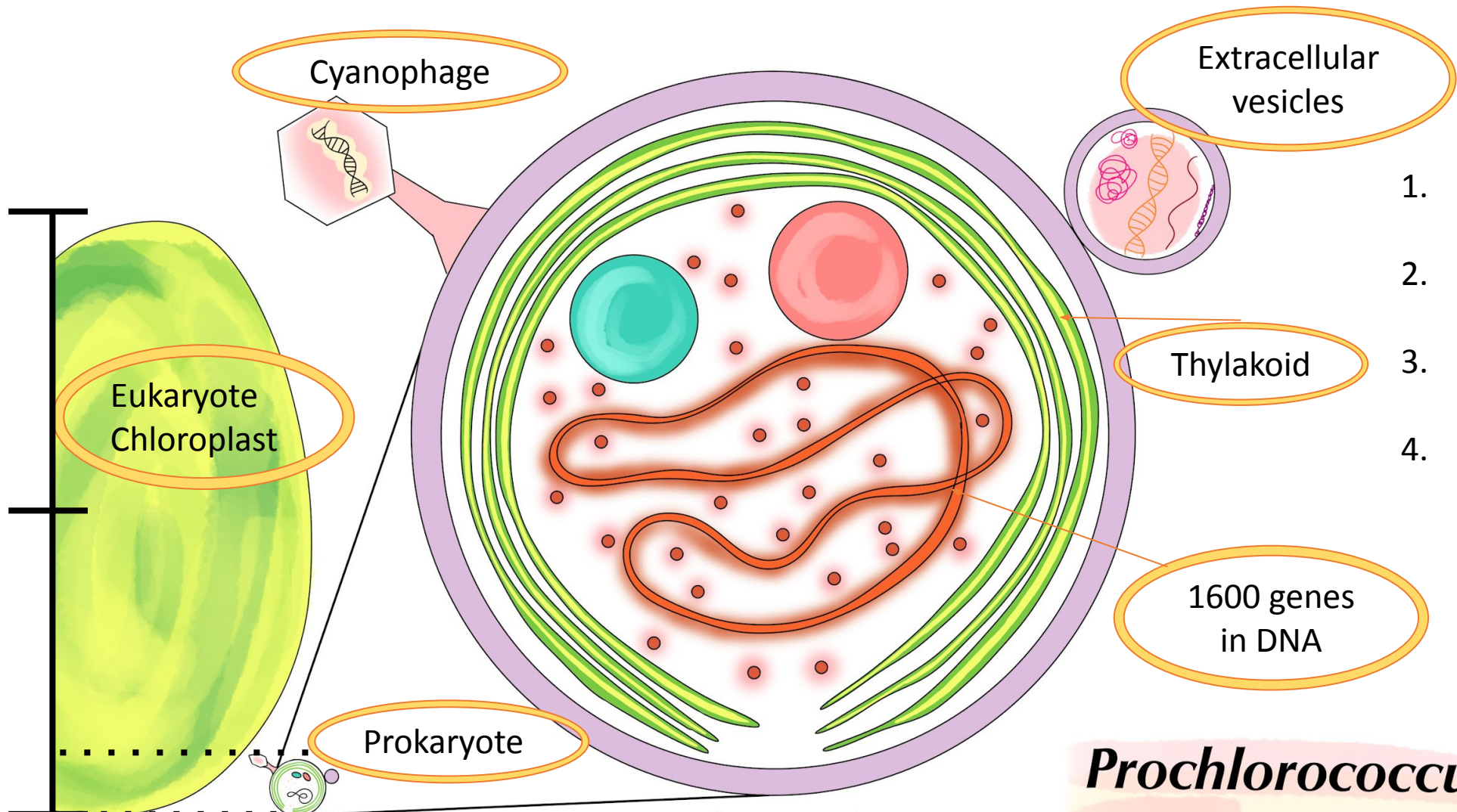
Prochlorococcus
MED4



100 nm

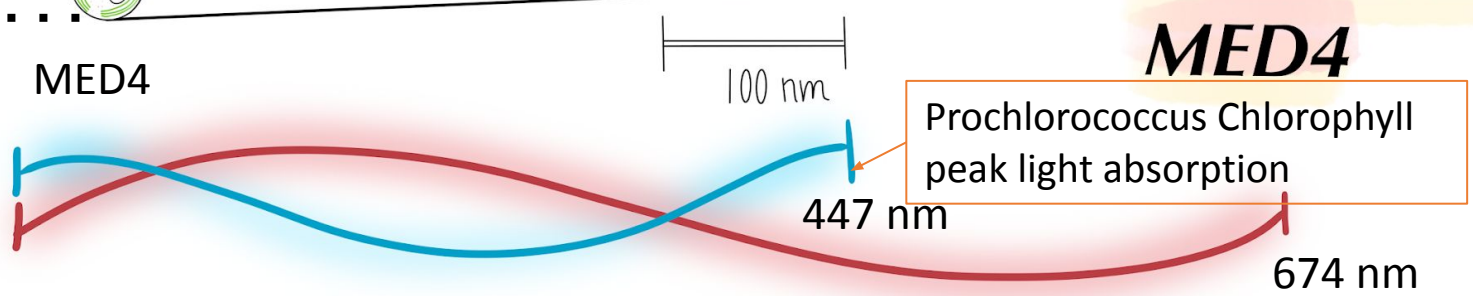
Cell Membrane/Wall

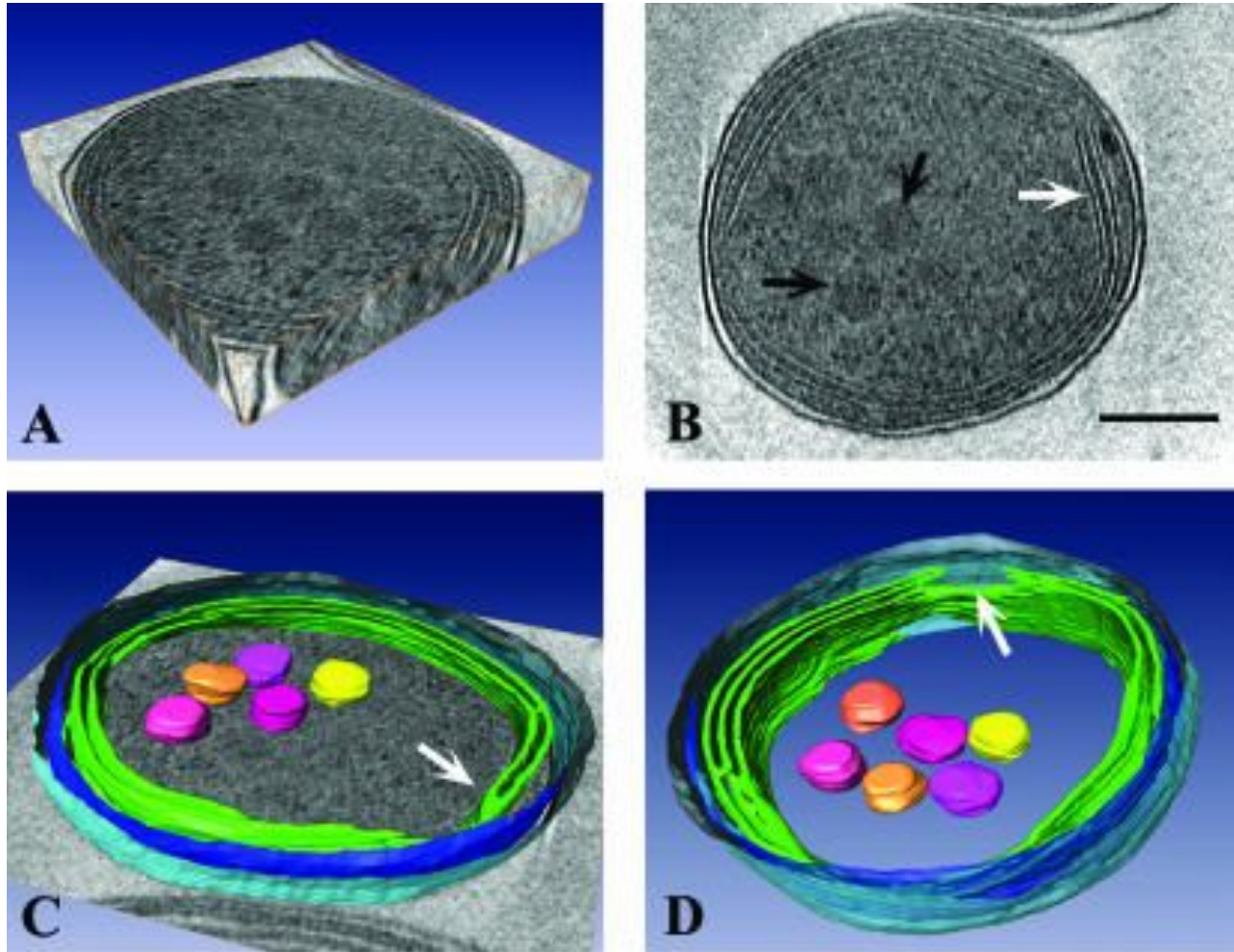
B



1. 2-5 vesicles/cell per generation
2. Horizontal gene transfer
3. Chaff to prevent viral attack
4. Communication/food for heterotrophic bacteria

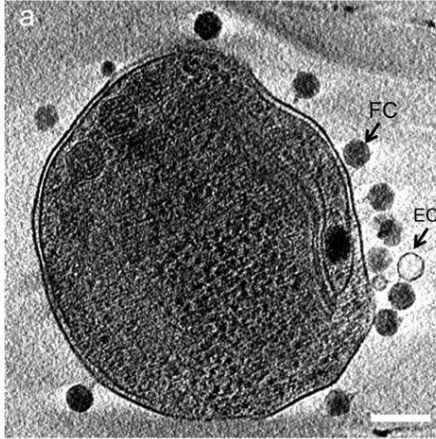
***Prochlorococcus
MED4***





Cryo-Electron Tomography Reveals the Comparative Three-Dimensional Architecture of *Prochlorococcus*, a Globally Important Marine Cyanobacterium[∇]

Claire S. Ting,^{1,*} Chyongere Hsieh,² Sesh Sundararaman,¹ Carmen Mannella,² and Michael Marko²



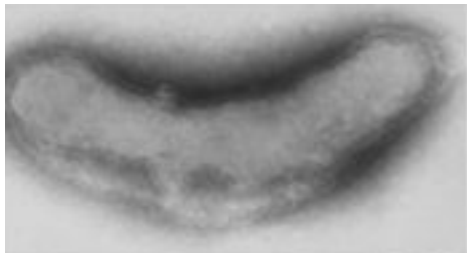
Nature <https://www.nature.com/articles/srep44176>

Prochlorococcus MED4 with cyanophages attached.

Virus are dark objects on membrane/cell wall. Scale bar 100 nm.
Cell ~500 – 600 nm in diameter. Photoautotrophic

There are $\sim 1 \times 10^5$ *Prochlorococcus* cells per mL of seawater.

There are between 1×10^6 and 10×10^6 viral particles per mL of seawater.



SAR11 or *Pelagibacter*

Cell ~ 800 nm in length. Heterotrophic. Most common Earth organism?
(Picture to scale with *Pro* above)

There are between 0.2×10^6 and 1×10^6 bacterial cells per mL seawater.

Students have measured an average of 30 drops of water in 1 mL.

How many *Prochlorococcus*, *Pelagibacter*, and viruses are found
In a drop of seawater? Revise your 'Drop of Seawater' diagram.

