

School of Biological Sciences Bioscience Olympiad Questions

1. Jack and Jill were debating where the wax that the bees make comes from. Jill argued that bees "harvest wax from flowers the same way as pollen". Jack insisted that they "make it inside their organism". How would you test who is right? Suggest as many experimental approaches as you can. (Read this question carefully and answer the question).
 2. In the imaginary steppe of Varasta planet peculiar animals called Yzargs live. They are medium-sized, terrestrial scavengers. Xenozoologists describe them as animals with long bodies on short legs. All travellers who went to Varasta noted that "Yzargs possess a property of swarming". It means that Yzargs gather consciously and very quickly in large quantities around every carcass suitable for eating. How do Yzargs find out that a carcass is available somewhere? Suggest as many hypotheses as you can.
 3. It is known that many plants form compounds that are not used directly for nutrition, respiration, growth or reproduction. What purposes are these compounds made for? Support your answer with examples from real life.
 4. In Dorothy and the Wizard in Oz by L.F Baum the following dialogue can be found:

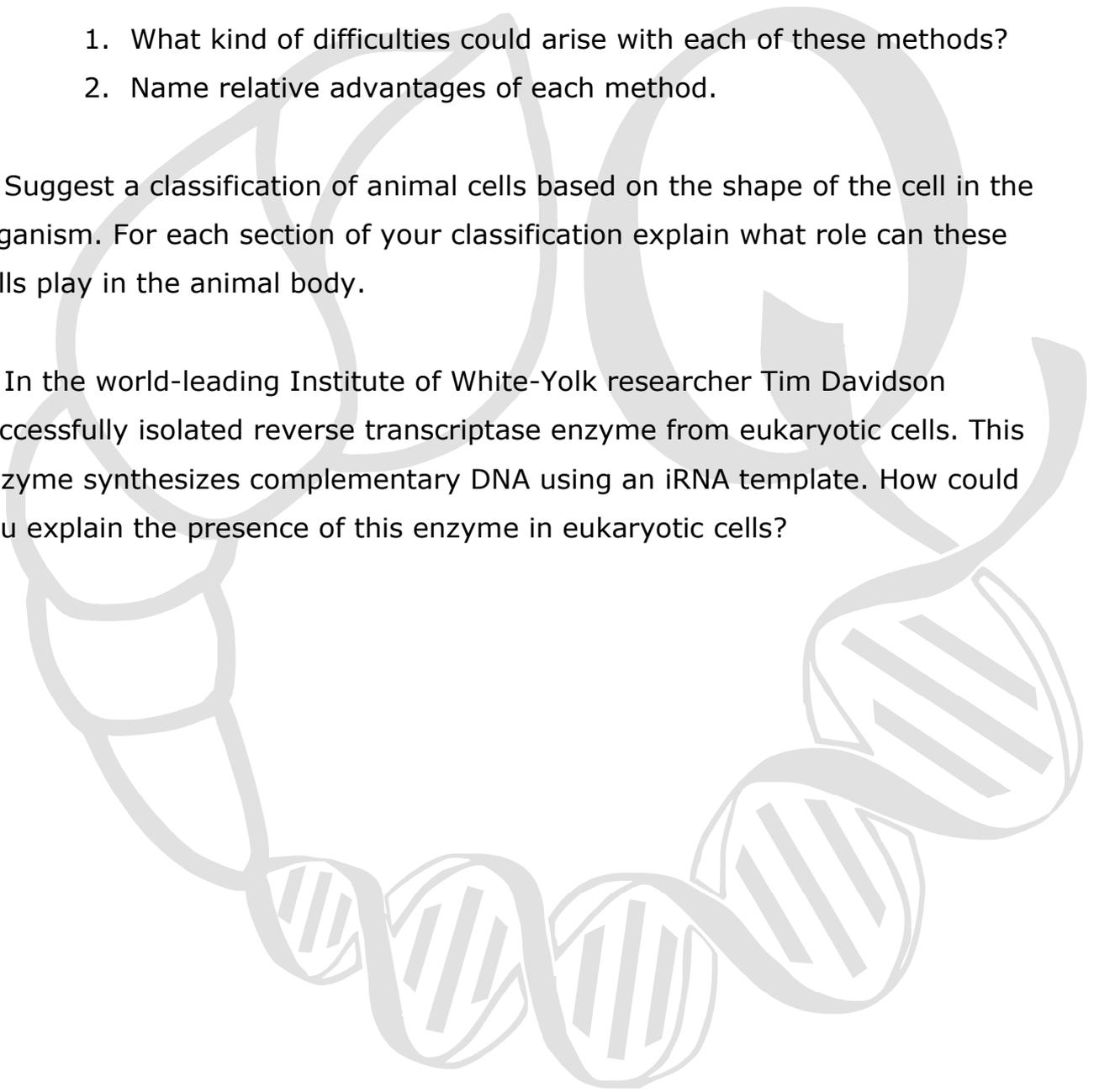
«"How did they happen to be so little?" asked Dorothy. "I never saw such small pigs before."
"They are from the Island of Teenty-Weent," said the Wizard, "where everything is small because it's a small island.»
- In reality, does the size of animals dwelling on an island depend on the size of an island itself? If it does not, explain why. If it does, please explain how. Also, try to thoroughly justify your answer.

5. In certain conditions (trauma or disease) an individual cannot obtain nutrition by mouth. This problem is usually solved by inserting a feeding tube directly into the stomach or small intestine or by administering intravenous injections of nutrients.

1. What kind of difficulties could arise with each of these methods?
2. Name relative advantages of each method.

6. Suggest a classification of animal cells based on the shape of the cell in the organism. For each section of your classification explain what role can these cells play in the animal body.

7. In the world-leading Institute of White-Yolk researcher Tim Davidson successfully isolated reverse transcriptase enzyme from eukaryotic cells. This enzyme synthesizes complementary DNA using an iRNA template. How could you explain the presence of this enzyme in eukaryotic cells?



Guidelines

Remember, that there is no single "right" answer to these questions. You are expected to suggest as many hypotheses, explanations, examples as you can or design experimental approaches in order to test your hypotheses. Questions and short model answers from the previous Olympiads can be found at the Olympiad webpage (<http://www.qub.ac.uk/Olympiad>). Model answers are brief examples of what is expected.

Please send your answers as a Word document file. It must be submitted in Verdana or Arial Type Face size 10. There is no page limit, but please keep it appropriate. Answers should be clearly numbered and each answer has to be started on a new page. Pages in the document should be numerated. Figures and pictures can be attached as well or included into the document (however check the printing resolution of the images prior to sending).

Regarding teams: we are looking for mixed teams containing at least one GCSE student, one lower 6th/AS-level student and one upper 6th/A2 student. Schools have a free choice on the other team members (maximum team size is 5). One team per school.

You have to submit your answers before or on 23 September

All this info and general information is available at: <http://www.qub.ac.uk/Olympiad>

You can contact Dr Alexander Galkin via e-mail olympiad@qub.ac.uk

Good luck!