

Plant Biochemistry BioPL462-2009 -

Start 19 Jan 2009 - Monday/Wednesday/Friday 9.05-9.55 am. Warren Hall 260

Part I (21 meetings) – Klaas van Wijk kv35@cornell.edu; tel 255-3664. Emerson Hall 332

Note: After each topic, we will take time for Q&A and Discussion. This will help to ‘digest’ the information and resolve aspects that are not clear. It is expected that you have read the chapter and relevant literature before each Q&A and Discussion. After each topic, there will be a very brief ‘Quiz’. If you have more questions, ask me after each meeting or schedule an appointment with me in my office.

Week 1. Chapter 1 and referral to other Chapters; websites

19 Jan **Organizational meeting** – participants, program, literature, tests and exams
21 Jan **Plant Organelles and their basic structure and biochemical functions** – Vacuole,
23 Jan Mitochondria, Plastids, Peroxisomes, ER, Golgi, Nucleus. Pathway and enzyme
databases on the web

Week 2 Chapter 4 + www search engines

26 Jan **Protein transport and translocation.** Protein Import and translocation into nucleus,
28 Jan vacuoles, mitochondria, plastids and peroxisomes. Prediction and experiments
30 Jan

Week 3 Chapter 12

2 Febr **Photosynthesis - Light and dark reactions & regulation** Light harvesting,
4 Febr Thylakoid Electron. Transport and structures of PSI, PSII, ATP synthase and cytb6f
6 Febr complex. State transitions. Calvin-Benson Cycle Regulation Rubisco C3 versus C4,
BS and Mesophyll cells

Week 4 Chapter 12 + 22.8

9 Febr **Chlorophyll, Heme and Carotenoid biosynthesis; Oxidative stress defense**
11 Febr Biosynthetic pathways, mutants and phenotypes, functions
13 Febr Anti-oxidant metabolism (glutathione, ascorbate, tocopherols; superoxide Dismutases)

Week 5 Chapter 13

16 Febr **Carbohydrate metabolism.** Hexose and Triose phosphate pools; Starch Biosynthesis
18 Febr and Degradation; Oxidative pentose phosphate pathway; differences chloroplasts and
20 Febr non-green plastids

Week 6 Chapter 14

23 Febr **Respiration.** Glycolysis, Citric acid cycle (TriCarboxylic Acid/Krebs Cycle), mito
25 Febr electron transfer & oxidative phosphorylation;
27 Febr **Photorespiration** – Oxygenation reaction Rubisco; interaction chloroplasts,
peroxisomes, mitochondria; regulation & function of photorespiration (Chapter 14.7-)

Week 7

2 March Overflow session
4 March Q& session and review
6 March **Test – part I in class; No Book (25%)**

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Part II (21 meetings) – Joss Rose, 331 Emerson Hall (jr286@cornell.edu), 255-4781

There will be a 5 minute multiple choice pop quiz at the end of each topic.

Week 8. Chapter 2 – Joss Rose

9 March **Plant cell walls:** monosaccharides, polysaccharides, primary wall

11 March biosynthesis, structural proteins,

13 March

March 16-20 *Spring Break*

Week 9

Monday 23 **Plant cell walls contd.** Cell wall modification

Wednesday 25 **Lipids and membranes:** lipid structure,

Friday 27 fatty acid biosynthesis,

Week 10

Monday 30 membrane synthesis and function, the cuticle,

April

Wednesday 1 storage lipids, genetic engineering of lipids, membrane transport (chapters 3 and 10)

Friday 3 **Nitrogen and sulfur metabolism:** Nitrogen fixation, ammonia uptake, nitrite reduction,

Week 11

Monday 6 sulfate uptake and assimilation, glutathione synthesis and conversion (chapter 16)

Wednesday 8 **Amino Acid Biosynthesis:** Nitrogen assimilation, GS/GOGAT,

Friday 10 aromatic amino acid biosynthesis,

Week 12

Monday 13 aspartate-derived amino acid biosynthesis

Wednesday 15 branched chain amino acid biosynthesis, proline metabolism (chapter 8)

Friday 17 **Secondary metabolism:** terpenoids, alkaloids biosynthesis,

Week 13

Monday 20 phenylpropanoids, flavonoids, coumarins,

Wednesday 22 lignin biosynthesis and secondary cell walls,

Friday 24 biotechnology applications (chapter 24)

Week 14

Monday 27 **Hormone biosynthesis and metabolism:** Gibberellins as a case study (chapter 17)

Wednesday 29 Review Session

May

Friday 1 **Test – part II in class; No Book (25%)**

Take-home exam part I and II combined due on May 16 (50%)