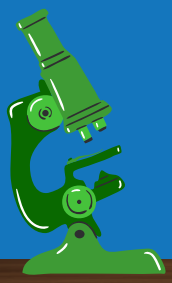
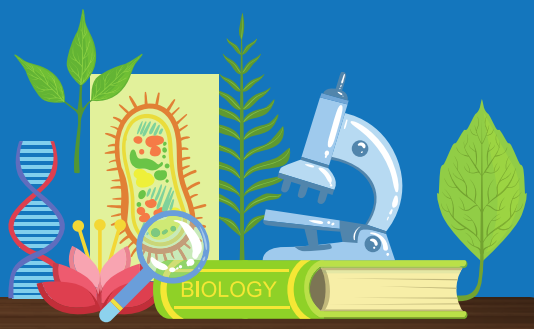
The STEAM-steinettes Gazette



Edition 2

Biology

Feb. 2023



> If facts are the seeds that later produce knowledge and wisdom, then the emotions and the impressions of the senses are the fertile soil in which the seeds must grow.
>
> Rachel Carson

A New Frontier in Modern Medicine

By: Aynsley

Breathtaking and bold, the field of regenerative medicine has been blazing full speed ahead since the late 1900s, with one of its most notable innovations being autologous cell therapy (Kazmi et al. 2009). For decades, the solution to organ failure was transplantation - implanting viable organs from another individual into a patient - but organs may be rejected as the immune system attacks "non-self" cells (Mao and Mooney 2015). Enter autologous cell therapy, or ACT. First developed in the 1980s, ACT is a "novel therapeutic intervention" in which an individual's own cells are cultured outside of the body and then "reintroduced into the donor" (Kumar et al. 2014). One example concerns bone repair, in which autologous chondrocytes (cells that produce cartilage) are collected from the ends of the patient's bones and "implanted at the site of injury" in order to treat "focal articular cartilage defects" (Mao and Mooney 2015). This innovative therapy has downsides, though. There is a time delay in treatment as cells must be "culture-expanded," and ACT is expensive, sophisticated, and not widely accessible (Mao and Mooney 2015). Yet autologous cell therapy is groundbreaking because it circumvents the "risks of hypersensitivity reactions" associated with transplantation (Kumar et al. 2014). The versatility and possibility inherent in human tissue means there is a universe of potential for autologous cell therapy, and if the current pace is any indication, there is so much more to come.

Read on!

FEMALE SCIENTIST SPOTLIGHT

By: Jasmine

DR. MASAYO TAKAHASHI

Masayo Takahashi, born 1961, is a physician, ophthalmologist, and stem cell researcher. After she received her M.D. and Ph.D. at Kyoto University, she worked as an assistant professor in the Kyoto University Hospital (World Stem Cell Summit). Later, she moved her work to Salk Institute, where her discoveries on the retina first began. She has done important work in the developmental biology field, studying retinal regeneration. Until recently, it was thought that in adult mammals, the retina is incapable of regenerating after sustaining damage. However, new knowledge leads scientists to believe it is possible. Takahashi's research looks into the possibility that transplanting cells from outside the retina may one day make it possible for regeneration through the use of intrinsic progenitor cells (Center For Developmental Biology). Her project involves creating Induced Pluripotent Stem Cells (iPS) from the skin cells of patients with macular degeneration. From there the iPS cells will be turned into retinal cells to be used on the patients. So far, her research has shown positive results.

DR. EVELYN MAE MENDOZA

Born August 7, 1947, Evelyn Mae Tescon Mendoza is known for her research in biochemistry and biotechnology. She holds a Ph.D. in biochemistry. Her research studied things such as plant resistance to pests, the fatty acid and the triglycerol composition of various coconut species, and the development of a papaya with delayed ripening aided by genetic engineering. More specifically, she studied the biochemical basis of the macapuno phenotype of a coconut, the nutritional quality of cowpea, mungbean, cassava, sweet potato, and other legumes indigenous to the Philippines (Famous Filipino). She has conducted a number of researches and written dozens of papers that have won a number of honors and awards. These include the IPB Recognition Award in 1990, The Outstanding Women in the Nation's Service in 1989, the Achievement Award in Chemistry in 1988, The Achievement Award In Research in 1988, Outstanding Young Scientist in Chemistry in 1984, and Distinguished Service Award in 2000.

Science Experiments!

By: Hitej

INTERMEDIATE

Swaying Stems

Phototropism is when a plant, in response to light, either sways towards the source of light or away from it. You can examine phototropism from the comfort of your own home. Place a plant next to a window that has light shining from one side. It doesn't have to be for the whole day, but for an hour or so during the day. Through the period of a week or two, you will see the plant leaning towards the area the light comes from!

ADVANCED

Acidity Detector

Different substances have different levels of acidity. To measure the acidity, you can use litmus paper. This is a special type of paper that changes colors based on the acidity levels. High acidity is red, neutral is the same color, and basic, the opposite of acidic, is blue or yellow-green.

CLICK HERE FOR THE STEPS!

Global Science Happenings

By: Hitej

Researchers find that stranded dolphins' brain activity is similar to Alzheimer's patients'.

Yale scientists revive organs of a dead pig.

AlphaFold AI predicts 3-D DNA structure of known proteins from their amino acid sequence.

WATER BEARS: THE MICROSCOPIC ANIMAL THAT WILL OUTLIVE US ALL

By: Barros

Have you ever heard of Water Bears? Tardigrades, also known by their common name "Water Bears," are micro-animals with terrifying endurance to temperature, lack of food, and lack of oxygen. These tiny critters are typically around 1 millimeter long, and are best seen under an electron microscope. With an impressive resistance to temperature, radiation and lack of nutrients, these adorable alien-looking creatures are the focus of scientists trying to find out how to better human life, specifically regarding their ability to withstand incredible amounts of radiation. The key to these tiny bears being able to live in conditions ranging from the heat of the Sahara to laboratory temperatures below -200 degrees Celsius is their ability to go dormant. During dormancy, Water Bears cease all of their bodily functions - even breathing! This, paired with their temperature and radiation resistance, is why they would be able to survive out in space if they were taken there! A Water Bear's dormancy can last as long as needed to survive the situation it has been put in, from a few hours to a few centuries! Once they are in dormancy however, it can take many hours to wake them up if you were to try to. The longer it's been in dormancy, the longer it will take to wake it up. Luckily, as long as Water Bears have access to food and water, they can grow by cell-division, though their protective outer layers will contain the same number of cells for the duration of their adult lives. Interestingly, before these little guys reach their adult stage, they still have their protective covering of cells, though as the Water Bears grow, they molt, or shed, their once-fitting layer that has inevitably tightened.

Now that you know a little more about Water Bears, you can go and try to collect your own! Here's a lovely site by the University of Carleton that includes some more facts, as well as an instructional guide on how to collect Water Bears from local moss or lichen: https://serc.carleton.edu/microbelife/topics/tardigrade/index.html.

Review: Spin by Robert Charles Wilson

By: Barros

Spoilers
Rating: 5/10

Recommended Age: 14+

Spin is a hard science-fiction novel written by Robert Charles-Wilson that starts off and breaks into the world of the Spin Trilogy, with the following two books being Axis and Vortex. This book follows Tyler Dupree and his friends Jason and Diane Lawton as they witness the stars and moon go out one night, only to find out years later that the Earth has been enclosed in a time-slowing membrane, making mere seconds on Earth the equivalent to hundreds of years externally. Taking full advantage of this fact, Tyler works as Jason's personal physician as Jason launches a plan with his team to colonise Mars. Fast forward, and a few years later an extraterrestrial spacecraft crashes down into a rainforest, carrying a long-descended human inhabitant of Mars. This Martian has brought with him life-enhancing medicinal technology that not only extends the life of the patient who takes it but enhances abilities such as reflexes and empathy. The rest of the book goes on to explain the ethics and moral debacles as to who should receive this treatment and when, as well as if infants should be exposed to its effects or not. With the reader being confronted by many mind-boggling questions and moral dilemmas, *Spin* is a wonderful book for deep thinkers and adventure-lovers alike, graciously combining the twists and turns of hard science-fiction with the brain-exercising labyrinth of bioethics and philosophy. Once you finish this book, you'll be rushing to get the sequel!

Fantastic Facts!

By: Sofia

All humans have 9 senses — vision, hearing, smell, taste, touch, balance, temperature, proprioception (body awareness), and pain.

The body can detect taste in 0.0015 seconds, which is faster than the blink of an eye.

We aren't actually physically touching anything, because atoms never touch.

Meet the Team

A STEAM Club + The Einsteinettes collab

Ace

Aynsley

Barros

Halee

Hitej

Jasmine

Maddi

Sofia

Special thanks to our awesome advisors, Ms. Cristen Jones and Mr. Chad Hamblin

The STEAM-steinettes Gazette is an interclub collaborative science newsletter created entirely by POA students from STEAM Club (6-12) and The Einsteinettes (9-12). A new issue will be published monthly for grades 6-12, each focusing on a different realm of science.

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