

**Spring 2007 Biology 111 In-Class Exam #3 – BioEnergetics**

There is no time limit on this test, though I have tried to design one that you should be able to complete within 20 minutes. You are not allowed to use your notes, old tests, any electronic sources, any books, nor are you allowed to discuss the test with anyone until all exams are turned in at 11:20 am on Wednesday April 18. You may use a calculator and/or ruler. If you do not write your answers in the appropriate location, I may not find them.

**-3 pts if you do not follow this direction.**

**Please do not write or type your name on any page other than this cover page.**

Staple all your pages (INCLUDING THE TEST PAGES) together when finished with the exam.

Name (please print):

Write out the full pledge and sign:

On my honor I have neither given nor received unauthorized information regarding this work, I have followed and will continue to observe all regulations regarding it, and I am unaware of any violation of the Honor Code by others.

How long did this exam take you to complete (excluding typing)?

Lab Question:

**4 pts.**

1) If the flagella on a population of *Chlamydomonas* cells were growing at  $\sim 0.25 \mu\text{m}$  (i.e., 250 nm) per minute, how many amino acids of tubulin were being added per minute to the pairs of growing flagella?

Answer box

13,106,250

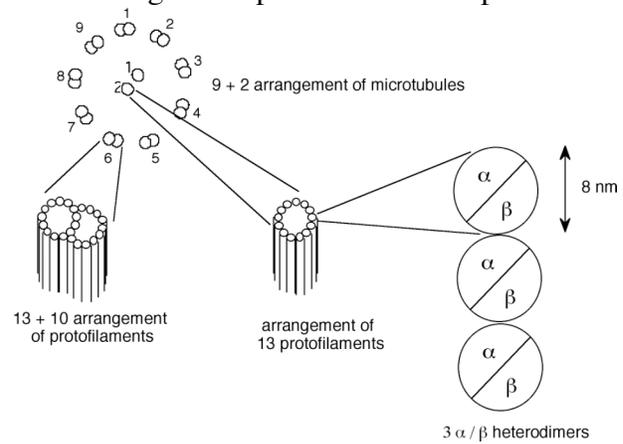
Show your work:

$(23 \times 9) + (13 \times 2) = 233$  protofilaments  $\times$  2 flagella = 466 protofilaments

$250 \text{ nm/min} \times 1 \text{ dimer}/8 \text{ nm} = 31.25$  dimers/ min

900 amino acids per dimer: 14,562 dimers/min in one protofilament

**13,106,250 amino acids per minute in both flagella**



Lecture Questions:

**14 pts.**

2) Starting with **pyruvate**, diagram the citric acid cycle with particular attention to energy, carbon, and all waste products.

**Was looking for a diagram similar to the one we did in class.**

**4 pts.**

3) List two possible products of fermentation and how many carbons are in each one.

1. **ethanol** has 2 carbons
2. **lactic acid** has 3 carbons

**3 pts.**

4)  $\text{Pi} + \text{ADP} \rightarrow \text{ATP}$   $\Delta G =$  +7.3 kcal/mole ATP

**3 pts.**

5) List 3 parts of a photosystem.

1. **antenna complex of pigments**
2. **reaction center (2 molecules of chlorophyll a)**
3. **primary electron acceptor**

**3 pts.**

6) List 3 different pigments in plants.

1. **chlorophyll a**
2. **chlorophyll b**
3. **carotenoids**

**3 pts.**

7) What genus of bacteria is responsible for reducing much of the nitrogen that we consume?

Rhizobium