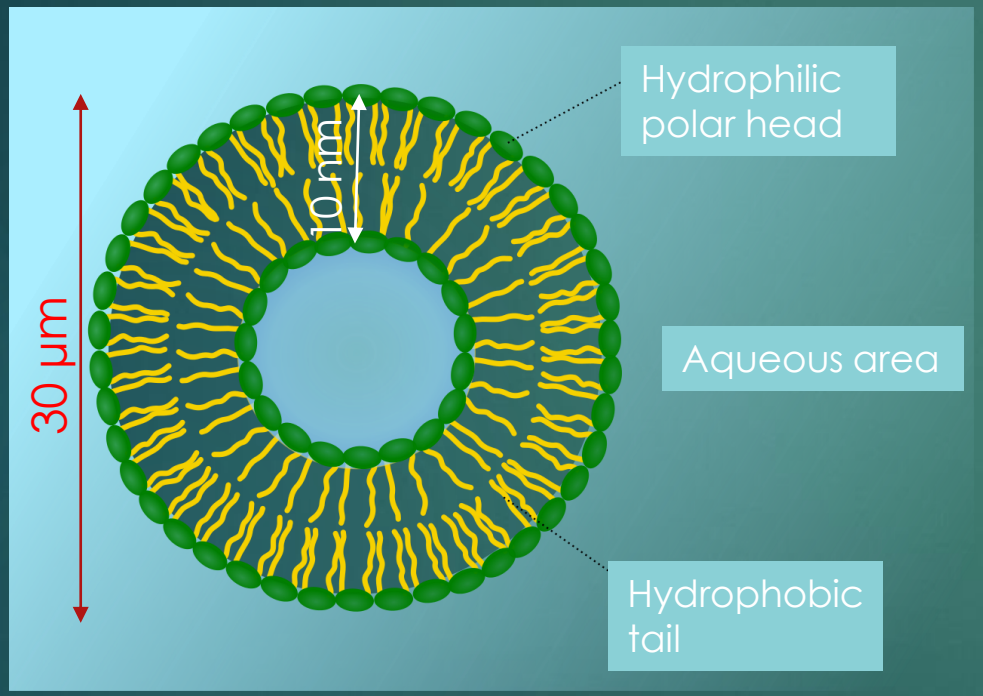
Giant Unimlamellar Vesicles growth and observation

Under P.Muller supervision and with M2 student V.Ruffine's help

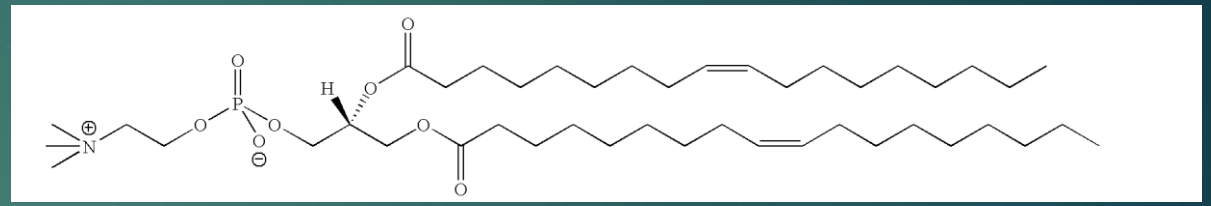
Introduction

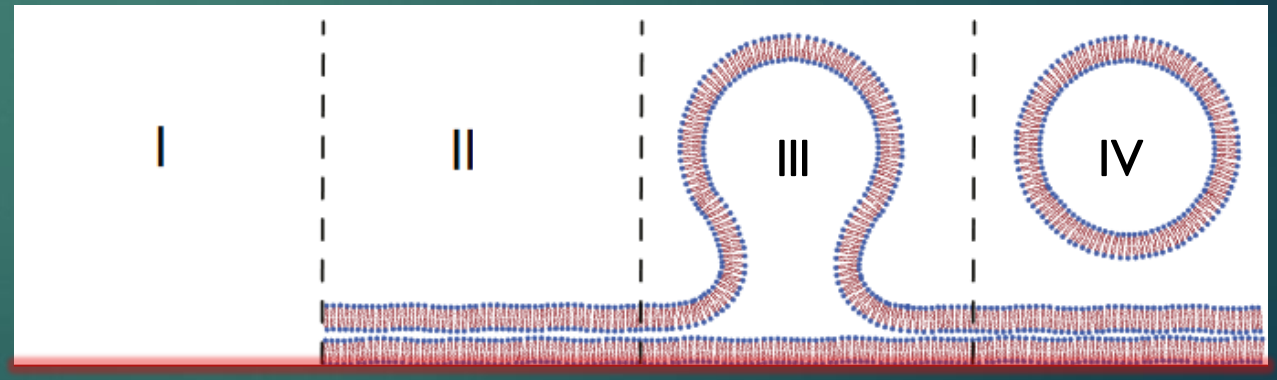


- What is a vesicle?
- What are GUV?
- What do we want?

I GUV Theory

- The DOPC phospholipid
  - Amphiphilic
  - Makes unilamellar Vesicles
  - M = 785g.mol-1
  - Cm = 1g.L-1
  - Su = 50 $Å^2$
- Growth on PVA
  - More vesicles
  - Bigger vesicles
- Approximately 2 bilayers/microliter
  - $^N/_V = \frac{C_m.N_A.S_u}{M.\pi.R^2} = 2{,}44$ lamellas

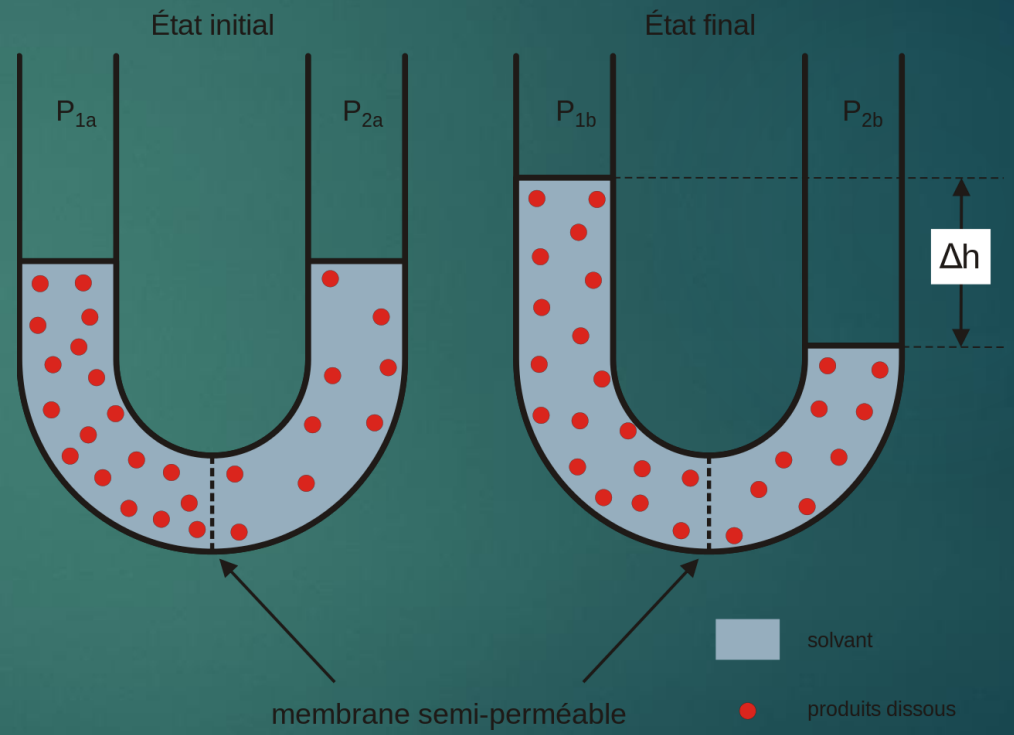




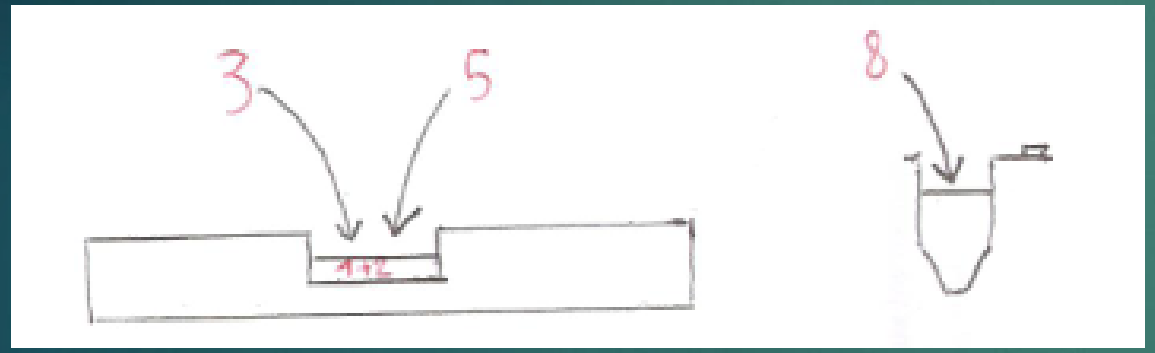
Extracted from Biophysical Journal Volume 105 July 2013, p.159

GUV Theory

- Vesicle environment
  - Water
  - Sucrose
  - Glucose
- Sugars mix
  - Osmotic pressure
  - Phase contrast
  - Decanting



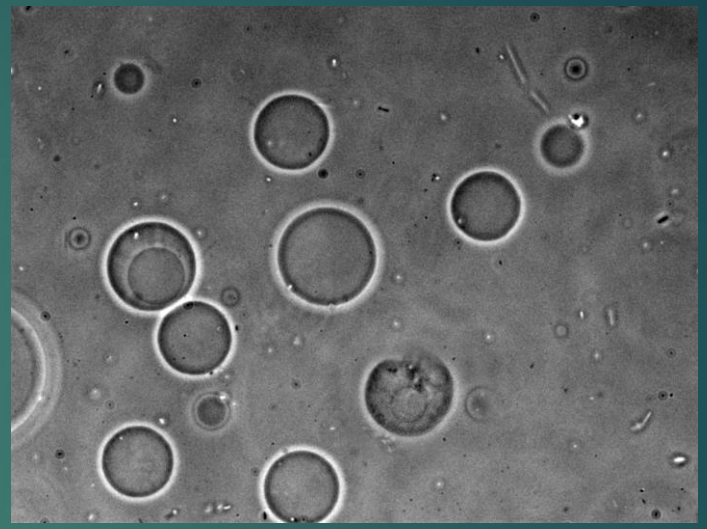
II Materials and Method

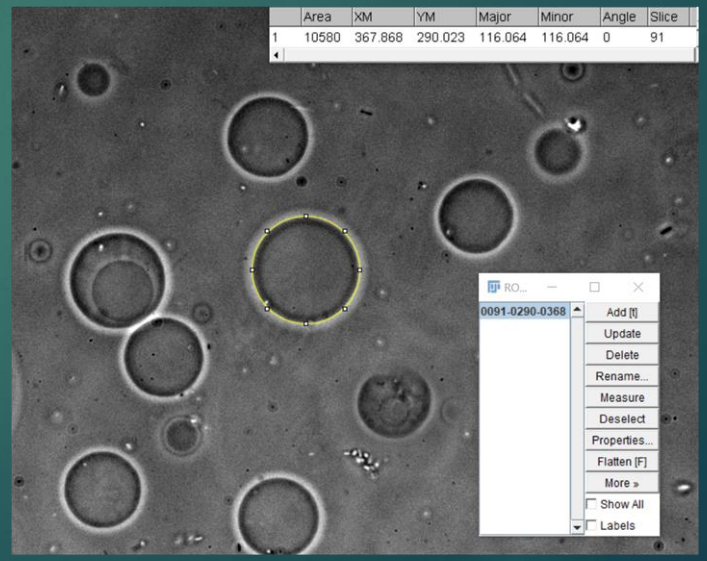


- Creation
  1. Coating Polyvinyl Alcohol layer
  2. Heating (1h30)
  3. Phospholipid
  4. Vacuum Drying (45 mins)
  5. Adding Sucrose
  6. Activation (1h)
  7. Transferring into an Eppendorf
  8. Adding Glucose
  9. Decanting in Eppendorf (2h)
  10. Glass slide deposition

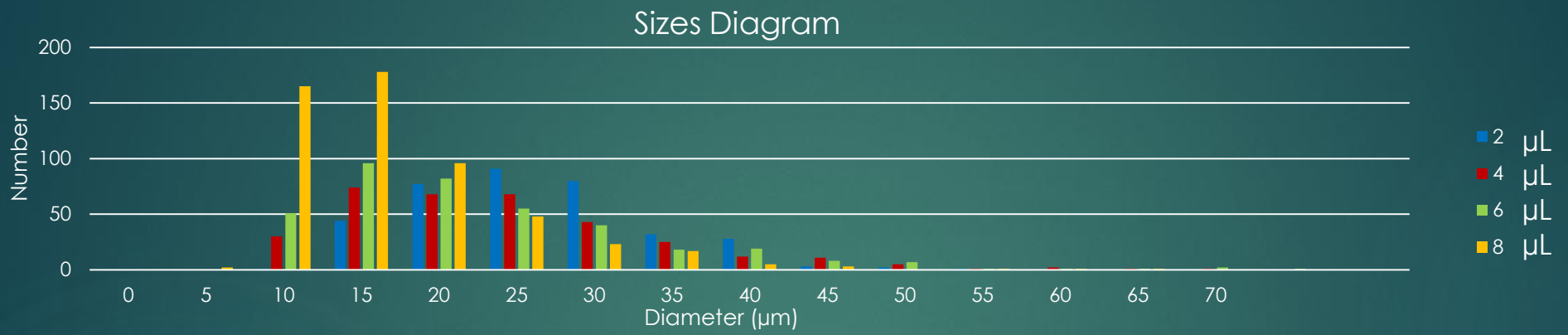
II Materials and Method

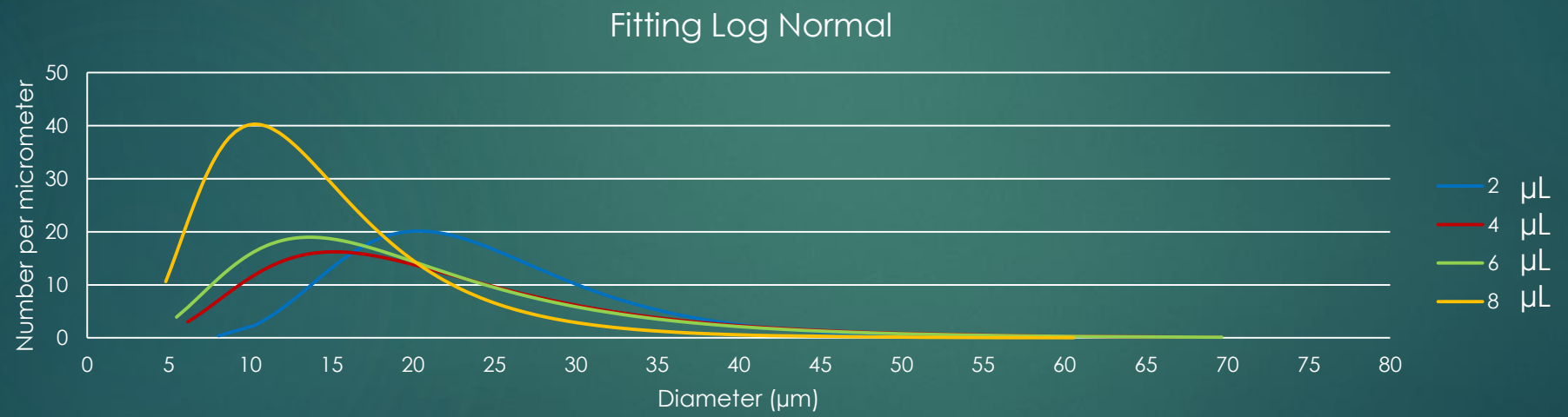
- Observation
  - GUV => optical microscope
  - Sugars => Phase contrast
  - Occasional fluorescence
  - Photographs
  - Counting and measuring
  - Separating the wheat from the chaff





III Results





Log Normal : $f(x;\mu,\sigma) = (x.\sigma.\sqrt{2.\pi}.e^{\frac{(\ln x-\mu)^2}{2.\sigma^2}})^{-1}$

Conclusion and outlook

- Conclusive size distribution
- Identification of the phospholipid volume as a possible distribution factor
- Many other possible factors :
  - Temperature
  - Drying time
  - Phospholipid
  - Sucrose/Glucose proportions

Thank you for your attention!