**Achtung: Gedankenprotokoll – NICHT vollständig!**

Sauer

1. Name 6 reaons for the complexity of biological systems.

2. You want to determine the intracellular concentration of a metabolite. Name 5 steps of the experiment, name a proplem, a consequence and a solution for each step.

3. C13 Flux Experiment. Find out about relative contributions of the two pathways.

B

I2

A -> I1 I4 -> I5-> I6 -> C

I3

3a. How would you carry out the experiment (feed A, B or C is not enough)?

3b. Which metabolites would you measure?

3c. Which other things would you need to know?

3d. How would you get the fluxes from this?

4. Monitor changes on glycolytic cycle in response to Fructose.

Heinmann

1. Define “model structure” and “model parameter”.

2. What is “conditional probability”?

3. Distance measures in hierarchical clustering. Describe key features of Euclidian distance measure and Pearsons distance measure. Formulas not necessary.

4. How does FBA deal with underdetermined systems? What is the underlying assumption of FBA?

5. You want to study the influence of addition of large amounts of glucose on an organism that grows aerobically on fructose. Before carrying out the experiment you want a model that predicts the outcome.

5a. What kind of model would you search for on the internet?

5b. What would this model tell you?

5c. How could you benefit from modeling before carrying out the experiment?

Hafen

1. Model of genetic interactions.

1a. Which models is used to represent these interactions?

1b. Where are the limitations?

1c.

2. Systems biology of multicellular organisms.

2a. Why is systems biology difficult in multicellular organisms?

2b. Which features should the ideal multicellular organism have for systems biology?

2c. Which methods would be suitable?

2d. Compare the development of normal blood cells with the development and discuss which one would be easier to understand from a systems point of view.

Wolfrum

1. You have an organism with an unknown genome. From comparison to related organism you know that the genome is about 4-5 Mpb. Which method would you use for sequencing? Describe strenths and weaknesses of your approach.

Stoffel

1. Design an RNAi screen for genes involved in regulation of function and number of mitochondria.

2. Name 4 characteristics of an siRNA that are important for its function.

Pelkmans

1. How can imaging-based techniques be used to determine the origins of cell-to-cell variability?

2. How can incoherent positive feedback (in other words how can different upstream acitivities work together to produce an outcome) lead to the elimination of intrinsic noise?

3a. Design an image-based assay to find out if a mitogenic signaling pathway is activated.

3b. Design an image-based assay to monitor the translocation of a transcription factor into the nucleus.

3c. You find out that two parallel pathways are activating your signaling pathway in a.) This means even if you delete one pathway this would have no influence on the activity on the pathway in a.). How could you still find genes that are regulated by one of the two pathways?

3d. Assume you found two genes in with your assay in 3b. One, when knocked-down, increases the translocation into the nucleus, and one, when knocked-down, increases the retention in the cytoplasm. The first one is a kinase and the second one is a phosphatase. Describe and draw the interactions you found. What kind of regulatory system did you discover?