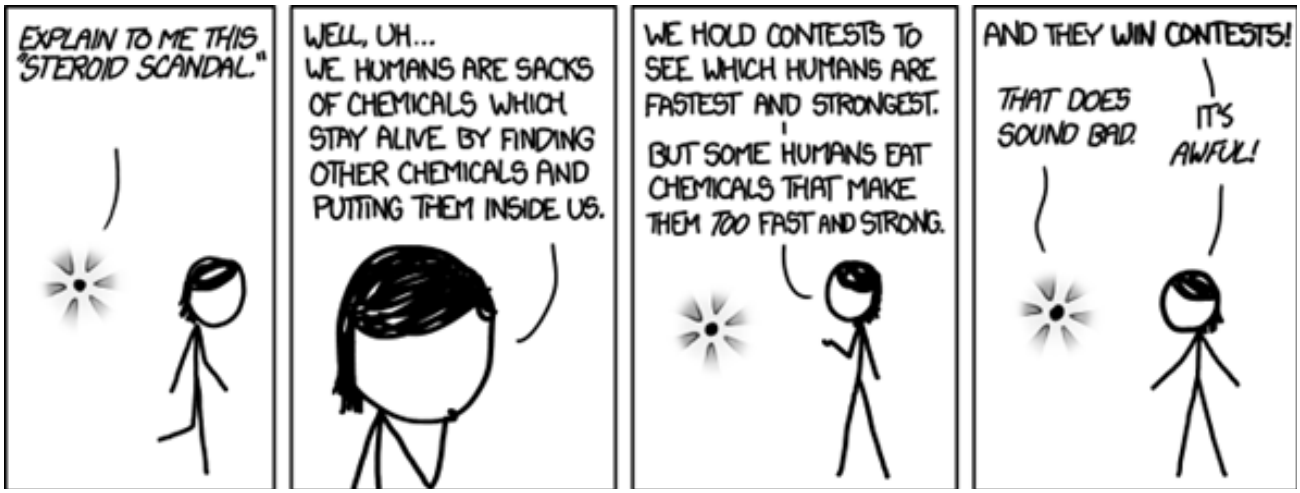
Topics for Turncoat Prelims

Note:

- The following are the ten topics for the Prelims round of Turncoat. All participants are requested to mail their first two preferences as soon as possible, as each topic can be allotted to a maximum of five people only. Each participant would be allotted one of the topics based on their preference order as well as on a first come-first serve basis.
- The topics have been designed to allow for biologically as well as socially relevant arguments. But it is necessary to keep in mind that though the social, cultural and ethical aspects need to be brought out in the debate, the significance of biological and research-oriented arguments must not be undermined either. Use of excessive jargon is however discouraged.

The topics begin on the following page.

Topic 1:



The use of "enhancing potions" in sporting events dates back to the ancient Greeks and Mayans. In the present scenario, the term 'performance-enhancing drugs' encompasses a variety of drugs including anabolic steroids, stimulants, diuretics and even certain painkillers. However, many of them are banned in competitive events. Although these drugs are often associated with potential side-effects, the long-term effects have not been properly investigated. Besides, there are certain hormones like Erythropoietin and Human Growth Factor that are exogenously administered by medical professionals in certain clinical cases.

As humans, we aim to push boundaries of our own capabilities, either with external or internal stimulation. Are performance-enhancing drugs (physical or mental) then justified as manifestations of our ambition to outdo ourselves, or do they undermine "human capabilities"? Are the associated risks too grave?

Keeping the above questions in mind, argue for or against the motion:

Should performance-enhancing drugs be legalised?

Topic 2

In 2011, scientists identified five mutations of the bird flu virus, H5N1, that make the disease highly transmissible among ferrets. Humans have a similar immune vulnerability. Fearful of its potential as a biological weapon, The National Science Advisory Board for Biosecurity, a U.S. government agency, pressured Science and Nature not to publish their paper. The controversial research also sparked a debate over whether potentially dangerous information should be made public. On the other hand, supporters for the H5N1 research argued that the benefits of free access of this knowledge would allow the world to design the most effective strategies to defend against the disease, an advantage which far outweighs the potential risks of bioterrorism. Also, given that influenza virus cannot be controllably used, especially a strain humans may not have immunity to, the risk of a pandemic reduces its attractiveness as a bioweapon.

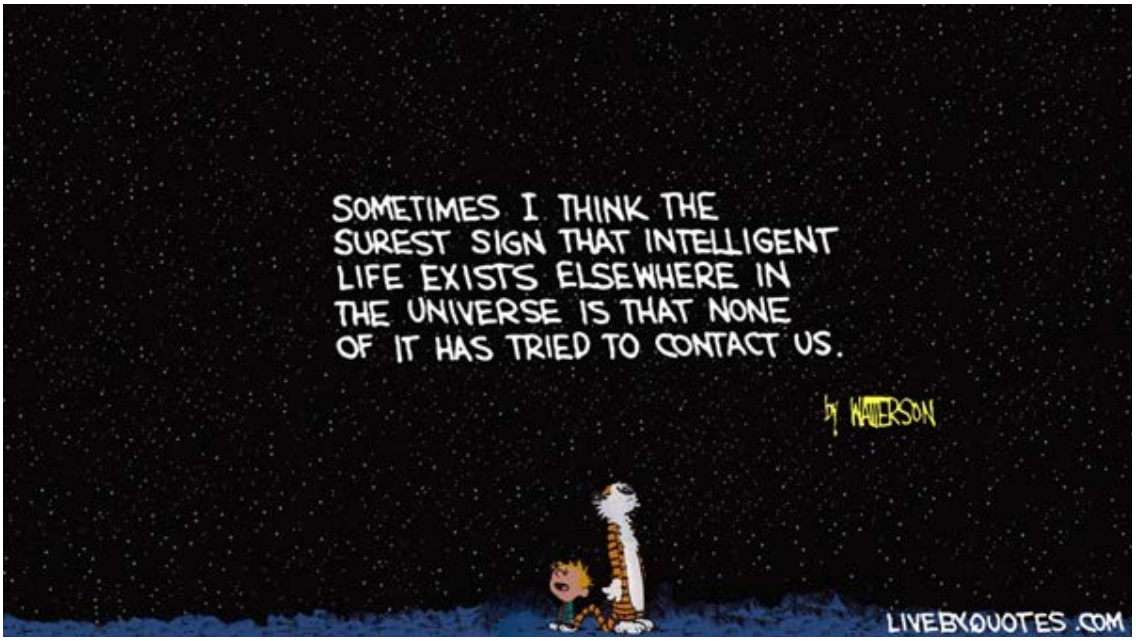
In light of the above example, argue on the following:

Was the argument of bioterrorism by the National Science Advisory Board a reasonable cause to suggest suppression of potentially useful scientific research?

Topic 3

The possibility of life in other parts of the universe is as daunting as it is exciting. There is a lot of speculation on whether those "life-forms" would be carbon-based as it is on Earth. The suitability of carbon for being the backbone of life is justified by the uniqueness and diversity present in its chemical and physical properties. However, alternative forms of biochemistry may use other elements. Silicon is one of the most popular substitutes for carbon, along with more exotic theories proposing the use of boron and metal oxides like zirconia. But the viability of such forms of biochemistry is often in question. The entire living kingdom on Earth has evolved with a carbon backbone entirely supporting its structural and metabolic processes. Whether this is due to the specific resource availability on Earth or a universally favourable phenomenon is the question.

Non-carbon based forms of life are certainly possible, but are they equally likely?



Topic 4

DNA profiling, developed in 1984 by Alec Jeffreys, is popularly used as evidence in legal and criminal disputes. Besides its uses in forensic science, it also has great potential for mapping genetic disorders and genetic engineering applications. However, despite being a powerful tool, it has been implicated in famous mistrials and wrongful convictions. The main challenges are contamination of DNA samples, faulty preparation techniques, lack of standardisation and erroneous interpretations. Planting of fake DNA evidence is also a serious concern and creates doubts about the reliability of this technique in future criminal investigations.

Taking into consideration the enormous potential and applicability of DNA profiling techniques, and at the same time recognizing the numerous concerns it presents, argue for or against the motion:

DNA fingerprinting technique is a reliable and sustainable forensic tool and DNA profile continues to be the most dependable form of evidence in identification of individuals or familial relationships.

Topic 5

The book *My Sister's Keeper* by Jodi Picoult involves a young girl being conceived by in vitro fertilisation to act as donor for an organ/cell transplant for her elder sister who is suffering from acute promyelocytic leukemia. Later, she sues her parents for medical emancipation. Picoult's novel is a work of fiction, but it does emphasise numerous questions that arise both for the families affected by the decision to create a saviour sibling, and for the clinicians and legal system which have to regulate the practice.

In your opinion, is the concept of "saviour sibling" justified or is it violation of an ethical or medical code?

Topic 6

A new-born horse foal is ready to walk as soon as it is born, a capability evolved to apparently evade the risk of predation. However, in humans, the period of childhood and adolescence combined is roughly around 18–20 years on an average. The development of the prefrontal cortex also comes to an end only around our mid-twenties. While this could possibly be a favourable condition for the development of our intelligence and higher cognitive skills, this leisurely pace of our development clearly has its costs, like greater parental investment and higher risk of the offspring dying before reaching adulthood! In this context, argue for or against the motion:

Is the long maturing age for humans a trade-off for our higher functional and intellectual capabilities?

Topic 7

Bioethics addresses a large number of questions, ranging from debates concerning animal experimentation, gene therapy, life extension, cloning, genetic engineering and even astrobiology. The need for responsible research work often leads to the formulation of ethical codes. But, is it necessary to enforce such codes? Do such regulations seriously impede scientific progress and are borne out of irrational fear, or are they crucial to a systematic and beneficial way of performing scientific research?

Are ethics in science a necessity or a liability?

Topic 8

In evolutionary biology and ethology, an organism is said to behave altruistically when its behaviour increases the reproductive fitness of other organisms, at a cost of its own reproductive fitness. Unlike the context of everyday parlance, the biological notion of altruism does not depend on the (conscious) intentions of the organisms performing it, but solely on the consequences of an action on the organisms' reproductive fitness.

Though this seems counter-intuitive in context of the Darwinian theory of natural selection, a popular theory to explain this behaviour is that it is advantageous at the level of a group. Though this "group selection" theory does allow for altruistic behaviours, it is considered a weak evolutionary force and may not be able to account for all forms of altruism in different species. An alternative proposal is the "kin selection theory", one of the basic tenets of which describes a genetic basis for altruism. The kin selection theory argues that individuals displaying altruism are selective towards related individuals for displaying such behaviour, leading to "propagation" of some "altruism related genes". In contrast to kin selection, group selection wouldn't predict significant change in altruistic behaviour if the individual migrates and becomes part of another group it may not be closely related to.

What, according to you, is the more feasible explanation for the evolution of altruism in different species - group selection or kin selection?

Topic 9

The sequencing of the human genome has renewed interest in biological differences between racial and ethnic populations, as genetic variants associated with disease susceptibility, environmental response, and drug metabolism are constantly being identified, and frequencies of these variants in different populations are being reported. For instance, current evidence for genetic contributors to type II diabetes indicates that variants associated with that disease in some European populations (e.g., localized Finnish and French populations) are not associated with the disease in Mexican American and Native American populations. However, boundaries between social groups are highly fluid and most genetic variation actually exists within all these social groups—not between them. Even the smallest socially defined population will have multiple haplotypes, alleles, polymorphisms, and other genetic characteristics that will be shared among different socially defined groups. Also, it is possible for particular combinations of alleles to confer unexpected resistance or heightened susceptibility in individuals.

Given the correlations between disease susceptibility and ethnic groups, and the inherent variation within a population, do human genome studies pose a definite risk of ethnic cleansing?

Topic 10

The appearance of life on Earth can be seen as an evolutionary continuum that seamlessly joins the prebiotic synthesis and accumulation of organic molecules in the primitive environment, with the emergence of self-sustaining, replicative chemical systems capable of undergoing Darwinian evolution. The discovery and development of the catalytic activity of RNA molecules, i.e. ribozymes, has given considerable support to the RNA world hypothesis—an early evolutionary stage prior to the development of proteins and DNA-based genomes, during which primitive life forms based on ribozymes existed. Nevertheless, the hiatus between the primitive soup and the RNA world is discouragingly enormous, and the understanding of the pre-RNA world certainly remains unclear.

One alternative model suggests that the first living systems were self-assembled complex biochemical networks lacking genetic polymers. It had loosely self-organized cycles of replicating peptides, replicating primordial lipid worlds and autocatalytic metabolic networks, associated with minerals or operating within permeable membrane-bounded systems. This would have lent to a kind of limited "phenotypic heredity". Such models suggest that the basic traits of metabolism could develop only after the closure of an amphiphilic bilayer into a vesicle i.e. the appearance of membranes represents the discrete transition from non-living to life. Others argue that the essential traits of living systems could have not emerged in the absence of genetic material being able to store, express and, upon replication, transmit to its progeny information capable of undergoing evolutionary change.

What, according to you, is a more reasonable basis for emergence of life - the genetic-first or the metabolism-first theory?