

Chemistry 401 – Week 2
Protocells and the origins of life

Some questions to guide your reading:

Chen et al. (2004) *Science* 305, 1474-6.

1. What is the chief *goal* of this work. They're wordy on this point – see if you can ID a single sentence that says it all. (Do not confuse goals with results. Find a hypothesis or some similar statement of what they seek to achieve, not what they did or did not achieve.)
2. How were the following experiments conducted (you may need to look at supplemental material)?
 - a. Preparation of sucrose containing vesicles.
 - b. Measurement of membrane tension.
 - c. Rate of lipid exchange.
 - d.
3. Explain the experiments behind Fig 1A-F and how they are to be interpreted. Take special note of the exponential decay curve in 1B. What is the relevance of that curve shape?
4. On 2nd page, middle column, a paragraph begins “To examine the mechanism...” Explain the goal, methodology and results of this set of experiments.
5. Describe series of experiments and results that are depicted in Fig. 2.
6. What is distinct about the set of experiments described in Table 1 & Figure 3, and how are these of particular interest?
7. Parse the sentence “In contrast, a neutral polymer such as PNA (peptide nucleic acid), having no associated counterions, would be a much less effective osmolyte, a difference that may have influenced the natural selection of the genetic material itself.” It may help to google PNA.
8. Last, and certainly not least, identify the structure and the role of the following compounds used in this experiment: bicine, calcein, GMM, meristoleate, POPC, R18, Triton X-100 & 5'-UMP. If there are others whose name/structure elude you, look them up!

Adamala and Szostak (2013) *Nature Chemistry* 5, 495-501.

1. Again, attempt to succinctly define the *goal* of this study.
2. Figure 1 is intended to summarize this study. Be able to walk through its content. (As an aside, is this a helpful visual? Could it be better?)
3. Figures 2-7 each describe distinct experiments. Be able to explain how the data was collected for each figure and what the results are.