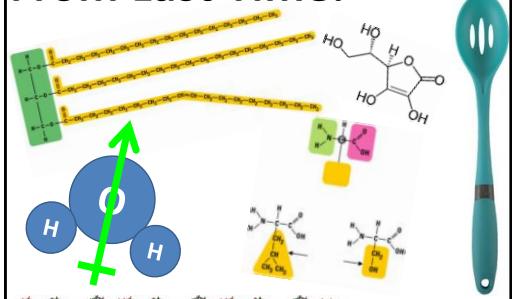
From Last Time:



Carbohydrates

"Carbo" → carbon
"hydrate" → water, O and H

Common Sugars

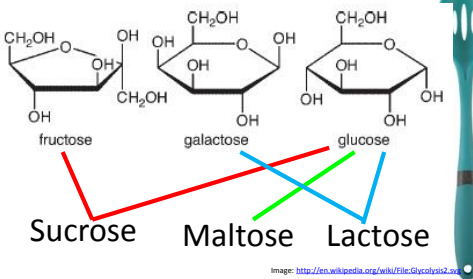


Image: http://en.wikipedia.org/wiki/File:Glycolysis2.svg

Common Sugars

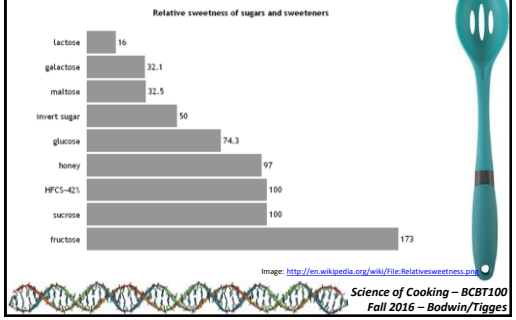
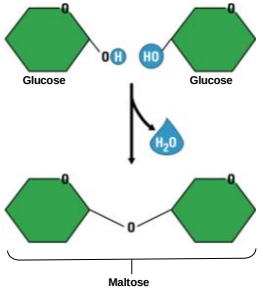


Image: http://en.wikipedia.org/wiki/File:Relativesweetness.png

Disaccharides



- Monosaccharides react to form disaccharides
- Liberate water
  - *Dehydration*
  - *Condensation*
- Reversible
  - *Hydrolysis*
  - *"-ase" enzymes*

Image: http://en.wikipedia.org/wiki/File:Glycolysis2.svg

Sugar Metabolism

Glycolysis

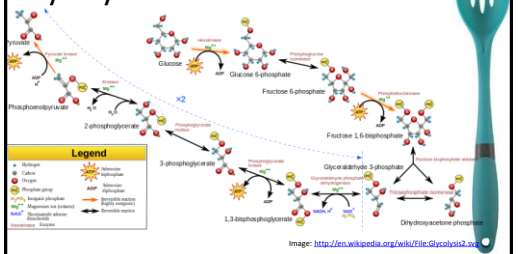


Image: http://en.wikipedia.org/wiki/File:Glycolysis2.svg

ATP ⇔ ADP ⇔ ATP

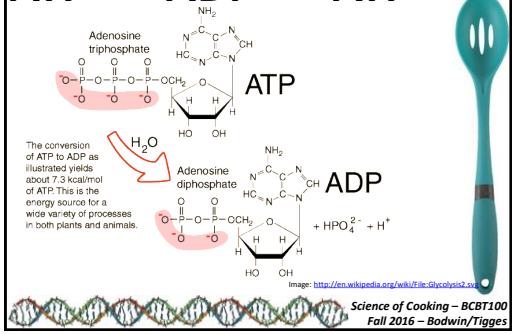


Image: http://en.wikipedia.org/wiki/File:Glycolysis2.svg

Sugar Metabolism

Glycolysis

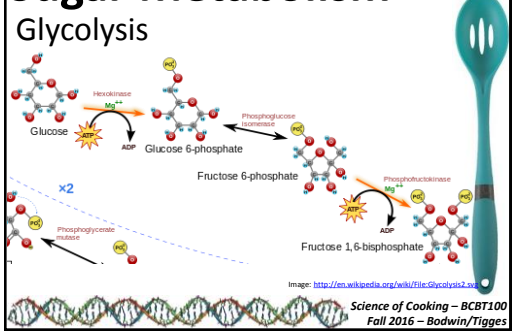
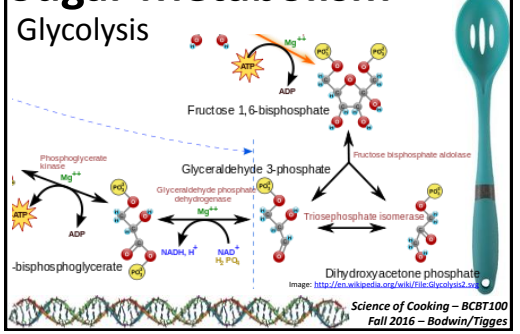


Image: http://en.wikipedia.org/wiki/File:Glycolysis2.svg

Sugar Metabolism

Glycolysis



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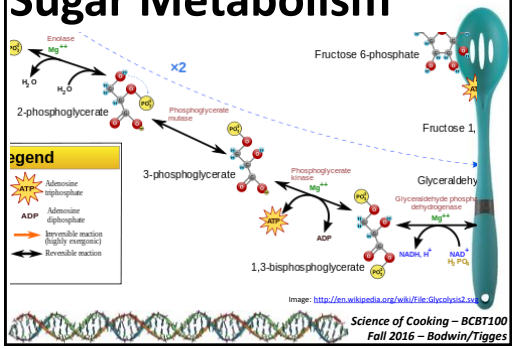
Sugar Metabolism



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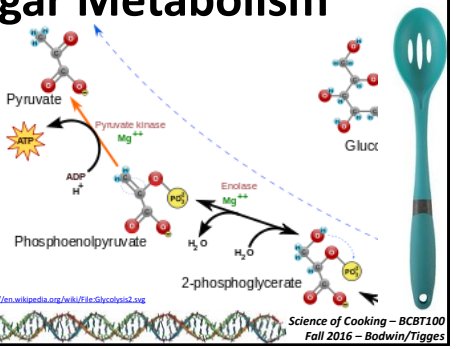
Science of Cooking – BCBT100
Fall 2016 – Bodwin/Tigges

Sugar Metabolism



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Sugar Metabolism

Glycolysis

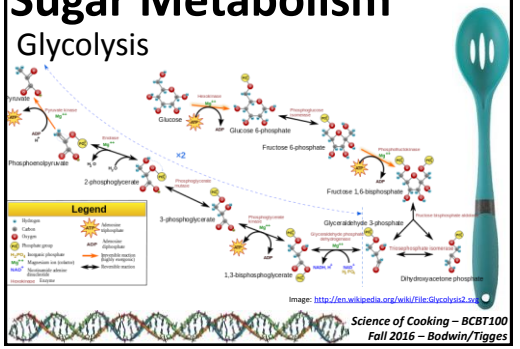

Image: http://en.wikipedia.org/wiki/File:Glycolysis2.svg

Science of Cooking – BCBT100
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Polysaccharides

Storage and structure

Starch, Glycogen, Cellulose

Sugar polymers

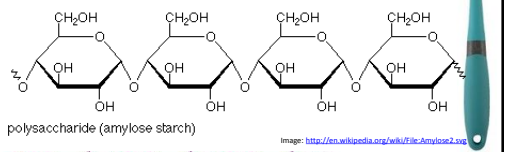


Image: http://en.wikipedia.org/wiki/File:Amylose2.svg

Starch

Glucose polymers

Energy storage in plants

Potatoes, rice, grains

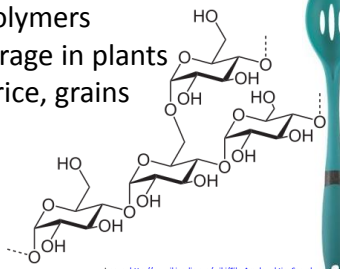


Image: http://en.wikipedia.org/wiki/File:Amylopektin_Sessel.svg

Starch - Structure

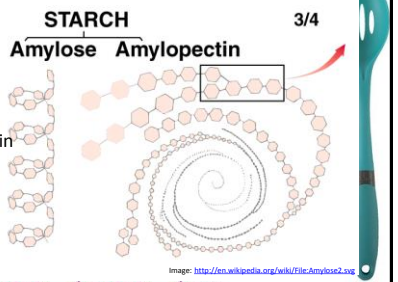
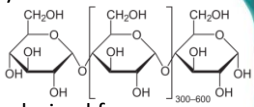


Image: http://en.wikipedia.org/wiki/File:Amylose2.svg

Starch – In foods

Thickener – binds a LOT of water

Provides energy - amylase



Industrially:

- Dextrose = glucose derived from hydrolyzed starch
- HFCS – dextrose treated with glucose isomerase

Image: http://en.wikipedia.org/wiki/File:Amylose2.svg

Glycogen – "animal starch"

Highly branched glucose polymer

Energy storage

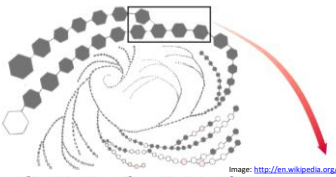
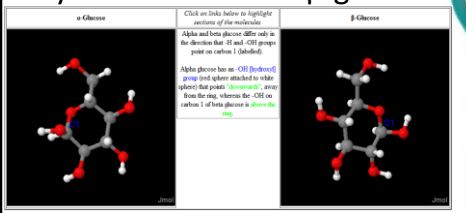


Image: http://en.wikipedia.org/wiki/File:Amylose2.svg

Cellulose

Polymers made from β-glucose



Side-by-side animations:
http://www.biotopics.co.uk/JmolApplet/alphabetajglucose2.html

Cellulose

- Enzymes that break amylose can't break cellulose
- Rigid, tough *fibers* that make plant cell walls and stalks
- Cross-linking

Cellulose - Dietary

Insoluble Fiber

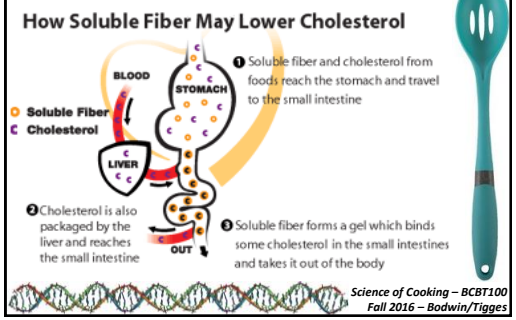
- Highly modified cellulose, up to ~1/2 the mass of a plant
- Binds water, "feel full"
- Draws water into gut
- Fruits, vegetables, whole grains

Cellulose - Dietary

Soluble Fiber

- Highly modified cellulose
- Forms gel with high water content
- Water-soluble substances absorbed by gel – "intestine sweeper"

Cellulose - Dietary



Cellulose – Food source?

Cellulosic fiber is indigestible

- Most animals lack enzymes to break down cellulose
- Ruminants have bacteria in the gut that {partially} digest cellulose to glucose

Image: http://www.publicdomainpictures.net/view-image.php?image=627&picture=black-cow, http://www.cvm.ncsu.edu/vhc/efac/rhm

Interactions

Fats and water

Amphiphiles

Micelles

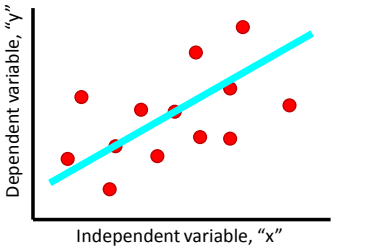
Emulsifiers

Working with Data

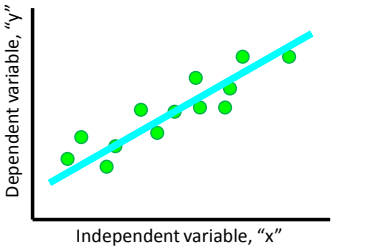
Table → organize related info

Graphs → show trends

Making graphs



Making graphs



"Good" Graphs

Choose "x" & "y"
Scatter plot – no connectors
Fill the area
Label axes clearly
Use meaningful fit lines/trends