

# When the Dead Flocculate!

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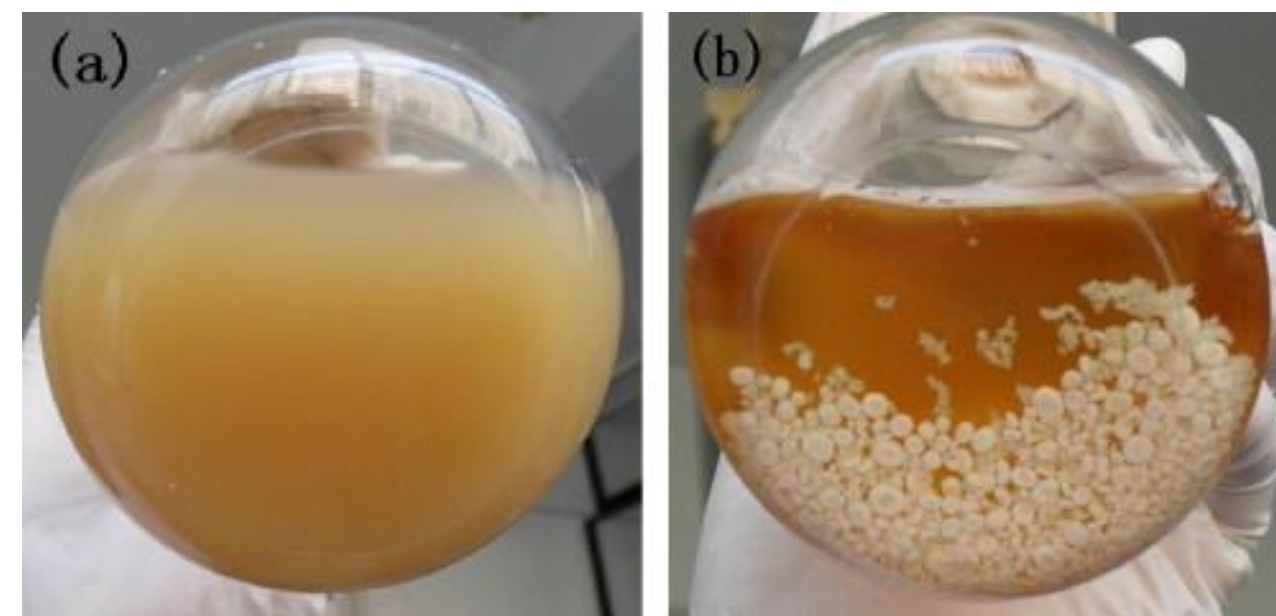
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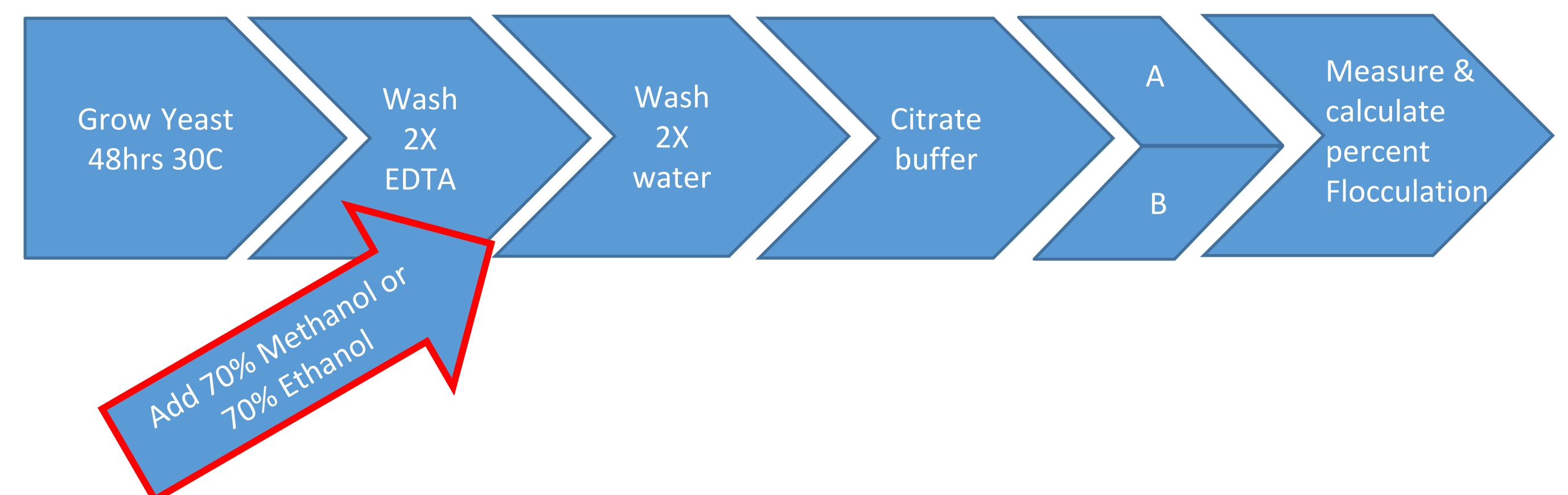
## Background

- Yeast is a good model organism due to it having a rich ground for study molecular mechanisms<sup>1</sup> and its similar way of aging compared to eukaryotic cells<sup>2</sup>.
- Classically flocculation was defined as a reversible process where yeast cells aggregate spontaneously and form flocs with either sediment quickly within the culture medium<sup>3</sup>.
- Flocculation is a useful property for the traditionally used in the industrial fermentations<sup>4</sup>.

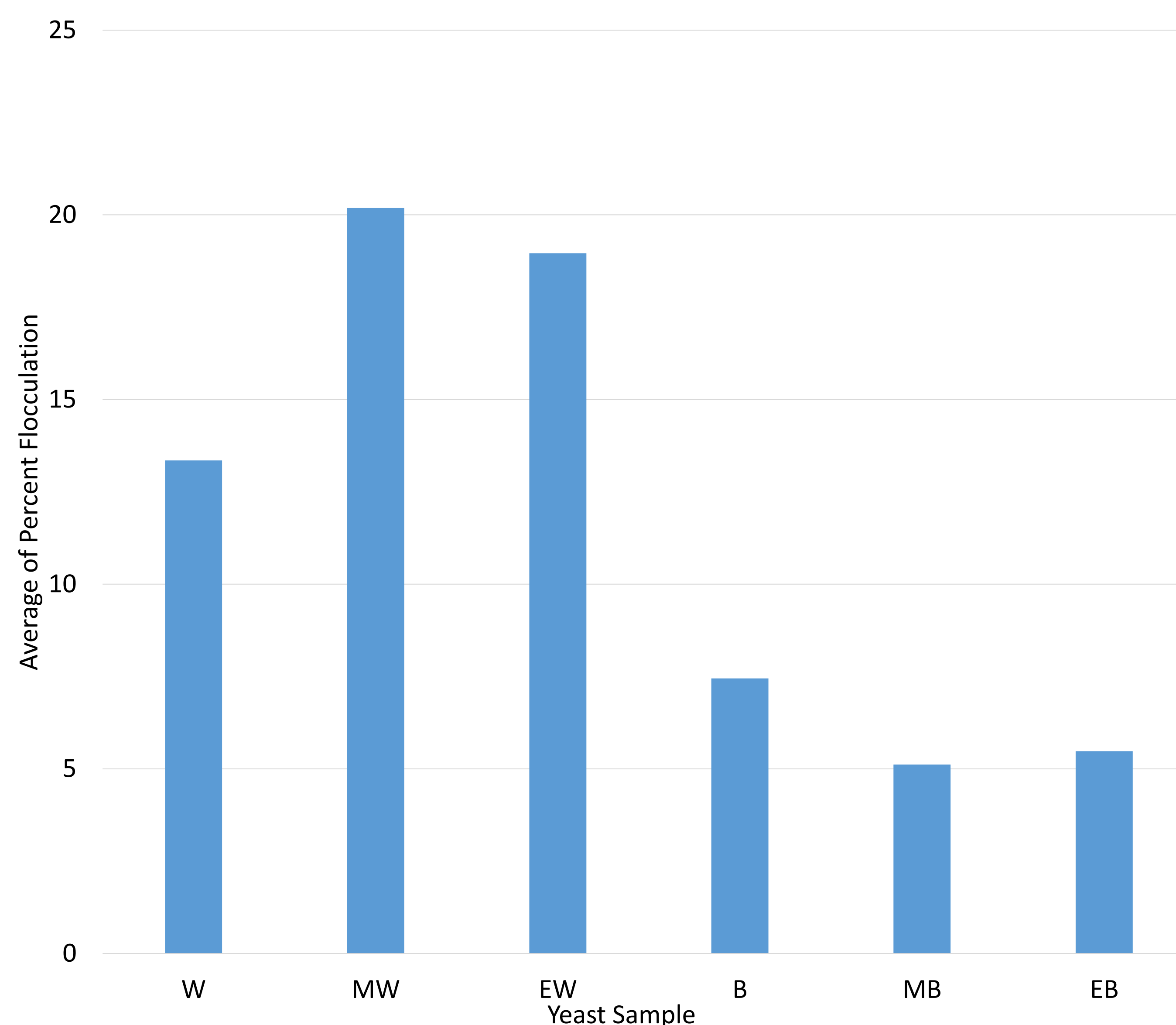


**Figure 1. Not Flocculated Yeast vs. Flocculated Yeast.** (a) shows yeast that is not flocculated compared to (b) which is flocculated yeast<sup>8</sup>.

## Methods



## Results



**Figure 4. Average Percent Flocculation of WLP002 and BY4743.** Compiled by averaging out all of the data collected during the experiment. W=WLP002, B= BY4743, M=Methanol, and E=Ethanol. The WLP002 control is represented by W and the control for BY4743 is represented by B. Methanol treated WLP002 is represented by MW and ethanol treated WLP002 is represented by EW. Methanol treated BY4743 is represented by MB and ethanol treated BY4743 is represented by EB.

## Discussion

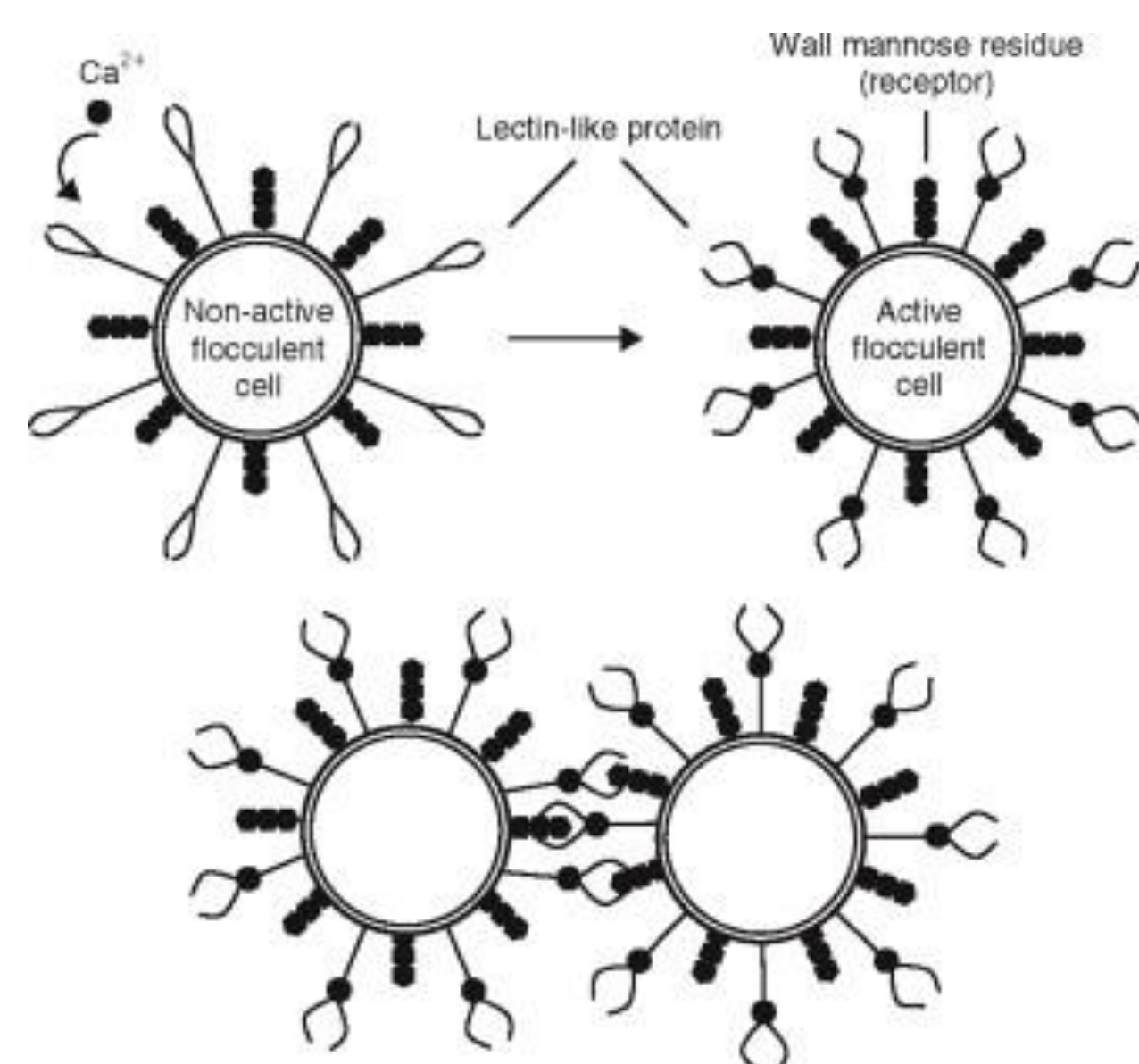
- 70% Methanol average flocculation for yeast WLP002 was 20.19% flocculation, this means that the treated WLP002 flocculated on average better than WLP002 control.
- The treated yeast cells do flocculate however, we did not confirm that the yeast cells we treated with alcohol were alive or dead.
- The hypothesis from this experiment was rejected due to that flocculation was still occurring after the yeast cells were treated with 70% Ethanol or 70% Methanol.

## Future Directions

- Staining the yeast cells to see if the yeast cell are actually dead.
- Also, looking at the yeast cells under a microscope to see if flocculation is occurring or if the clumping is aggregation.
- Using other alcohols and other concentration of alcohols to see if there are similar results.

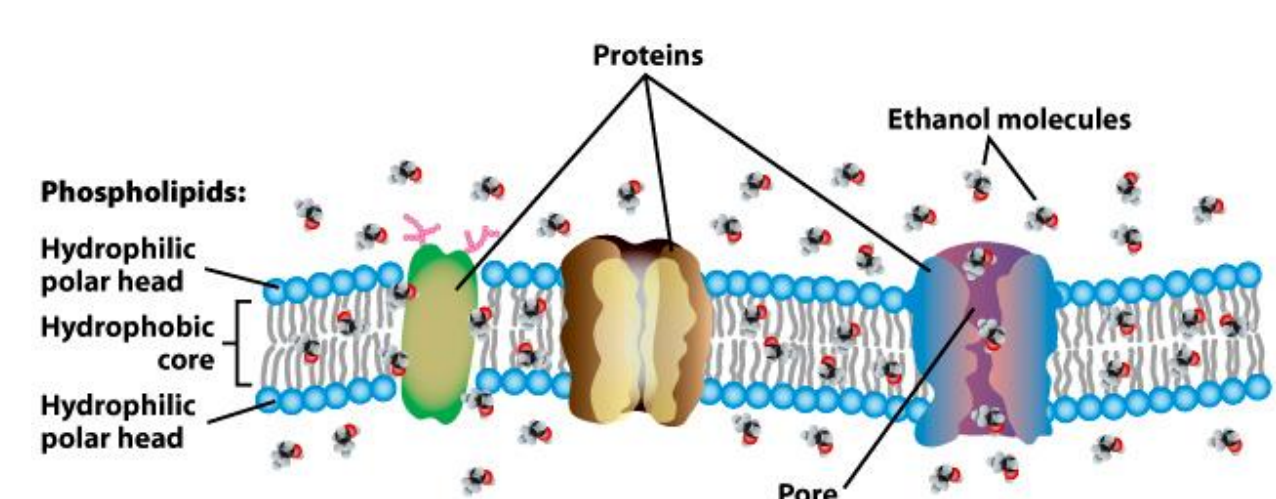
## References

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**Figure 2: Diagram of how flocculation occurs.** This figure shows how cells flocculate<sup>5</sup>.

- 70% alcohols are effective by crossing over the cell membrane and attacking the entire cell<sup>6</sup>.
- Using 70% alcohol, like 70% isopropyl alcohol, on single celled organisms and viruses to kill by dehydrating them<sup>6</sup>.
- The 70% alcohol that is added yeast cells pulls the water out of the cells and effectively dehydrating the yeast cells.



**Figure 3: Ethanol diffuse passively across biological membranes.** Shows how ethanol diffuse across biological membrane by going through the lipid bilayer<sup>7</sup>.

## Research Question

### Research Questions:

After being treated with 70% methanol or 70% ethanol, do dead yeast cells flocculate?

### Hypothesis:

After yeast cells are exposed to 70% Ethanol or 70% Methanol, the dead yeast cells will be unable to flocculate.

The alcohol treatment is generally lethal to yeast cells.

70% Methanol or 70% Ethanol does not affect the cells ability to flocculate.

Methanol treated WLP002 flocculates the better than Ethanol treated yeast cells.

**DEAD CELLS can FLOCCULATE!**