CHEM 495. Topics: Biochemistry, Physiology and Neurochemistry of Beer, Wine and Alcohol. Intersession (Rome) 2023

Block I - Possible Exam Questions

1) What are the key carbohydrates used and produced by yeast fermentation? What is the source and chemical nature of carbohydrates used in wine making vs beer? Are complex carbohydrates from seeds available to yeast (explain your answer) and how does malting prepare carbohydrates for fermentation?
2) Acetaldehyde is a compound made during fermentation. How is this product made, what are the aromas/flavors from this compound, and is this a valued flavor/aroma in beer, wine or distilled spirit?
3) Pick one of the GMO strains of yeast described in class or one you find on the web. Describe the genetic changes made, how they were made (be fairly simple for this part of the answer), and the changes the modifications made to fermentation or the product of fermentation.
4) Explain what a "reducing equivalent is" (more than NADH), why NAD+/NADH ratio/concentration is important for continued glycolysis. How does a cell continue to metabolize/ferment sugars in the presence or absence of oxygen (answer in terms of NAD+ regeneration).
5) What are the metabolic processes that occur in early and late fermentation? When and HOW is ethanol produced in each phase?
6) You have pitched yeast for wine or beer fermentation. But the culture is stuck – meaning the fermentation has stopped. What might be the causes and how would you fix the fermentation? Think of what both the compound/issue and the role they play in supporting metabolism.
7) How are the Warburg and Crabtree effect related and how do they differ? What are the metabolic advantages of the Crabtree effect both evolutionarily and practically for wine or beer makers?