

YOUNG GLOBAL SCIENTISTS

YGS

MAGAZINE

VOLUME 1

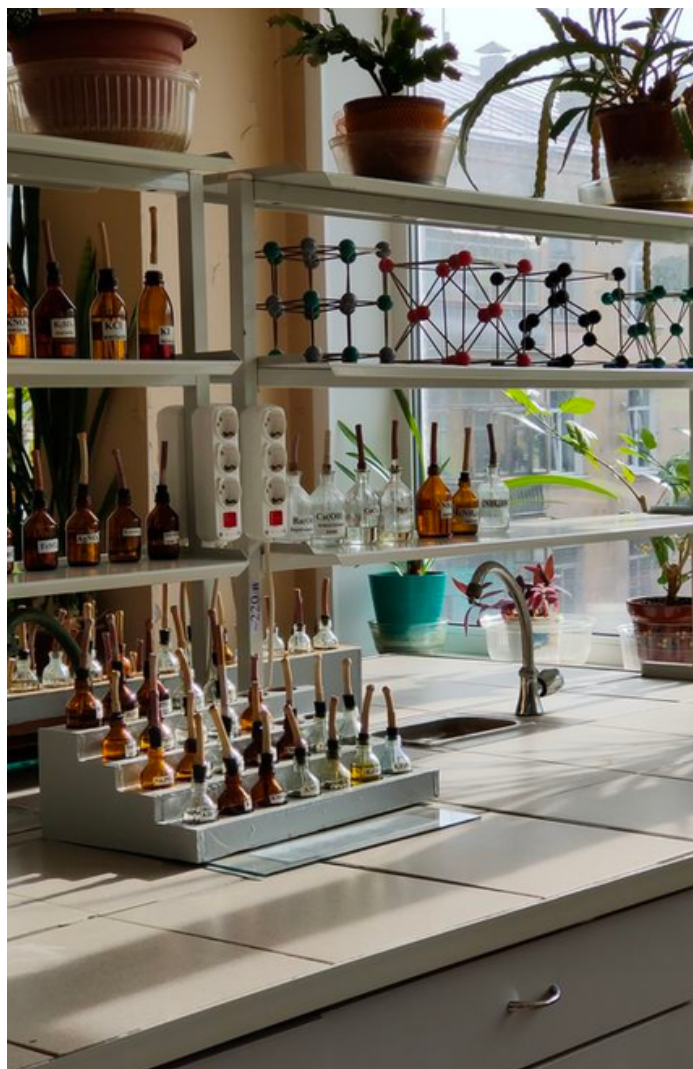
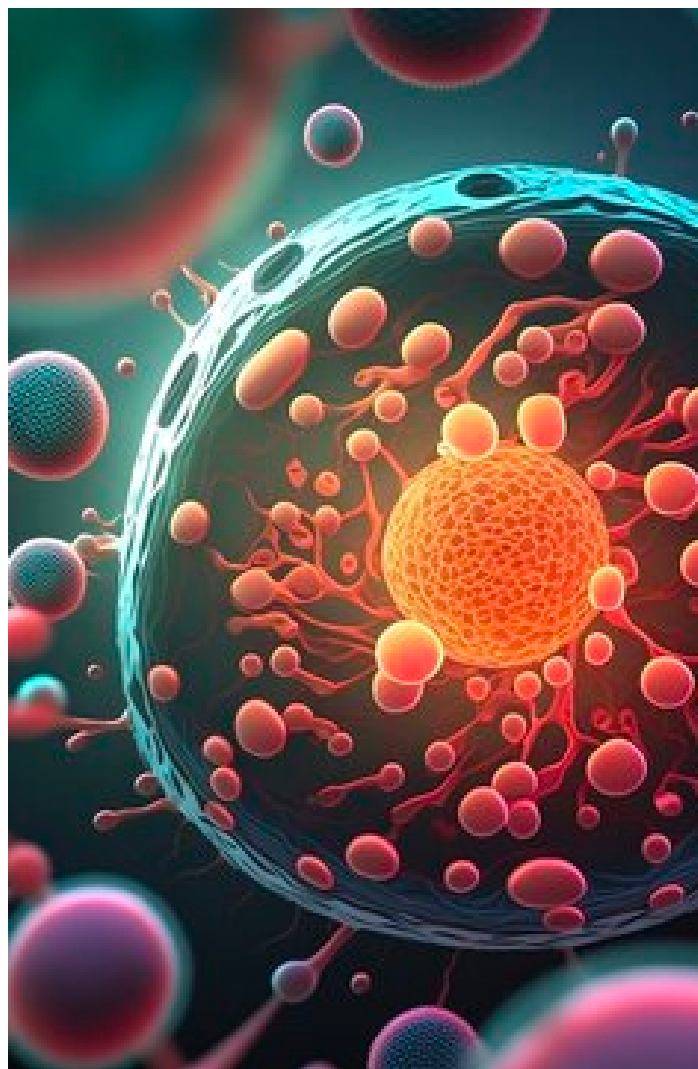
Scientific Discoveries by Students

Linking Alzheimers and Mouth Bacteria

Brain Injuries and Language Disorders

Effect of Heavy Metals on Pollen

How to Perform Research as a Student



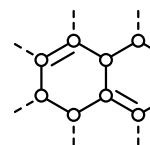
Editor's Note

The Young Global Scientists Journal (YGS) is an online student-run journal that creates opportunities for young scholars around the world to share their learning and publish their thoughts and discoveries.

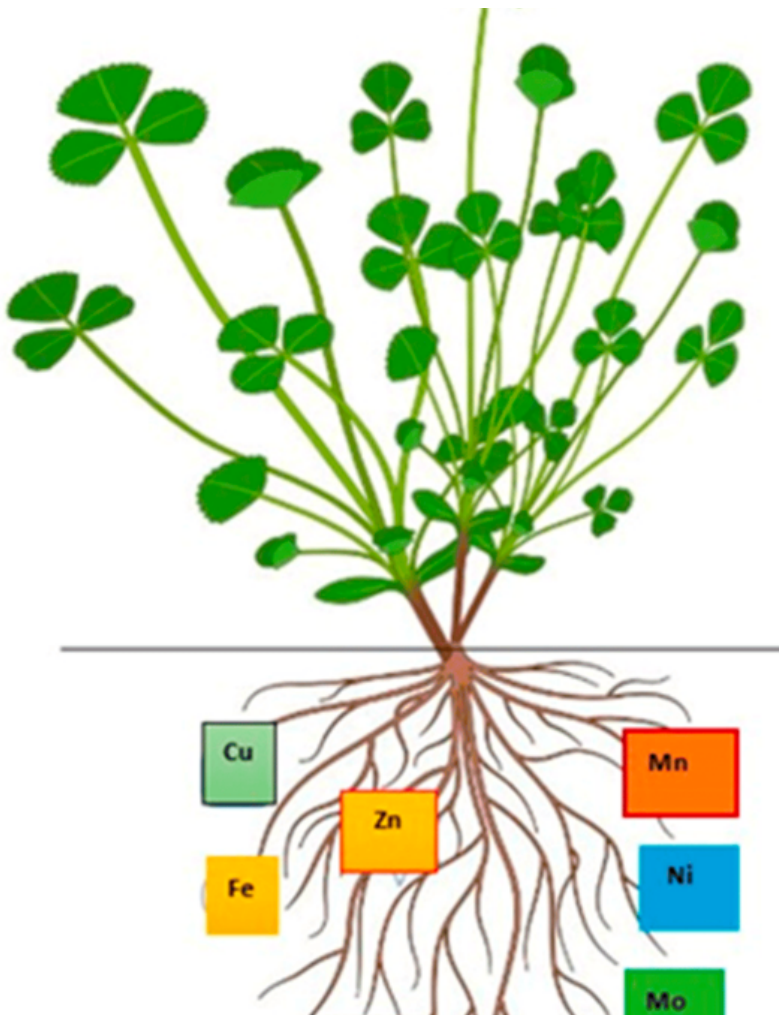
This magazine aims to highlight select scientific publications from the latest edition of the YGS Journal. Articles in this magazine cover the major discoveries in the published papers, making the incredible work done by these high school students accessible to the public.

Throughout the magazine, various articles describe tips for pursuing research in high school along with advice on how to design and perform experiments. This was done to promote scientific research in high school.

The purpose of this magazine is to inspire and support students in their pursuit of scientific discovery, preparing them for futures in research-related careers.



NIRBAAN MAKEN



Research Reveals the Impact of Heavy Metals on Marigold Pollen

Paper written by Alinur Jaboldinov / Article written by Nirbaan Maken

In a study conducted by 17-year-old researcher Alinur Jaboldinov from Kazakhstan, the genotoxicity of environmental pollutants on marigold (*Tagetes erecta* L.) in Almaty's urban ecosystem has been thoroughly investigated. Alinur, an aspiring scientific researcher, is a student at the Nazarbayev Intellectual School of Physics and Mathematics in Almaty and a research assistant at KazGUU.

The study aimed to assess the fertility of pollen grains in marigolds from different areas of Almaty and determine the impact of anthropogenic stress on the city's ecosystems. Using a combination of pollen tests, atomic absorption spectrometry, and statistical analysis, the research focused on understanding the relationship between pollen sterility and the content of heavy metals in the soil.

Results from the investigation revealed a significant correlation between pollen sterility and the presence of heavy metals in the soil. Surprisingly, the areas with expected low contamination levels exhibited the highest proportion of sterile pollen, while sites with high contamination showed the lowest. Heavy metals such as iron, copper, cobalt, nickel, and chromium were found to be responsible for pollen sterility.

The data obtained from this study has practical applications in biomonitoring the city's ecosystems, analyzing atmospheric and soil pollution in Almaty, and identifying common signs of environmental disasters in other cities facing similar environmental challenges. The research highlights the importance of studying genotoxicity to safeguard human health and biodiversity, particularly in regions with significant mining and metallurgical industries, like Kazakhstan.

How to Write a Scientific Research Proposal in High School

Special Edition: How to Perform Research in High School

Pursuing a research project in high school is a difficult, yet rewarding endeavor. Moreover, students often have a difficult time doing wet-lab experiments due to a lack of research lab access. Additionally, due to safety concerns and other issues, university professors often don't permit high school students in their labs. However, there are other ways! From doing research in your school labs to renting out lab spaces nearby, there are many different approaches that one can take. However, one thing that students must do when pursuing these opportunities is prepare a proposal. Scientists have to consistently convince funding agencies to provide them with the money and opportunity to do research. Here is an outline for a strong proposal that can give students get their foot in the door at many labs.

1. Title/Topic

It is always important to create a concise and clear title that outlines the goals of your work. It can be useful to look through published scientific papers and see how to format your own title.

2. Objective

This is a pivotal section in your proposal. Here, you should explain the problem that you are trying to solve or the hypothesis that you will research. Schools and other institutions will only provide you with labs if you have set goals.

3. Research Methodology

Describe the type of research you will do. If its biochemistry-based, for example, list out what equipment or experiments you will be conducting (i.e gel electrophoresis, enzyme assays). Also mention who you will work with.

4. Implications

After describing what you're doing, its important to describe why. Mention the bigger picture problem you are attempting to solve. This is where you have to advocate for yourself and the importance of your research.

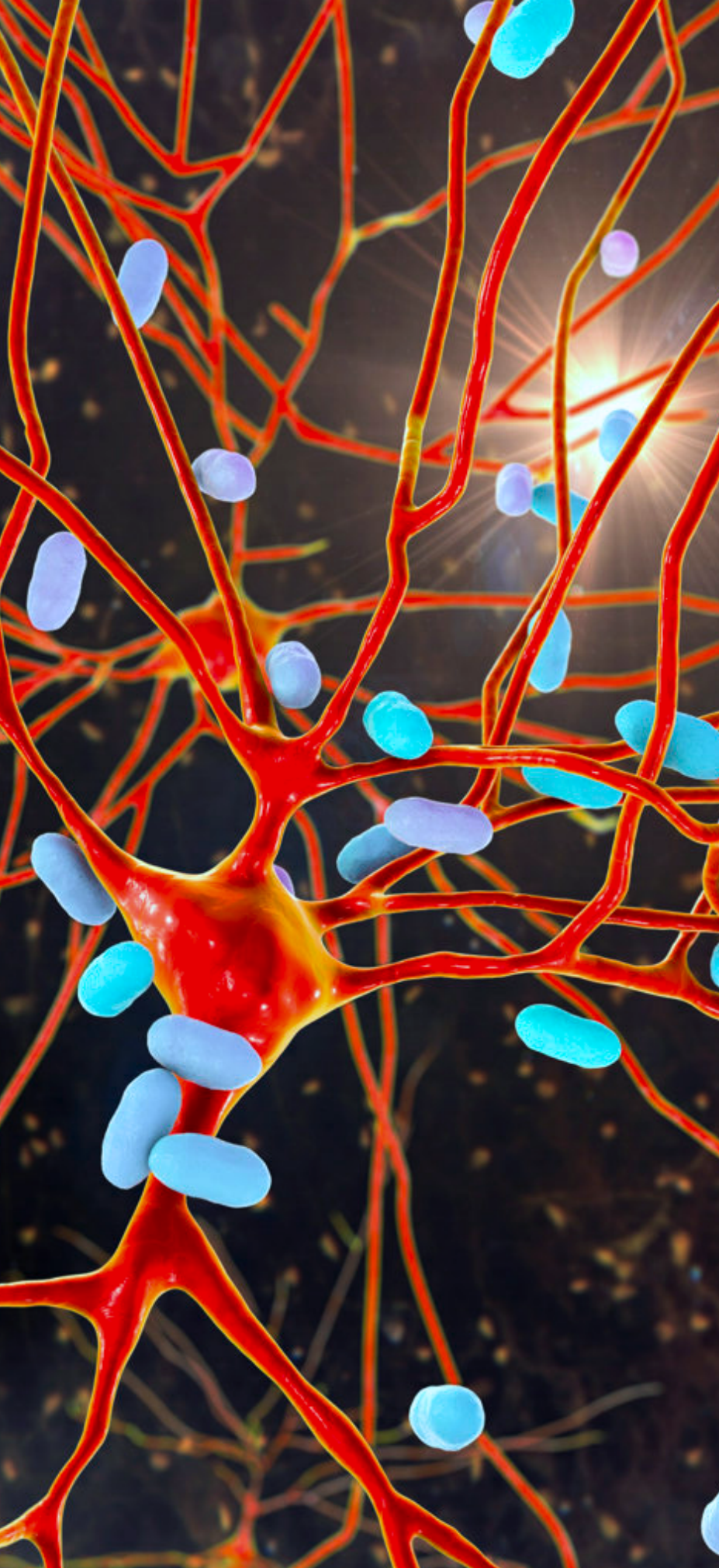
5. Safety/Materials

This is arguably the most important section. When doing scientific research, safety is of utmost importance. Here, its important to list necessary precautions you will take, along with the materials (i.e chemicals) you plan on using.

6. Time Frame

Finally, it can be useful to mention the approximate time frame for your research. This can give schools or other institutions an idea of how long you intend on doing research and how long you plan on using their resources.

In the end, it can always be helpful to include a literature review that shows that you know what you are doing! Its important to note that this is just an outline and only includes sections that are necessary. There are always times when more information is needed such as listing personal reasons for pursuing the project, or, if you intend on receiving funding, how you plan on using the money.



The Link Between Alzheimer's and Bacteria

Paper written by Amal Khan

Research by Amal Khan, a sixth form student from the United Kingdom, has highlighted a concerning link between Alzheimer's disease and mouth bacteria. The study mentions the presence of *Porphyromonas Gingivalis*, a bacteria causing gum disease, in the brains of 96% of Alzheimer's patients compared to only 39% in individuals without the condition. Periodontitis, a severe form of gum disease caused by *P. Gingivalis*, affects more than half of the US population aged 30 and older. The bacteria can translocate from the mouth to the brain through various routes, increasing the risk of cognitive decline and Alzheimer's development. Once in the brain, *P. Gingivalis* secretes proteases called gingipains, which degrade brain proteins, leading to neurodegeneration and the formation of amyloid beta plaques, characteristic of Alzheimer's. Despite the complexity of the relationship between the bacteria and the disease, this research opens up new possibilities for potential treatments and biomarkers for Alzheimer's risk assessment.

The study emphasizes the importance of maintaining good oral hygiene to prevent the accumulation of harmful bacteria in the brain. Although it remains uncertain whether the bacteria cause Alzheimer's or are a consequence of the disease, controlling the rate of *P. Gingivalis* can delay symptoms and potentially serve as a biomarker for predicting future Alzheimer's risk. Khan's research offers a valuable insight into the multifaceted nature of oral health and its impact on overall well-being. While more research is needed to fully understand the link between mouth bacteria and Alzheimer's, this study raises awareness of the potential risks associated with poor oral hygiene and underscores the significance of early prevention and intervention to combat this debilitating neurodegenerative condition.

Impact of Traumatic Brain Injuries on the Development of Language Disorders

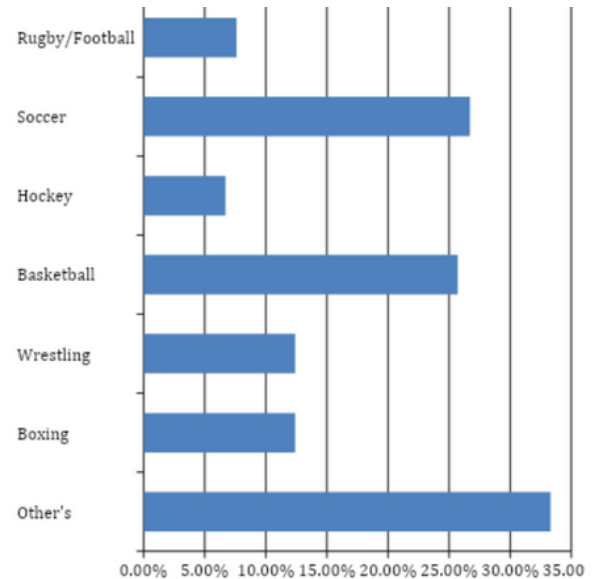


Paper written by Syed Hassan Bukhari and Fareha Bukhari,

These young researchers have delved into the relationship between traumatic brain injuries (TBIs) and the emergence of Receptive and Expressive Language Disorders among adolescents. The study examined the links between learning proficiency, GPA, and sports participation in the development of these language disorders after a TBI. The findings shed light on potential indicators and shed new insights into this critical issue.

MAJOR RESULTS

The investigation revealed intriguing patterns within the adolescent age groups. A significant correlation emerged between TBI encounters and the age range of 10 to 13 years. Alarmingly, 85% of participants falling within this group reported having experienced a form of TBI, suggesting a potential vulnerability during this developmental phase. Equally intriguing was the connection found between learning proficiency and TBI encounters. Those who faced TBI incidents demonstrated varied degrees of learning proficiency decline, with approximately 54% scoring lower in proficiency tests. This underlines the role of brain injuries in affecting cognitive skills crucial for comprehension and communication



The study also highlighted the role of sports involvement in TBI occurrences. Of particular note were high-contact team sports, such as rugby, football, soccer, and basketball, which demonstrated an association with brain injuries that could contribute to language disorders.

Though the study's generated nature may have influenced some outcomes, the exploration into the intricate relationship between TBIs and language disorders remains promising. With the potential to advance our understanding of these disorders and their underlying causes, the research underscores the need for targeted interventions, early diagnosis, and heightened awareness. As the scientific community awaits further studies, these findings provide valuable insights into the multifaceted landscape of adolescent language development in the wake of traumatic brain injuries.

Selecting a Feasible & Exciting Scientific Research Project

Special Edition: How to Perform Research in High School

After writing a proposal and gaining access to a lab, students must develop an idea for their project. Oftentimes, this can be the most difficult stage due to the overwhelming number of potential projects and ideas out there. One way to avoid becoming overwhelmed, is to simplify the project. Its important to remember that as students, we are not full-time researchers and also don't have the experience to perform revolutionary research. When picking a project, it is best to keep it simple and feasible. This can make it hard to do novel research but it is possible if you are creative and are aware of current proceedings in your field of interest.

Literature Review

To start a project, it is always important to narrow down which field you want to study (I.e chemistry, biology, neuroscience). After selecting a broad topic, you should do an exhaustive review of literature in this topic by browsing through scientific journals (I.e Nature, PNAS, Science). From here, try to narrow done your interests, but keep in mind the limited resources you have available. I always find it best to focus on projects that only involve solutions and limited technology since school labs and other areas typically have lots of substances/chemicals but not access to advanced machinery.

Selection & Preparation

After a comprehensive review of scientific literature, its time to select your topic. After narrowing down your interests, try to think of ways to build off of this research. Ask yourself, what new insights can I provide? Can I try to find new methods to achieve these results? Spend time trying to think of whatever you could do to make the research topic novel in some way. The impact of your research doesn't have to be extremely significant since that takes many years and extensive experience. All research is significant because it, in some way, pushes the knowledge of the field further.

Compromise & Revisions

Finally, this is arguably the hardest part of research: compromise. Initially, you will have big dreams about your project and will want to accomplish a wide variety of things. However, throughout the process, you will have to compromise and focus in on a single goal. After picking a project, you will have to make lots of revisions based on the technology and materials you have. It can be useful to go on google calendar and map out a timeline for your project. This timeline will not only help you make your project more specific and attainable, it will help you in the future when organizing your data.

Picking a Topic Without a Lab

Its still possible to do scientific research without a lab. Oftentimes journals allow for the publication of scientific reviews. Essentially these are research papers that don't highlight new findings but, instead, delve into a topic of interest in a field and highlights current papers on the topic. To write a review, you must explain the given topic, its background, and highlight new findings.



Links and Sources

Articles

Impact of Heavy Metals on Marigold Pollen

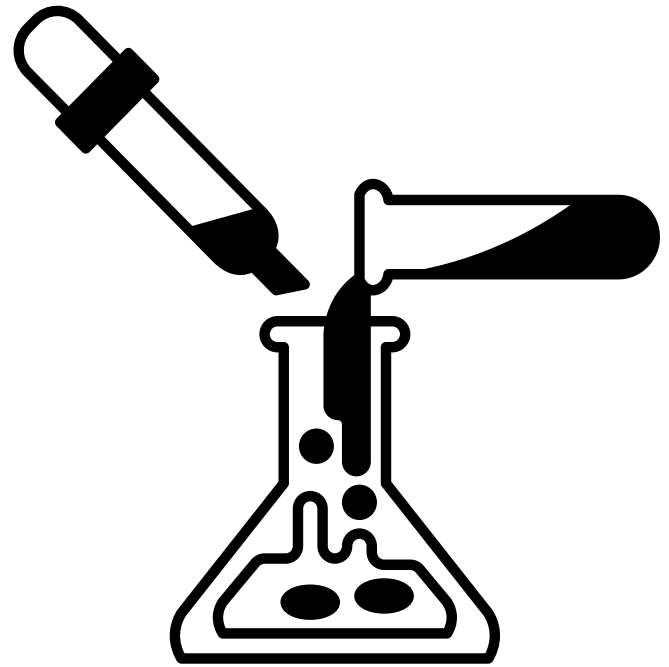
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The Link Between Alzheimers and Bacteria

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Impact of Traumatic Brain Injuries on the Development of Language Disorders

<https://www.ygsjournal.com/files/ugd/389a2bd4601cb1549a4b1c8c3f07b572331beb.pdf>



Make sure to look out for the second volume of the YGS Magazine!

Check out our latest editions at
<https://www.ygsjournal.com/>

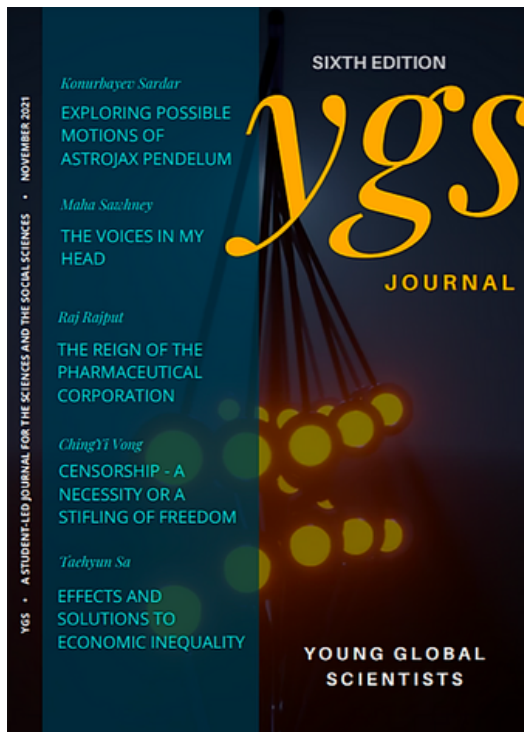


Image Sources

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