**TJHSST Biology Olympiad, 2018-19**

**Sponsor: Dr. Locklear**

Captains: Eric Sun and Derrick Liang

Teaching Coordinators: Adele Peng and Eugene Lee

Treasurer: Edward Lue

Webmaster: Chris Jose

**Introduction**

Biology Olympiad is a rigorous academic club at TJ, geared towards preparing for national-level biology exams. Meetings are every Friday B block in Room 22. During 8th period practices, lectures will be supplemented by notes based off of the primary text, Campbell and Reece’s *Biology 8th Edition*. Practice questions will be worked into lectures to solidify understanding of lecture material.

This year, after-school practices will be held on Friday afternoons from 4 to 6 p.m.  Full tests with past competition problems will be completed and analyzed with the captain and teaching coordinators.

Our primary goal is to help prepare students for the USA Biology Olympiad Open and Semifinal exams. Note that while our distributed note packets and practice exams will help with biology competitions, individual inquiry is the ultimate factor for success in these exams. We hope that the enthusiasm for biology fostered within the club combined with our provided resources will drive students to achieve their own goals.

**Competitions**

USA Biology Olympiad, or USABO, is the main competition of the year. An annual contest with high prestige, USABO consists of three rounds: Open, Semifinal, and Finals.

The first test, the 50-question Open, encompasses general theoretical biology. This year, it will be administered on February 16th (subject to change) at TJ during 8th period. Details on how to register will be provided later in the year. Next, the Semifinal is a three-part exam that includes multiple choice, multiple true/false, and free response problems for a total between 200 and 250 points. While there is no lab portion, this test applies practical statistical analyses and reaches beyond the scope of general theoretical knowledge. The semi-final Exam is taken by students who score among the top 10% in the Open and will be administered on March 23rd (subject to change).

The twenty top-scoring individuals nationwide on the Semifinal exam are invited to a two-week training camp dedicated to practical and theoretical biology. The Final exam consists of test-taking and lab portions. Four finalists are selected to represent the US in the International Biology Olympiad.

Additional information is available here: <http://www.usabo-trc.org/>

The University of Toronto National Biology Competition will be offered in late April at TJ.  It is a 50-question multiple choice test that covers general biology, and is less difficult than USABO. The top 50 overall performers receive National Biology Scholar with Distinction awards and receive monetary compensation. Other top scorers are deemed National Biology Scholars. Last year, for the sixth consecutive year, TJ placed as the first overall school.

Check out the website, which contains additional information, including practice tests: <http://www.biocomp.utoronto.ca/>

We also will host our own contests this year, the TJ Biology Olympiad Winter Contest (TJBOWC) and the TJ Biology Olympiad Spring Contest (tentatively). The BOWC is a 30 question multiple-choice test that will be written by this year’s officers and will take place in mid-December. The TJBOSC will tentatively take place in mid-April. Topics covered on the two contests will include all of the lecture topics before the contest date. The officers will grade the contests and post the results online. An answer key with explanations to all the questions will also be posted. There will be three divisions (currently taking or have already taken IBET, currently taking AP Bio, already taken AP Bio). The top two scorers in each division will receive prizes.

**Resources and Text**

*Biology* by Campbell and Reece is the premiere introductory college text in the country, and it is strongly recommended that competitive club members carefully study each chapter, as the USABO Open and National Biology Exams are both directly based upon them. The 7th and 8th editions of the text are preferable.

        Ancillary recommended books provide more depth and specificity: *Biology* by Raven, Losos, Mason, and Singer; *Biology of Plants* by Raven, Evert, and Eichhorn.

The webmaster-maintained website contains plentiful resources for reviewing material and practicing test-taking technique. Links to high-quality graphic videos and college lectures are posted all year, and files of practice tests and previous USABO open exams will become available throughout the year. Resources like MIT OpenCourseWare are highly recommended.

**Media**

TJ Biology Olympiad email: [tjhsst.biologyolympiad@gmail.com](mailto:tjhsst.biologyolympiad@gmail.com)

Website (must create account to access files): [www.tjbio.webs.com](http://www.tjbio.webs.com)

Includes powerpoints, lecture notes, detailed calendar, and practice tests, and other external resources

Facebook Group: “TJHSST Biology Olympiad”

**Elections**

In order to be eligible to vote, you must have attended a minimum of **six (6)** Biology Olympiad meetings this school year.

In order to be eligible to run for office, you must have attended at least **nine (9)** Biology Olympiad meetings for the school year. Attendances are self-reported, but will be verified by the sponsor. Those whose self-reported attendance counts differ significantly from those provided by the sponsor will be considered ineligible to run for office. Additionally, if you plan to run for the position of captain or teaching coordinator, you must have given at least one lecture this school year. Most members satisfy this requirement by doing guest lectures in the spring.

All officers are expected to attend meetings regularly throughout the school year. The available officer positions (6) and their associated responsibilities are as follows:

* Captains (2): Responsible for club oversight, communications with the teacher sponsor and TJ administration, managing communications between all team officers, coordinating and registering for competitions, and carrying responsibility for weekly lectures and practices.
* Teaching Coordinators (2): Head of writing and delivering 8th period lectures, practice tests, and games; responsible for assisting the captain when needed.
* Treasurer (1): Accountable for maintaining the club bank account, organizing fundraisers, and managing all transactions with club members, officers, and faculty (e.g. paid registration for USABO and Toronto)
* Webmaster (1): Responsible for weekly upkeep of the Biology Olympiad website, which consists of posting lectures and practice exams, as well as updating the club calendar. Experience with web design and/or computer science is highly recommended.

Please keep in mind that officers are***accountable to the team*** for the entire school year, and are therefore subject to impeachment if the duties listed above are not met. More information on election will be given as the end of the year nears.

**Sample Questions**

*1.  Which statement is true about enzymes?  Enzymes:*

A. Are made up of a base containing nitrogen, phosphate, and ribose.

B. Have activity that is independent of temperature and pH

C. Lose some or all of their normal activity when their 3-D structure is disrupted.

D. Provide the activation energy needed to activate a reaction.

E. Work once only and then are destroyed.

*2.  Which of the following correctly describes how the lifespan of a protein is regulated?*

A. The part of the sequence coded for by the UTR tags it for destruction.

B. Giant protein complexes called ubiquitins destroy proteins after they have remained in the cell for a certain time.

C. Proteins are methylated over time; heavily methylated proteins are destroyed by proteasomes.

D. Proteins are tagged with ubiquitins, which are recognized by proteasomes; the proteasomes destroy the proteins.

E. Proteins tagged with methyl groups are destroyed by ubiquitins.

*3.  Which of the following chemicals or groups of chemicals is not a major determinant of flower color?*

A. Flavonols

B. Carotenoids

C. Cyanidin

D. Phytoalexin

E. Betacyanin

*4.  Place the following statements regarding photosynthesis in C4 plants in the correct order.*

I. ATP is used to convert pyruvate to phosphoenolpyruvate (PEP).

II. Mesophyll cells export four-carbon products such as malate through plasmodesmata.

III. PEP carboxylase adds carbon dioxide to PEP to produce oxaloacetate.

IV. Carbon dioxide is used to produce G3P in the Calvin cycle.

V. Carbon dioxide is released in cells that contain the protein rubisco, which binds it.

A. II, V, IV, I, III

B. V, II, III, IV, I

C. I, III, V, II, IV

D. I, III, II, V, IV

E. I, V, III, II, IV

*5.  Which of the following is not formed from neural crest cells?*

A. Peripheral nerves

B. Bones of the middle ear

C. Parts of the teeth

D. Bones of the jaw

E. Muscles of the face

*6.  The lymphatic system is most involved in the absorption of nutrients from which of the following foods?*

A. Bacon

B. Banana

C. Lettuce

D. Skim milk

E. White bread

*7.  Beriberi, a disease characterized by tingling, poor coordination, and reduced blood circulation, can be avoided by consuming adequate amounts of which of the following?*

A. Zinc

B. Thiamine

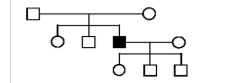
C. Folic acid

D. Magnesium

E. Vitamin A

*8. Given the pedigree, what is (are) the possible mode(s) of inheritance?*

I. Autosomal dominant

II. Autosomal recessive

III. X-linked dominant

IV. X-linked recessive

A. II only

B. I or III only

C. II or IV only

D. all four modes

E. none of the above

*9.  The 2011 Nobel Prize in Physiology was awarded to Bruce Beutler, Jules Hoffman, and Ralph Steinman in part for their discovery of the Toll receptors in fruit flies.   The Toll-like receptors (TLRs) are their equivalent in mammals.  Which of the following statements regardings TLRs is FALSE?*

A. TLRs function in the adaptive immune system as signaling receptors.

B. TLRs are found both on the plasma membrane of cell walls as the inner surfaces of vesicles.

C. Specific TLRs are capable of recognizing pathogen-associated molecular patterns (PAMPs) such as flagellin, double-stranded RNA, and lipopolysaccharides (LPS).

D. Signaling of TLRs promotes phagocytosis of foreign material.

E. All of the above are true.

*10.  Which of the following pairs represent two distinct species?*

A. House mouse, Fancy mouse

B. Mayan Indian, Inuit Indian

C. Monarch butterfly, Viceroy butterfly

D. Papillon, Chihuahua

E. Soldier ant, Drone ant

*11. What types of nervous system diseases would be characterized by neurofibrillary tangles, and death of dopamine generating cells, respectively?*

A. Schizophrenia; Parkinson’s

B. Schizophrenia; Major Depression (PTSD)

C. Alzheimer’s; Parkinson’s

D. Alzheimer’s; Bipolar Disorder

E. Parkinson’s; Major Depression (PTSD)

*12. Why would the presence of cysteine be of importance in determining protein structure (and thus function)?*

A. Cysteines are considered hydrophilic, so, tertiary structure would result in cysteines on the outer parts of the protein.

B. Cysteines contain thiol (-SH) groups, and along with sulfur containing methionine, can form disulfide bridges which can have a major effect on protein conformation.

C. Since cysteines are considered reducing agents, resulting disulfide bridge formations are considered mostly unstable unless catalyzed by disulfide isomerases.

D. A and B

E. A, B, and C

