

CHEMAZINE

Theme: Water | Brain Chemistry | Interviews with Alumni and more

DEPARTMENT OF CHEMISTRY
CITY COLLEGE, KOLKATA

2024



“The highest education is that which does not merely give us information but makes our life in harmony with all existence.”

-Rabindranath Tagore

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1.



Dr. Arindam Rana
HOD, Department of Chemistry,
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বিভাগীয় প্রধানের শুভেচ্ছাবার্তা

রসায়ন বিভাগের দেওয়াল-পত্রিকা ছিল হাতে-লেখা। মাঝে বেশ কিছু বছর বন্ধ থাকার পর পুনরায় তার আত্মপ্রকাশ ২০১৪-তে। তখনও সে হাতে-লেখা। ছাত্রছাত্রীরা অসীম উৎসাহ ও ধৈর্যের সঙ্গে পরিশ্রম করে লেখা তৈরী, ছবি আঁকার মাধ্যমে তাদের সৃজনশীল প্রতিভার প্রকাশ করত। সঙ্গে চলত হইচই, আনন্দ – তারুণ্যের স্বাভাবিক উচ্ছ্বাস। করোনার ঘরবন্দী জীবনেও তার ব্যতিক্রম নেই। এলো আন্তর্জালের যুগ। শুরু হল কেম্যাজিন এর নতুন রূপ। বর্তমানে আমরা পাই দু'রকম প্রকাশ। স্থানাভাবে দেওয়ালে থাকে মূল পত্রিকার এক ভগ্নাংশ মাত্র। পুরোটা পড়া যাবে আন্তর্জালেই।

এবারের বিষয় বৈচিত্র্যের অন্যতম আকর্ষণ দুটি অমূল্য সাক্ষাৎকার – ১) অবসৃত অধ্যাপক অর্ধেন্দুশেখর দত্তগুপ্ত, যিনি এই বিভাগের ছাত্র এবং পরবর্তীকালে এই বিভাগেই এক অন্যতম জনপ্রিয় অধ্যাপক ছিলেন। তাঁর পুত্র প্রণবও এই বিভাগের কৃতি ছাত্র, বর্তমানে শ্রীরামপুর কলেজের স্বনামধন্য অধ্যাপক। ২) ডঃ রূপম দিল্লা, যিনি এই বিভাগে ছাত্র ছিলেন এবং বর্তমানে এনআইআইটি রৌরকেল্লার তরুণ অধ্যাপক। এবছর তিনি এফ.আর.এস.সি. নির্বাচিত হয়ে দেশের মুখোজ্জ্বল করেছেন।

প্রতি বছর ছাত্রছাত্রীদের সঙ্গে এই আনন্দের ভাগ নেবার সৌভাগ্য আমার হয়েছে, হচ্ছেও। আর রয়েছেন আমার প্রিয় বিভাগের সহ-অধ্যাপকবৃন্দ, যাঁদের অত্যন্ত মূল্যবান সুপারামর্শ ও আগ্রহ এই সাফল্যের অন্যতম রসদ। অধ্যক্ষ ড. শীতল প্রসাদ চট্টোপাধ্যায়ের সক্রিয় উৎসাহে ও ছাত্রছাত্রীদের যত্নশীল প্রয়াসে রসায়ন বিজ্ঞান ও শিল্প বোধের এক অনবদ্য সুখপাঠ্য **কেম্যাজিন-২০২৪**। সকলে এই আনন্দের স্বাদ নিন প্রাণ ভরে।

শুভেচ্ছান্তে,

ডাঃ অরিন্দম রানা
বিভাগীয় প্রধান, রসায়ন
সিটি কলেজ, কলকাতা-০৯

2.



Editorial Note

The Editorial team of Chemazine 2024 is thrilled to present its all-new version this year, which is centred on the theme 'Water.' The work highlights its importance in brain chemistry, chemical science communication, and features informative interviews with our esteemed alumni.

It is our pleasure to thank the authors and departmental faculty for their relentless support in bringing about this publication to life. We as a part of the Editorial Team including, Subhronel Das, Rounak Saha, and Sibsankar Palit were delighted to give our best to bring out this issue. May the pages of this magazine inspire and educate you as we celebrate the vital role water plays in science and life.

Best wishes,
Editorial Team
Chemazine 2024

In Photo: Editorial Team,
Chemazine 2024

Left to Right: Sibsankar Palit,
Subhronel Das and Rounak
Saha; Semester VI.





Foreword

The edition of Chemazine 2024 by the Department of Chemistry, City College, Kolkata, deals with the important theme of Water and its basic role in life and brain chemistry. This issue explores that chemical interaction that moulds our thoughts and emotions and how intricately water is associated with neurochemistry.

Interesting discourses on chemical science communication are provided here, discussing how complex ideas can be communicated with new and innovative methods. Interviews of distinguished alumni give individual perspectives on the journeys undertaken, accompanied by reflections on their years at City College.

This collection-not only a testament to the scientific investigation but also emphasizes on the importance of communicating science in our society. It's a pleasure for us, the Editorial Team, to invite you into this journey of illumination and to see how chemistry continues to form our understanding of life and wellness.

Regards,
Editorial Team
Chemazine 2024

4.



Department of Chemistry, City College

By Sudipta Dey; Semester II

The Chemistry Department at City College, established in 1884, is one of the institution's oldest and has evolved to meet modern educational needs. The department has undertaken several initiatives for the purpose of innovative teaching methods beyond traditional lectures. The department sustains innovative practices, encouraging the student body to participate more in seminars and indeed through an independent student-driven magazine, the wall magazine and its digital form, CHEMAZINE. The seminar library that is available for Honours students comprises around 400 books and reference material. Besides that, journals of national and international repute are available to the teaching faculties.

The department has very comprehensive laboratory facilities for teaching and research purposes, including specialized labs for different branches of chemistry and spectrophotometers and digital balances. Importance to mentoring is given through frequent parent-teacher meetings, visits to industries, and seminars by leading scientists. Recent improvements have been made in terms of digital means of communication and making study material more easily accessible to students. This department is devoted to safety, from ensuring that the lab environment is secure. The belief that growth is best achieved through active mentoring and practical exposure in the world of chemistry prepares students solidly for their future endeavours.

5.

Water means Life

By Rounak Saha, Swagato Sarkar, Goutam Patra, Santanu Das; Semester-VI

Introduction

"Water means life." Such a simple yet powerful phrase sums up the very quintessential role water plays for almost every creature on our planet. Water is essential to our survival; it supports our bodies, ecosystems, food production, cultural practices, and much more. About 60% of the human body is made of water, which performs the essential functions of maintaining body temperature, nutrient transport, aiding digestion, hydration, and so on; thousands of other functions help us stay alive. One can survive for weeks without food, but without water, one cannot survive even for about a day. Its importance spreads more than just individual health to society, agriculture, economic stability, and climatic control. Access to clean and safe water is a Human Right irrespective of differences (artistically shown in Figure 1).



Figure 1: Artistic representation of “Access to clean and safe Water as a Human Right”

However, with nearly 75 percent of our Earth covered by water, we find that so many questions arise regarding its source. Was it here from the beginning, or was it brought to Earth through space objects like asteroids? Scientists have done a lot of speculation and suggested a few theories: the precursors to Earth's formation were water-borne or space rocks came carrying water and the invader. And in this epic pursuit of being the first to uncover water's source, the people have been allowed to travel 4.6 billion years back in time for this exploration of some of the most widely accepted hypotheses and the role water has come to play in keeping life going.

Origins of Water on Earth

Science has faced a challenge in understanding how Earth accumulated such a vast amount of water. While Mars and Venus, our neighbouring rocky planets, no or significantly smaller amounts of water, Earth is exceptional to possess oceans of its kind. Scientists have proposed several theories for how our planet came to hold so much water.

- Planetary Differentiation and Volcanic Outgassing

In Earth's early stages, it was so hot that it melted much of the young planet. The molten state allowed for what's known as planetary differentiation—densest materials sink toward the core, and lighter materials form the crust and the atmosphere. And as Earth's interior cooled, volatile



compounds were released into its atmosphere through volcanic outgassing—the main culprits: water vapour, carbon dioxide, and methane. This slow release of gases may have allowed water to condense and eventually form our planet's first oceans. Today, scientists believe that part of Earth's water came from these deep planetary processes.

- **Delivery by Asteroids and Comets**

The other theory is that water-rich objects, such as asteroids and comets, delivered the water. During the formation of the solar system, icy bodies from the outer regions collided with the inner planets. Hydrogen isotopes—deuterium and protium—are similarly measured in asteroids named carbonaceous chondrites and Earth's oceans, which may support the theory that water came to Earth from asteroids. Water-carrying comets show a different isotopic signature, so scientists turn more heavily to asteroids as probably supplying much of the water of Earth.

- **Retention from Early Solar Material**

Some scientists feel that Earth might retain some amounts of water from the primordial material that was part of the early solar system. Even though this is not an easy hypothesis to verify, it would mean that Earth's water has been there since the dawn of its origin, locked in minerals and rocks within the Earth's mantle, and finds its way to the surface by volcanic action.

Scientists continue the quest to identify the precise sources of Earth's water. Each theory has resulted in legitimate contributions, and it is a reasonable assumption that Earth's water resulted from some combination of volcanic outgassing, asteroid impacts, and primordial retention.

Role of Water in Life

Water constitutes the foundation of our life, but at the same time, it has served as the basis for many biological, metabolic, and ecological functions in the course of history. Water is a medium for almost all biochemical reactions that take place in living organisms. Its polar nature makes it dissolve the widest range of biologically important molecules, such as making up cell membranes, keeping DNA stable and folding proteins. Water acts not only as a reactant but also as a product in all the cellular processes. It is the reacting molecule in photosynthesis in providing electrons and protons for sunlight to convert into energy; at the end, it is the byproduct at the end of cellular respiration. The polarity of water also enables it to perform hydrogen bonding, a characteristic significant in the three-dimensional structures of proteins and nucleic acids. If water did not exist, the cellular functions supporting life could not occur.

Water is essential to metabolism, which is the accumulation of biochemical processes that support life. As a solvent, water facilitates metabolic reactions occurring inside cells. Blood transports oxygen from the lungs to cells and carbon dioxide as a by-product, with its composition close to 51% water. A second application of water in living organisms is their involvement in digestive processes: due to hydrolysis, it breaks down the complex molecules, such as starch, into glucose for nutrition supply. In addition, water is required to transport nutrients and wastes through the body system. The kidneys filter water to remove the waste products of metabolism, which are disposed through the urine in the large amount of water. Hydration is a very crucial factor for maintaining overall health and well-being. The body needs water to enable regulation of temperature, balance of electrolytes,



prevention of infections, transport of nutrients to cells, and permitting organs and tissues to work correctly. Dehydration, the loss of water and essential electrolytes can result in serious outcomes ranging from effects on mental capability and mood to physical endurance. However, hydration indisputably is the common thread while standards for water consumption vary by guideline. Because needs vary from one person to another according to climate, activity level, and diet, so should each adapt to their own hydration. The choices for fluid intake made by the American Society for Clinical Nutrition's Beverage Guidance Counsel created a "pitcher" of liquid in 2006 (shown in figure 2), this guidance holds true today.

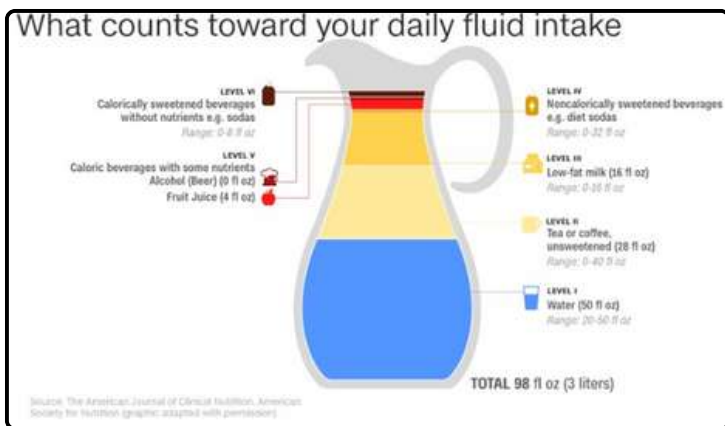


Figure 2: "Pitcher" of liquid created by the American Society for Clinical Nutrition's Beverage Guidance Counsel in 2006.

Ecological Significance

Water is an integral constituent of ecosystems, hosting an immense amount of biodiversity. Ecosystems are interacting groups of living respectively. Water is a nurturing component that allows vegetation to grow, hosts diverse aquatic wildlife, and is a breeding ground for millions of organisms. The water cycle maintained and sustained through processes of evaporation, condensation, precipitation, and infiltration, completes the inner aspect of the ecosystem. Indeed, it sustains not only an ecosystem but also

controls climate, facilitates nutrient cycling, and supports biodiversity. Water also plays a fundamental role in carbon and nitrogen cycles, both important to nature. It influences weather patterns and agricultural productivity, thus illustrating broader ecological and economic implications. Interdependency of water and ecosystems further magnifies how disruptions to the water cycle-including climate change or pollution-can have huge ripples on biodiversity and food security.

The Water Cycle: On a Continuous Journey of a Vital Resource

The water cycle is a natural process that describes the movement of water on, above, and below the surface of the Earth. Triggered by solar energy, gravity, and Earth's rotation, this cycle is vital for sustaining life, shaping landscapes, and regulating the climate. The Sun heats surface water into vapor, rising into the atmosphere (Evaporation). Plants lose water from small openings called stomata, adding to atmospheric moisture (Transpiration). Ice or snow become directly vapor without melting. This process is mainly in cold areas (Sublimation). Water vapor cools and condenses to form droplets, which results in clouds and precipitation (Condensation). When the water falls back to earth as rains, snow, or hail and returns to rivers and groundwater (Precipitation). Water moves into the soil down into the underground of the Earth, which replenishes the supplies of groundwater (Infiltration). Precipitation above absorption flows over land and carries with its nutrients and minerals and also can cause erosion sometimes (Surface Runoff). The water cycle plays a significant role in controlling the climate by distributing heat around the Earth and moderating precipitation. During the process, water is an essential nutrient carrier to all levels of

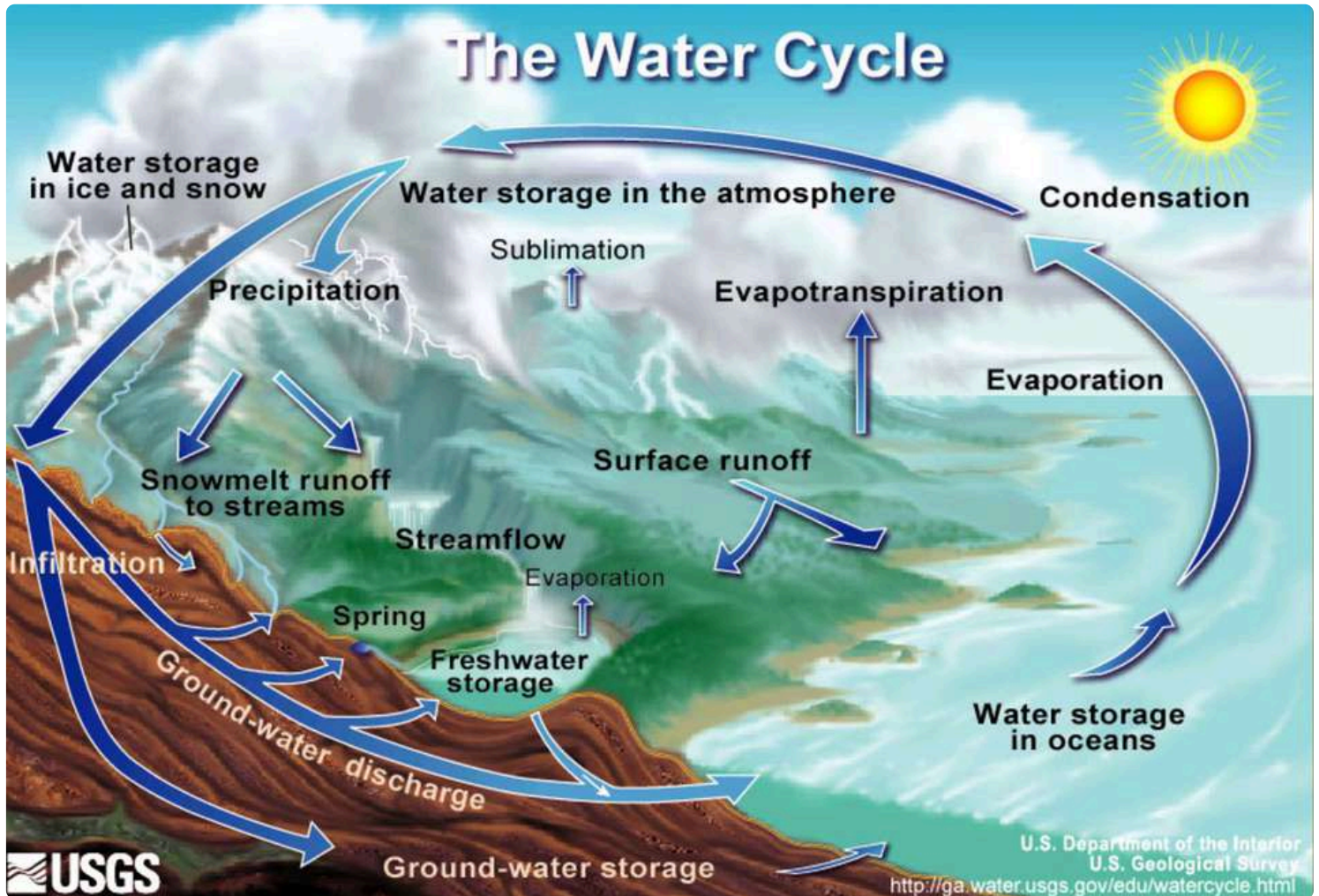


Figure 3: Detailed illustration of the Water Cycle

the food chains for living organisms in ecosystems and through the plants to animals.

Conclusion

From its mysterious origins to its undeniable significance in sustaining life and ecosystems, water remains one of Earth's most precious resources. "Water is life" is more than a phrase; it reflects a universal truth that all living organisms are intrinsically linked to this life-sustaining substance.

Our bodies, our economies, our food systems, and our planet's ecosystems rely on water. By understanding its origin, appreciating its biological, ecological, and health-related roles, and protecting it through conservation efforts, we can ensure that water continues to support life for generations to come.

6. ক্যুরি পরিবারের নোবেল কাহিনী

রিয়া মুখোপাধ্যায়, শাস্বত পাল; ষষ্ঠ সেমিস্টার



মারি ক্যুরি

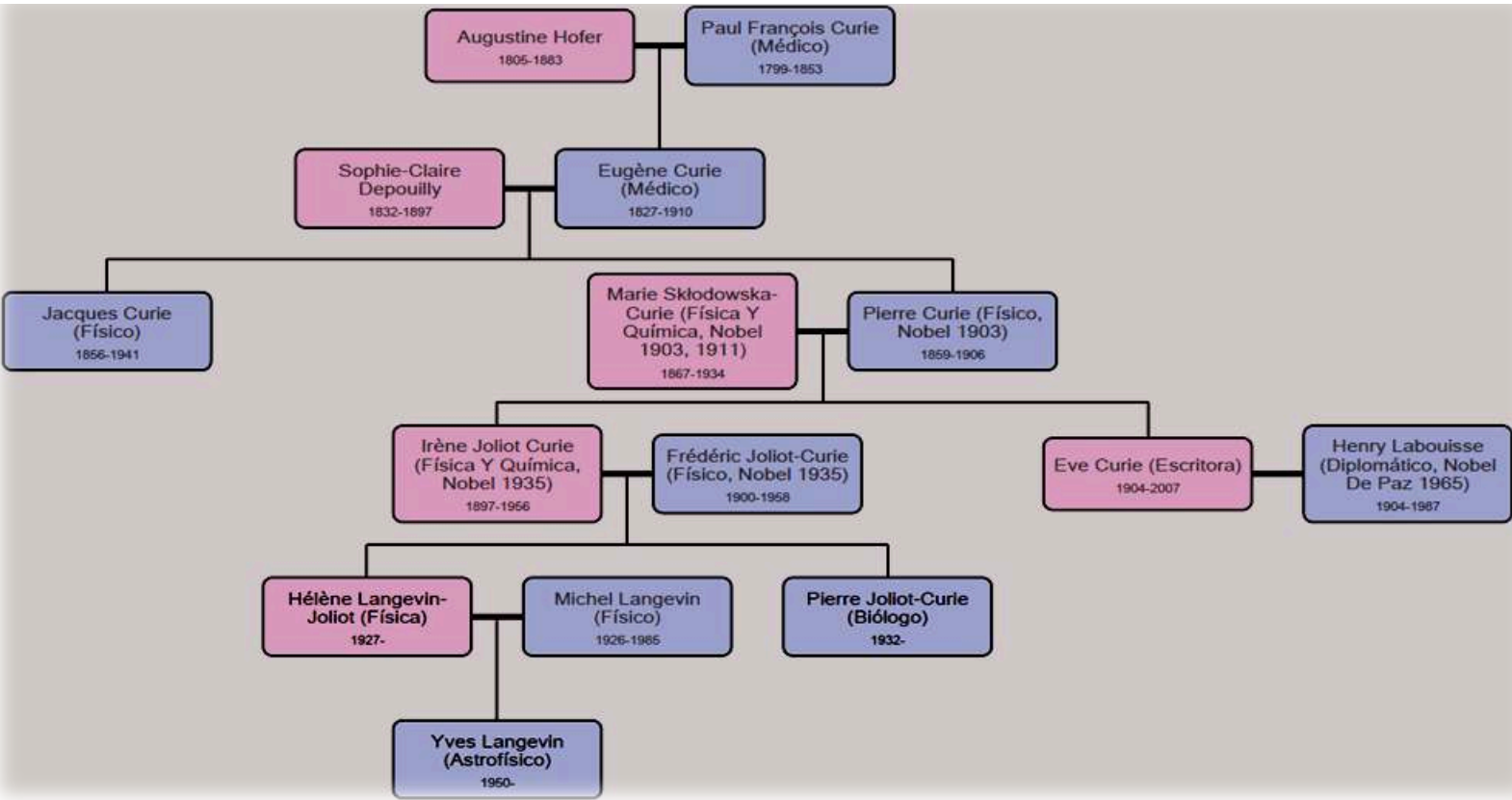
ক্যুরি পরিবার এবং তাদের বিশ্বজোড়া খ্যাতি

প্যারিস, শহরটা নাকি ভালোবাসার শহর। হ্যাঁ এই শহরেরই একটা ছোট্ট সুন্দর মিষ্টি পরিবার হল ক্যুরি পরিবার যাকে প্রাক-আধুনিক যুগের বিজ্ঞান এবং চিকিৎসাশাস্ত্রের সাধনালয় বলা যেতে পারে। সর্বাধিক নোবেল পুরস্কারে ভূষিত হওয়ার জন্য ক্যুরি পরিবার পারিবারিক নোবেল লরিয়েট হিসেবে পরিচিত, যার চারটি পুরস্কার জিতেছেন পরিবারের পাঁচজন স্বতন্ত্র বিজয়ী। এই পরিবারের সদস্যা মেরি ক্যুরি হলেন একইসঙ্গে প্রথম এবং বিজ্ঞানের দুটো আলাদা ক্ষেত্রে দু'বার নোবেল জয়ী একমাত্র ব্যক্তি। তাহলে নিচের বংশ-তালিকার মাধ্যমে পরিচয় করে নেওয়া যাক পরিবারের সদস্যদের সঙ্গে।

মেরি ক্যুরির জন্ম ও পরিবার

Marie Skłodowska-Curie পোল্যান্ডের Warsaw তে ৭ই

নভেম্বর ১৮৬৭ সালে পরিবারের কনিষ্ঠা সন্তান হিসেবে জন্মগ্রহণ করেন। তার মা একটি স্থানীয় স্কুলের প্রধান শিক্ষিকা ছিলেন এবং তার বাবা গণিত এবং পদার্থবিদ্যার অধ্যাপক। পরিবারে মুক্ত ছিল শিক্ষা, শারীরিক ব্যায়াম করাটাও ছিল অভ্যাস। মেরি ছোট, ভীতু প্রকৃতির, তার প্রিয় ছিল ভাই জোজেফ এবং তার দিদি জোসিয়া, ব্রনিসলআওয়া এবং হেলেনা। মেরি তার অসাধারণ স্মৃতির জন্য পরিচিত ছিলেন। চার বছর বয়সেও খুব সাবলীলভাবে পড়তে পারত সে, ষোল বছর বয়সে তার স্নাতকের উপর একটি স্বর্ণপদক জিতেছিলেন রাশিয়ান লিসিয়াম থেকে। মায়ের কাছ থেকে মেরি পেয়েছিলেন আপোষহীন সংকল্প করার মনোভাব এবং কর্তব্যের প্রতি ভালোবাসার অনুভূতি পেয়েছিলেন তার বাবার কাছ থেকে। মহাদেশ টা ইউরোপ হলেও তৎকালীন সময়ে নারীদের উচ্চ শিক্ষার জন্য অনেকটাই যুদ্ধ করতে হয়েছিল ক্যুরি এবং তার দিদিকে।



ছবি ১: ক্যুরি ফ্যামিলি ট্রি

মেরির জীবনে পিয়েরে

১৮৯১ সালের শেষ ভাগে মেরি ফ্রান্সে যান উচ্চতর পড়াশোনা করতে। সেখানে প্যারিস বিশ্ববিদ্যালয়ে পদার্থবিজ্ঞান-এ ভর্তি হন। খরচ চালাবার জন্য দিনের বেলা পড়াশোনা করতেন এবং বিকেলে করতেন গৃহশিক্ষকতা। কিন্তু তাঁর উপার্জন এতই সামান্য ছিল যে, শীতে পরার মতো গরম জামা পর্যন্ত কিনতে পারেননি। ফলে শীত এলে হয়ে পড়তেন অসুস্থ। ১৮৯৩ সালে মেরি পদার্থবিজ্ঞানে ডিগ্রী লাভ করেন এবং প্রফেসর গ্যাব্রিয়েল লিপম্যানের বাণিজ্যিক গবেষণাগারে কাজ করতে শুরু করেন। সেই সাথে তিনি পড়াশোনাও চালিয়ে যেতে থাকেন। এসময় তিনি ইউনিভার্সিটি থেকে একটি ফেলোশিপ যোগাড় করতে সক্ষম হন, যেটার সহায়তায় ১৮৯৪ সালে তিনি দ্বিতীয় ডিগ্রী লাভ করেন। বিভিন্ন ইস্পাতের চৌম্বকীয় ধর্মের উপর অনুসন্ধান করা নিয়ে প্যারিসে শুরু হয় মেরির বৈজ্ঞানিক জীবন। পোলিশ পদার্থবিদ জোসেফ কোয়ালস্কি জানতে পারেন যে, মেরি বড়ো একটি গবেষণাগার খুঁজছেন। তিনি চিন্তা করলেন, "পিয়েরে ক্যুরি" নামক একজনের অধীনে এ ধরণের বৈজ্ঞানিক গবেষণাগার থাকতে পারে। কারণ পিয়েরে ছিলেন "স্কুল অফ ফিজিক্স এন্ড কেমিস্ট্রি"র ইলেক্ট্রিস্টার। জোসেফের সূত্রে মেরির সাথে পিয়েরের পরিচয় হল। যদিও পিয়েরে বড় কোনো ল্যাবের তত্ত্বাবধায়ক ছিলেন না, তবুও তিনি মেরিকে কিছু জায়গা খুঁজে দিয়েছিলেন। সেখানেই মেরি তাঁর গবেষণা আরম্ভ করেন।

বিজ্ঞানের প্রতি মেরি এবং পিয়েরের পারস্পরিক আবেগ তাঁদেরকে কাছে টেনে আনে। একসময় তাঁদের মধ্যে

ভালোলাগা জন্ম নেয়। অবশেষে পিয়েরে মেরিকে বিয়ের প্রস্তাব দেন। কিন্তু মেরি প্রথমে সেটা গ্রহণ করেননি। কারণ তিনি নিজ দেশে ফিরে আসার পরিকল্পনা করছিলেন। আর বিয়ে করলে যদি ফ্রান্সেই থেকে যেতে হয়? পিয়েরে মেরির দুঃশ্চিন্তা সম্পর্কে জানতে পেরে বলেছিলেন, কোনো অসুবিধা নেই। মেরি ফ্রান্সে থাকতে না চাইলে মেরিকে বিয়ে করে মেরির সাথে তিনি পোল্যান্ডেও যেতে প্রস্তুত। যদি সেখানে গিয়ে তাঁকে বিজ্ঞানচর্চা ছেড়ে ফরাসী ভাষার শিক্ষক হতে হয়, তবুও। ভালোবাসা হো তো অ্যায়সা!

১৮৯৪ সালের গ্রীষ্মের ছুটিতে মেরি ওয়ারসোতে ফিরে আসেন পরিবারের সাথে একত্র হন। তিনি তখনও স্বপ্ন দেখছিলেন যে পোল্যান্ডে তাঁর পছন্দের বিষয়ের উপর কাজ করতে পারবেন। কিন্তু ভাগ্যের কী পরিহাস! তিনি মহিলা বলে ক্র্যাকো বিশ্ববিদ্যালয়ে তাঁকে কোনো পদ দেওয়া হয়নি। এ খবর শুনে পিয়েরে তাঁকে চিঠি লেখেন। তিনি মেরিকে রাজী করান ফ্রান্সে ফিরে গিয়ে তাঁর পিএইচডি শুরু করার ব্যাপারে। এদিকে মেরিও পিয়েরেকে চুম্বকবিদ্যার উপর তাঁর গবেষণার কাজ লিখে শেষ করতে বলেন। মেরির কথা শুনে পিয়েরে তাঁর পিএইচডি থিসিস লেখা সম্পূর্ণ করেন এবং ১৮৯৫ সালের মার্চে পিএইচডি ডিগ্রী লাভ করেন। সেসময় একটা উক্তি বেশ জনপ্রিয় হয় **"পিয়েরের সবচেয়ে বড় আবিষ্কার মেরি!"**

একই বছরের ২৬ জুলাই প্যারিসে দুজনে বিবাহ বন্ধনে আবদ্ধ হন, ছিলো না কোনো ধর্মীয় আচার ব্যবহার। সাধারণত পাশ্চাত্যের মেয়েরা সাদা গাউন পরে বিয়ে করে।



ছবি ২: মারি ক্যুরি ও পিয়েরে ক্যুরি

কিন্তু মেরি তার বদলে পরেছিলেন গাঢ় নীল রঙের পোশাক। মজার ব্যাপার হলো এই পোশাকটি অনেকটা মেরির ল্যাব কোট-এর মতো ছিল। বিয়ের পর মেরি "ক্যুরি" পদবীতেই পরিচিতি লাভ করেন। অবসর সময়ে তাঁদের মাত্র দুটো বিনোদন ছিলো। এক, বাইসাইকেলে করে দীর্ঘ ভ্রমণ; দুই, বিদেশ ভ্রমণ। পিয়েরের মধ্যে মেরি খুঁজে পেয়েছিলেন এমন একজনকে, যিনি ছিলেন একাধারে মেরির ভালোবাসার মানুষ, সবসময়ের সঙ্গী এবং বৈজ্ঞানিক কাজের সহযোগী।

নোবেল প্রাপ্তির সূচনা

১৯০২ পর্যন্ত মেরি আর পিয়েরে তেজস্ক্রিয়তার উপর মোট ৩২ টি গবেষণাপত্র প্রকাশিত করেন। ১৯০৩ সালে মেরি পিএইচডি ডিগ্রী পান, তাদের লন্ডনের "রয়াল ইন্সটিটিউশন"-এ আমন্ত্রণ জানানো হয়। কিন্তু নারী বলে মেরিকে বক্তৃতা দেওয়ার সুযোগ দেওয়া হয়নি। এমনকি একই গবেষণায় নোবেল পুরস্কারের জন্য পিয়েরকে মনোনীত করা হলেও মেরি কে করা হয়নি, অথচ পিয়েরের আগে মেরিই শুরু করেছিলেন তেজস্ক্রিয়তার উপর গবেষণা! এতে ক্ষুব্ধ হয়ে সুইডিশ গণিতবিদ এবং নারী বিজ্ঞানীদের পরামর্শদাতা হিসেবে পরিচিত "ম্যাগনাস গোয়েস্তা" পিয়েরেকে বিষয়টি সম্পর্কে অবহিত করেন। পরে পিয়েরের করা অভিযোগের ভিত্তিতে মেরির নামও তালিকাভুক্ত করা হয়। এত কিছু পর ১৯০৩ সালে রয়াল সুইডিশ একাডেমি অফ সায়েন্স তেজস্ক্রিয়তার উপর অসাধারণ গবেষণার জন্য ঐ বছরের পদার্থবিজ্ঞানের নোবেল বিজয়ী হিসেবে হেনরি বেকুয়েরেল, পিয়েরে ক্যুরি আর মেরি ক্যুরি-র নাম ঘোষণা করে। ১৯১০ সালে বিশুদ্ধ

রেডিয়াম পৃথক করার পর মেরি তেজস্ক্রিয়তার নির্গমন পরিমাপ করার জন্য একটি আন্তর্জাতিক স্ট্যান্ডার্ডের ধারণা দেন। এই মানকে পরবর্তীতে "ক্যুরি (curie)" নাম দেওয়া হয়। এটি তেজস্ক্রিয়তার Non-SI একক। ১৯১১ সালে রয়াল সুইডিশ একাডেমি দ্বিতীয়বারের মতো মেরি ক্যুরির নাম উচ্চারণ করে নোবেল বিজয়ী হিসেবে। তবে এবার রেডিয়াম আর পোলোনিয়াম আবিষ্কারের জন্য এবং বিশুদ্ধ রেডিয়াম পৃথক করার জন্য মেরিকে রসায়নে নোবেল দেওয়া হয়। ইতিমধ্যেই রেডিয়ামের বাণিজ্যিক ব্যবহারের জন্য কলকারখানা গড়ে উঠতে লাগলো। কিন্তু মেরি রেডিয়ামের পৃথকীকরণ প্রক্রিয়াকে প্যাটেন্ট করেননি। অন্য গবেষকেরাও যেন এই প্রক্রিয়াকে বাধাহীনভাবে ব্যবহার করতে পারে সেইজন্য। ফলে তিনি এর থেকে তেমন কোনো লাভ পাননি। কী নিঃস্বার্থ চিন্তাধারা! আলবার্ট আইনস্টাইন এটা দেখে বলেছিলেন মেরি ক্যুরিই সম্ভবত একমাত্র যাকে জনপ্রিয়তা কখনও বিপথগামী করতে পারবে না।

পরবর্তী প্রজন্ম গুলিতে নোবেলের ধারাবাহিকতা

১৮৯৭ সালে মেরি এবং পিয়েরের প্রথম সন্তানের জন্ম হয়। তারা তার নাম রেখেছে আইরিন। আইরিনও ঠিক তার মায়ের মতোই মেধাবী। তার ঠিক কিছুবছর পর ১৯০৪-এ তাদের কোল আলো করে আরও এক কন্যা সন্তান আসে তার নাম দেয় এভ।

তাঁর কন্যা আইরিন ক্যুরি এবং জামাই ফ্রেডেরিক জোলিয়টের গবেষণা রেডিয়াম এবং পোলোনিয়াম নিয়ে ছিল, যা পরবর্তী কালে পারমাণবিক গবেষণার ভিত্তি স্থাপন



ছবি ৩ (বাঁ দিকে): দুই মেয়ের সহিত মেরি | ছবি ৪ (ডানে): মেরির বড়ো মেয়ে আইরিন ক্যুরি এবং জামাই ফ্রেডেরিক জোলিয়ট

করে। ১৯৩৫ সালে তাঁদের যুগ্ম-গবেষণার জন্য নোবেল পুরস্কার অর্জন করা একটি গুরুত্বপূর্ণ মাইলফলক। তাঁদের গবেষণার মূল বিষয় ছিল কৃত্রিম রেডিওঅ্যাকটিভিটি, যা রেডিওয়াকটিভ উপাদানগুলির পরিবর্তন এবং সংশ্লেষণকে বুঝতে সাহায্য করেছে। এই আবিষ্কার চিকিৎসা এবং প্রযুক্তি ক্ষেত্রে এক নতুন যুগের সূচনা করে। উদাহরণস্বরূপ, ক্যান্সার চিকিৎসায় রেডিওথেরাপির ব্যবহার আধুনিক চিকিৎসা বিজ্ঞানকে বিপ্লবিত করেছে। এছাড়া হেনরি লাবোসিয়ের, যিনি মেরি ক্যুরির আরেক জামাই, একজন প্রভাবশালী বিজ্ঞানী এবং মানবাধিকার কর্মী ছিলেন। তিনি ১৯৬৫ সালে Noble Prize in Peace পান, যা মূলত ইউনিসেফের মাধ্যমে শিশুদের সুরক্ষার জন্য তার কাজের স্বীকৃতি। ইউনিসেফের পরিচালক হিসেবে, তিনি বিশ্বজুড়ে শিশুদের জন্য উন্নত স্বাস্থ্যসেবা ও শিক্ষার প্রচারে ব্যাপক কাজ করেন, বিশেষ করে যুদ্ধের আঘাতে বিপর্যস্ত এবং দরিদ্র অঞ্চলে।

মেরি ক্যুরি-র বৈজ্ঞানিক মনোভাব শুধু তাঁর গবেষণার ক্ষেত্রেই সীমাবদ্ধ ছিল না, বরং তাঁর সন্তানদের জন্যও এক অনুকরণীয় দৃষ্টান্ত স্থাপন করেছে।

উপসংহার

ক্যুরি পরিবার একটি অসাধারণ বৈজ্ঞানিক ঐতিহ্যের ধারক। মেরি ক্যুরি বলেছিলেন, "আমি তাদের মধ্যে আছি যারা মনে করেন যে বিজ্ঞানের দুর্দান্ত সৌন্দর্য রয়েছে"। তাঁর আবিষ্কার ও গবেষণা বিজ্ঞান ও প্রযুক্তিতে বিপ্লব এনেছে। মেরি এবং পিয়েরের ভালোবাসা ছিল বিজ্ঞান ও আবেগের একটি গভীর সংমিশ্রণ, যা তাদের একসাথে গবেষণার পথে এগিয়ে নিয়ে গিয়েছিল। রেডিওথেরাপির মতো উদ্ভাবন আজকের আধুনিক চিকিৎসা বিজ্ঞানকে এক নতুন দিগন্তে নিয়ে গেছে। ক্যুরি পরিবার এক অনন্য দৃষ্টান্ত, যাদের অবদান ভবিষ্যৎ প্রজন্মের জন্য অনুপ্রেরণার উৎস হয়ে থাকবে।

7.



Clean Water for All

*By Rakesh Chakraborty, Soumik Mandal,
Biswarup Ghosh; Semester-VI*

Clean Water for Everyone

Clean and safe water is a critical human right to be achieved but eludes billions of humans today. The challenge becomes more difficult as the world's population expands, and the impacts of climate change worsen the scarcity of water. Today, there are many complexities and controversial issues posed by water accessibility. Thus, the importance of clean water to public health, new innovative solutions for purification, and strategies to make water infrastructure more inclusive of all. The United Nations (UN) Sustainable Development Goal 6 (SDG-6) advocates for access to clean water and sanitation as a part of its Agenda 2030 (shown in figure 1).

The Challenge of Accessible Water at the Global Level

According to Guinness World Records, water is the most essential requirement of life, health, and hygiene. Nonetheless, thousands of people are denied access to clean drinking water. The World Meteorological Organization indicates that only 0.5% of the Earth's water is fresh and usable, thus reflecting the global water crisis level. According to reports, the percentage of population using safely managed drinking-water services increased from 69% in 2015 to 73% in 2022 worldwide but is still highly disparate and strongly lacking in many parts of Asia and sub-Saharan Africa. In 2020, 2.4 billion people lived in countries with water-stressed

resources, and 2.2 billion people were unable to use safely managed drinking-water services. Clean water access has grave implications if access is inadequate. A 2022 survey revealed that 1.7 billion people consumed microbially contaminated sources of drinking water, thereby putting them at risk of developing diarrhoea, cholera, and typhoid fever. In addition, exposure to hazardous substances, like arsenic, increases the risk of health hazards in the form of cancer and cardiovascular diseases.



13 **Figure 1: Sustainable Development Goal 6**



The World Health Organization (WHO) has set provisional guidelines for arsenic concentration in water supplied for drinking purposes at a concentration of 10 µg/L, with a strong emphasis on the need for such waters to be delivered through treatment technologies such as adsorption filters, distillation units, and reverse osmosis systems.

How important is Clean Water to Public Health Management?

By no means insignificant is the association of clean water access with public health. Most infectious diseases across the globe are caused by contaminated drinking water. Diarrheal diseases are often caused by pathogens in contaminated water, these diseases continue to produce an important health burden in developing countries. Typhoid fever is a bacterial disease and is associated with poor sanitation and contaminated sources of drinking. Cholera outbreaks are sometimes connected with a lack of safe access to drinking water and proper sanitation facilities. Apart from being a source of microbial contamination, chemical contamination such as that contributed by arsenic has also been known to cause major long-term health problems. For example, wells along the Gangetic plains of West Bengal and Jharkhand in India were adversely affected by arsenic because of geological causations.

Government Improvement Measures for Water Quality Improvement

Governments worldwide have understood the need to improve drinking water quality. Some of these actions include:

1. Ensuring all public and private sources of drinking water are periodically tested for specific contaminants.

2. Installation of filters to remove microorganisms that can cause disease or heavy metals from drinking water.

3. Treating water with chlorine or other disinfectants to kill all bacteria and viruses.

4. Managing hazardous waste to protect water sources in communities from contamination.

Updated WHO Guidelines for Drinking Water Quality (GDWQ) provides a basis for countries to improve their water management practices.

Innovative Solutions for Clean Water

While traditional methods are limited, innovative ones have emerged to offer solutions to the world's clean water crisis. Community involvement in water purification project leads to ownership and sustainability. Some influential community-led approaches are as follows:

- **Water Committees:** They are local government structures that assume management of resources as well as provide an advisory role in purification.
- **Low-Cost Filtration Systems:** Low-tech methods like sand filters or bio-sand filters are maintained at the grassroots level.
- **Rainwater Harvesting:** Harvest and purify rainwater to sustain an essential source of fresh water in arid areas.
- **Education Programs:** Improve hygiene practices while educating, increases the ownership of the local community over the entire water system.

Technological Innovations

Modern technological improvements also go a long way to facilitate availability of safe drinking water. Such purification through solar energy is particularly beneficial in isolated areas where electricity is not available.



Desalination technologies are continuing to advance which makes it increasingly feasible to convert seawater and brackish water into fresh water for consumption. Internet of Things technologies enable real-time monitoring of water quality, therefore providing communities with a chance to respond in real-time to contamination warnings. Mobile Water ATMs provide purified water at very minimal costs in the most deprived urban areas.

Inclusive Water Infrastructure and Access

The principle of inclusive infrastructure development is to ensure equal access to safe drinking water for everyone. The following are some of the strategies to be applied in making water facilities accessible:

1. Principles of Universal Designing: Water facilities are to be friendly to all those with different abilities through flexibility and ease of use, including the following:
 - Tap at varying height
 - Non-slip surfaces near the facilities
 - Ramps with gentle slopes for wheelchair use
2. Accessible Sanitation Facilities: Larger stalls with grab bars are appropriate for persons with disabilities; users with visual impairments benefit from the use of tactile signs.
3. Ergonomic/ sensor-based taps: Assisting technologies will provide a person with easy access to clean water in case they have limited physical strength.
4. Training the community: Train members of the community on assisting a person with disability for effective maintenance of inclusive facilities.

Importance of Participatory Design

Involvement of local communities in design issues encourages ownership and sustains projects.

Participative design techniques tap into local knowledge and skills, which enables development of appropriate projects to suit community-specific needs. Tools, such as community workshops, assist in the active participation of project planning. Capacity-building initiatives empower communities by equipping them with problem-solving skills required for resource management.

Conclusion

This is no rocket science to make clean and sanitized water accessible for all human beings in the earth; however, multifaceted efforts with human capabilities are required. Sustainable solutions addressing needs both currently and, in the future, can be achieved by integrating community-driven approaches with technological innovation, thereby incorporating the very essence of inclusivity while ensuring that the design of water infrastructure signifies an inclusive approach, thereby adding further accessibility for the most vulnerable people. It will become very important that governments, NGOs, and communities collaborate effectively in the implementation of these strategies as we move forward. We can pave the pathway toward a healthier future where everyone has access to safe drinking water-an essential foundation for public health and well-being globally. By prioritizing clean water accessibility now, we are investing not only in our present but also securing a healthier environment for generations yet unborn.



Clean Water for All

8. Chem-Photography

By Shaswata Paul; Semester VI

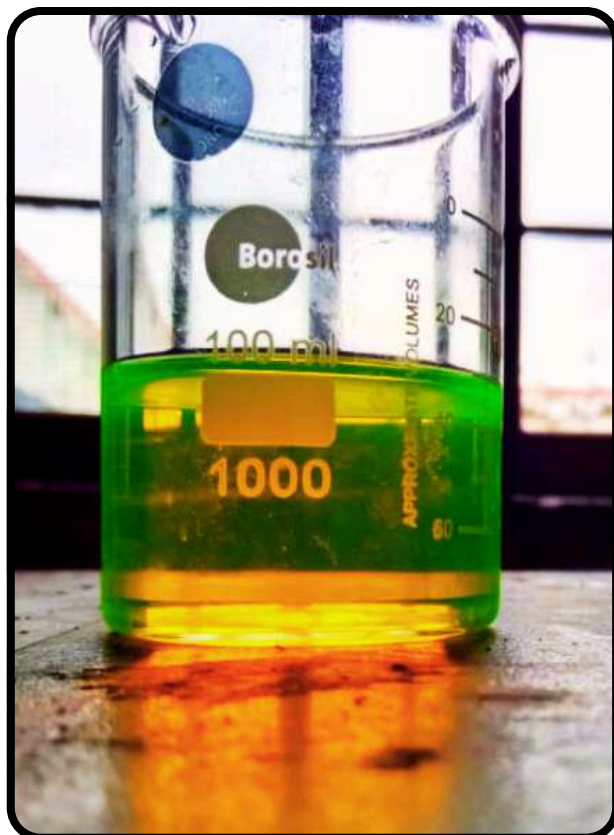


Photo 1: Making fluorescent compound



Photo 2: Column Chromatography



Photo 3: Synthesizing of complex compound, $[\text{Co}(\text{NH}_3)_4\text{CO}_3]\text{NO}_3 \cdot 0.5\text{H}_2\text{O}$



Photo 4: Copper Sulphate solution in a volumetric flask

Chem-Photography



Photo 5: Green-edge flame in Borate detection test



Photo 6: Inorganic Qualitative analysis

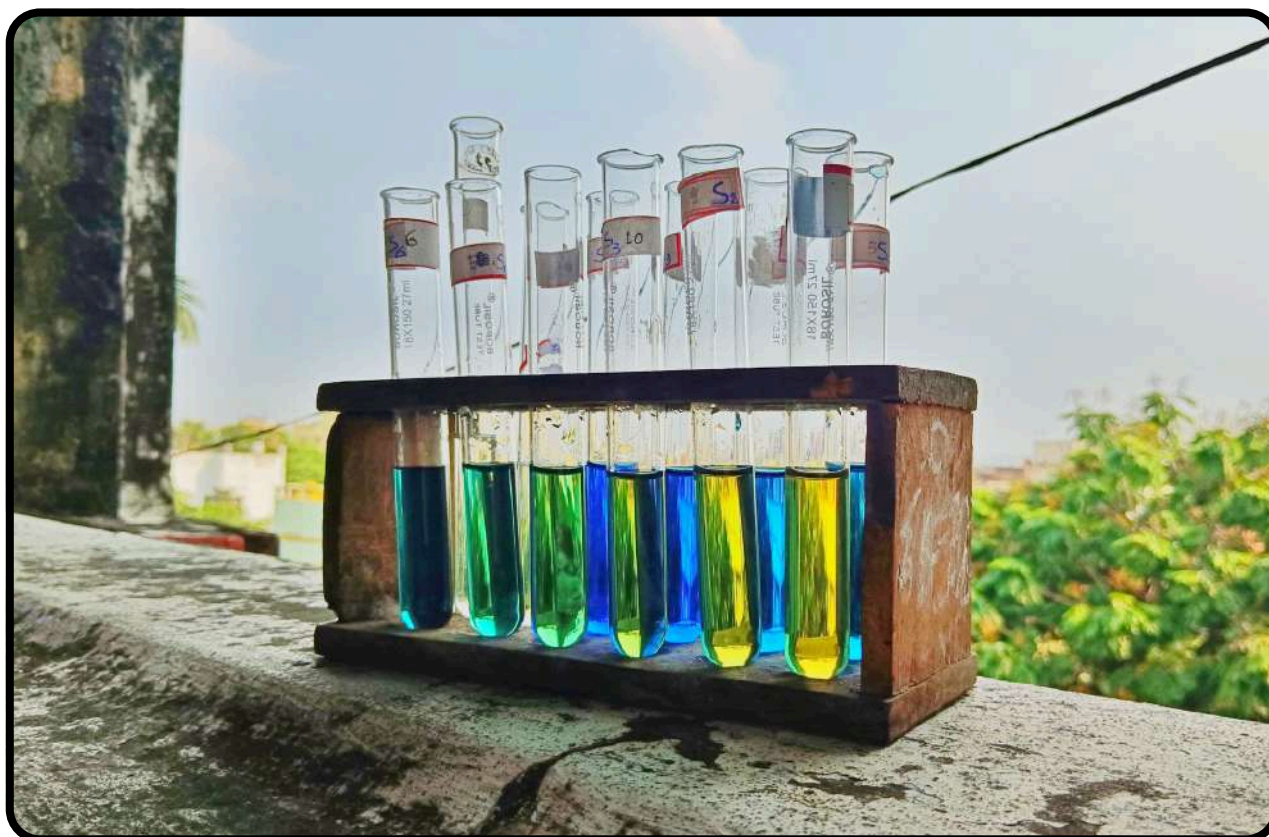


Photo 7: Colours of BCG indicator in solutions in test-tubes at different pH

Chem-Photography

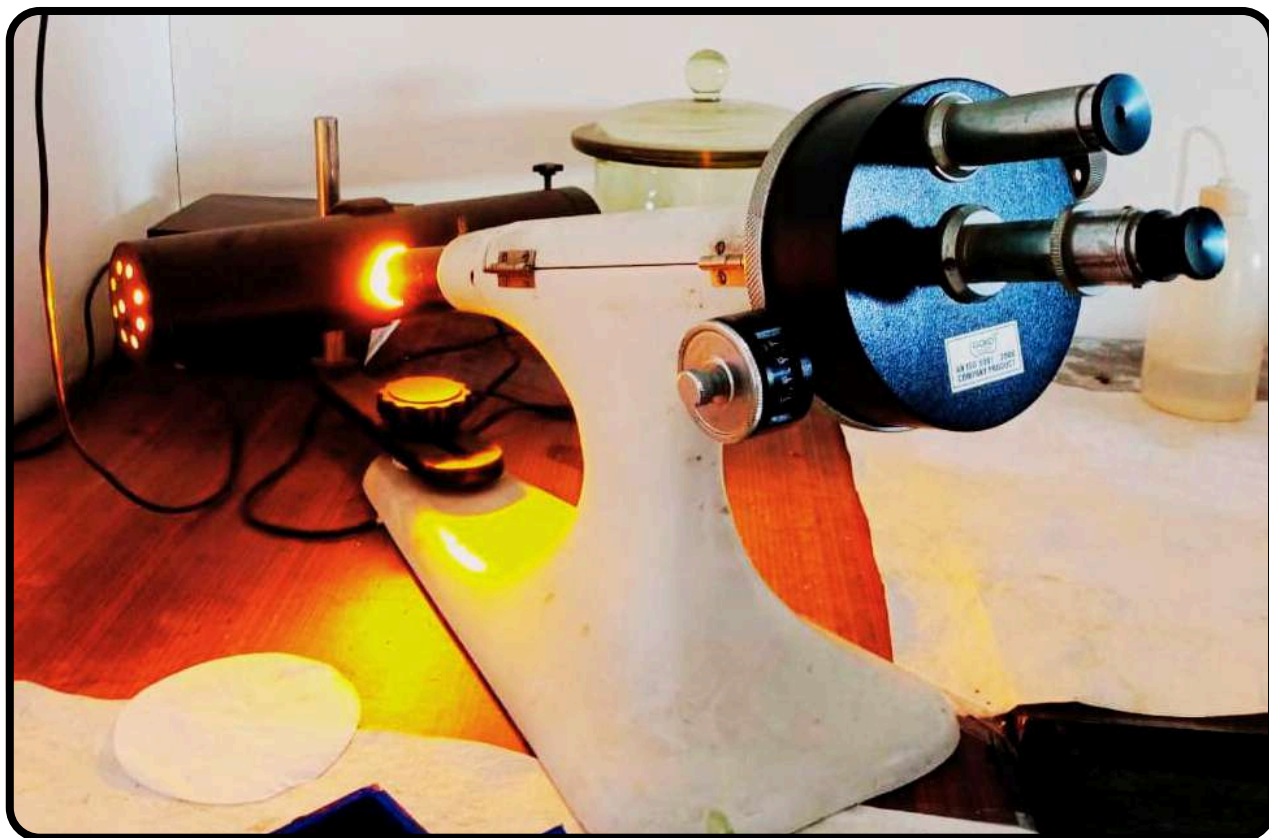


Photo 8: Measuring specific rotation of Sucrose using Polarimeter



Photo 9: Colours of complexometric titration



Photo 10: Re-flux set-up

9.



Neurochemistry: How does Chemistry shape our thoughts and emotions?

By Shaswata Paul; Semester-VI

Our Brain, our Ultimate Controller

The Brain is a complex organ weighing about 3 pounds and is the command centre of our body. Yes, I am talking about the brain that make you and me think! It receives, processes, and interprets information from the senses and initiates direct responses. It controls everything vital to our body including breathing, heart rate, body temperature etc. Its intricate network of neurons and synapses with multiple parts (as shown in figure 1) is the seat of all learning, memory, emotions, and consciousness. As the brain coordinates almost all of our bodily activities and integrates sensory and motor functions, it wouldn't be an exaggeration to call it "our Ultimate Controller".

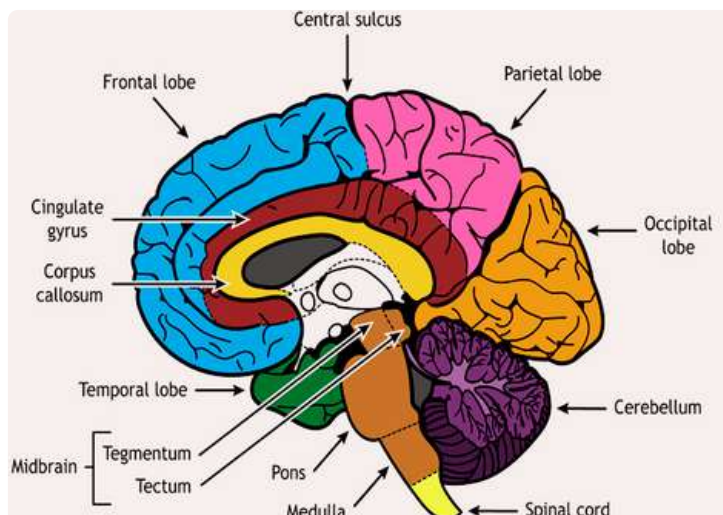


Figure 1: Parts of our Brain.

Neurotransmission

Our Brain ensures precise communication between neurons, through the process named 'Neurotransmission' (shown in figure 2). It involves balancing the flow of ions like sodium (Na^+) and potassium (K^+) essential for neuronal function. Neurons are the building blocks of our nervous system. They communicate at synapses. When stimulated, a neuron generates an action potential. This action potential which is essentially the electrical impulse that travels down the axon, changes the balance of ions (mainly sodium and potassium) across the membrane, which is crucial for signal propagation.

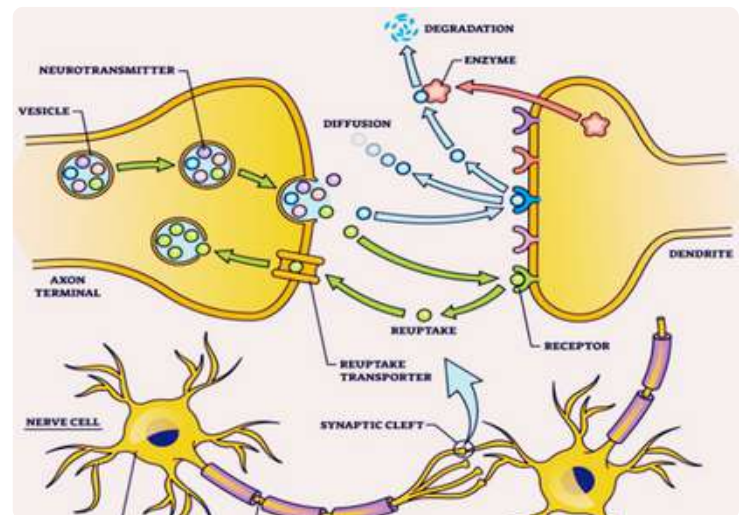


Figure 2: Process of Neurotransmission.



When the action potential reaches the axon terminals, it triggers the release of neurotransmitters from vesicles into the synaptic cleft. Neurotransmitters cross the cleft and bind to receptors on the receiving neuron. This can excite or inhibit the postsynaptic neuron. To stop the signal, neurotransmitters are either taken back into the presynaptic neuron or decomposed by enzymes in the synaptic cleft.

The Brain Chemicals and Our Mental Health

Neurotransmitters, hormones, and neuromodulators play an essential role in regulating mood, emotion, behaviour, and overall. Here are some of the chemicals that play an important role in our brain (artistically shown as figure 3) in terms of our mental health:

1. Dopamine (3,4-Dihydroxyphenethylamine): This Neurotransmitter regulates mood, motivation, and pleasure pathways. Its release is influenced by calcium ions (Ca^{2+}) during action potentials.
2. Serotonin (5-Hydroxytryptamine): This is involved in regulating sleep, appetite, and pain perception and also influences emotional well-being.
3. Acetylcholine (2-Acetoxy-N, N, N-trimethylethanaminium): Critical for our memory, learning, and muscle activation this Neurotransmitter operates through sodium (Na^+) ion influx, facilitating communication between neurons and muscles.
4. Cortisol (11β -Hydroxycorticosterone): This is primarily a stress hormone that modulates metabolism and immune response derived from cholesterol. It helps the body respond to stress.

5. Oxytocin: It is a nonapeptide containing the sequence Cys-TyrIle-Gln-Asn-Cys-Pro-Leu-Gly-NH₂ known as the "Love Hormone". It influences social behaviours, trust, and maternal bonding, synthesized in the hypothalamus.



Figure 3: Artistic representation of Chemistry happening in different parts of our Brain.

6. Glutamate (2-Aminopentanedioic acid): An important excitatory neurotransmitter involved in synaptic plasticity and cognitive functions such as learning and memory.
7. Endorphins ($\text{C}_{18}\text{H}_{23}\text{N}_3\text{O}_3\text{S}$): Natural pain relievers that promote feelings of well-being. It is released in response to stress or pain and help reduce discomfort and enhance pleasure.
8. Nitric Oxide: A gaseous neuromodulator that enhances neurotransmission and regulates blood flow in the brain, playing a role in communication.
9. Gamma-Aminobutyric Acid (GABA): An inhibitory neurotransmitter that reduces neuronal excitability and helps maintain balance with excitatory signals, crucial for anxiety regulation and relaxation.



Our Experiences

The neurochemistry of experience is fundamentally tied to how the brain processes, encodes and retrieves information. It involves neurotransmitter release, such as glutamate, which initiates synaptic communication and strengthens connections through long-term potentiation (LTP).

Gene expression is activated by signaling pathways, producing proteins like Brain Derived Neurotrophic Factor (BDNF) that enhance synaptic function. Emotional encoding occurs in the amygdala and hippocampus, influenced by dopamine and norepinephrine, while cortisol from the HPA axis can both enhance and impair memory formation.

Below are Table 1 & 2 listing down some of the Brain Chemicals responsible for our Positive and Negative Emotions.

Table 1: Brain Chemicals responsible for our Positive Emotions

Positive Emotions	For
• Joy	<i>Dopamine, Serotonin etc.</i>
• Gratitude	<i>Serotonin, Oxytocin.</i>
• Affection	<i>Oxytocin, Dopamine.</i>

Table 2: Brain Chemicals responsible for our Negative Emotions

Negative Emotions	Due to Imbalance of
• Depression	<i>Serotonin, Dopamine Norepinephrine,</i>
• Anxiety	<i>Serotonin, Norepinephrine, GABA</i>
• Stress	<i>Cortisol, Norepinephrine</i>



What's “You’ll be my last 7 minutes”?

The phrase “You’ll be my last seven minutes” refers to the phenomenon where significant (best) memories may appear shortly after brain death due to lingering neural activity (shown in figure 4). In the moments leading up to death, the brain's emotional centres, like the amygdala and hippocampus, may still function, allowing for the recall of profound memories. Neurotransmitters such as glutamate and norepinephrine facilitate this process, enhancing memory consolidation. Additionally, the release of dopamine during these recollections reinforces their emotional significance, illustrating the complex interplay between memory and emotion even in the final moments of life.



Figure 4: Fact of the phenomenon of “You’ll be my last seven minutes”.

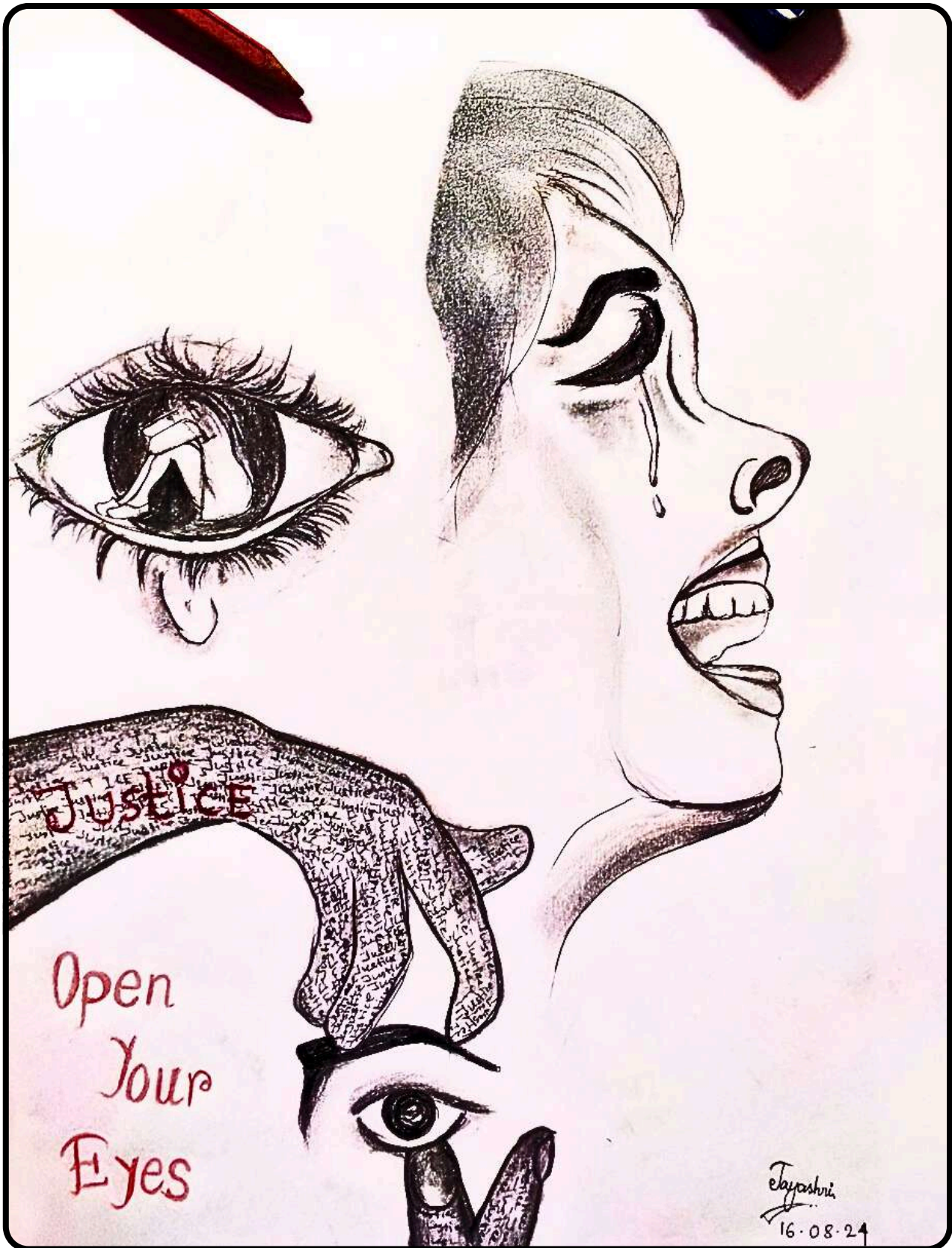
The Future of Brain Communication

Understanding neurochemistry is crucial for advancing mental health treatments, such as selective serotonin reuptake inhibitors (SSRIs) for depression and dopaminergic medications for attention deficit hyperactivity disorder (ADHD). Emerging research on the gut-brain axis indicates that gut health significantly influences neurotransmitter production, impacting mood and cognition. Furthermore, advancements in brain-computer interfaces and the concept of brain-net technology envision a future where direct brain-to-brain communication (shown in figure 5) mirrors the internet. This could revolutionize interpersonal connections, allowing for shared experiences and thoughts, ultimately creating new pathways for communication and understanding among individuals.



Figure 5: Brain-to-Brain Communication.

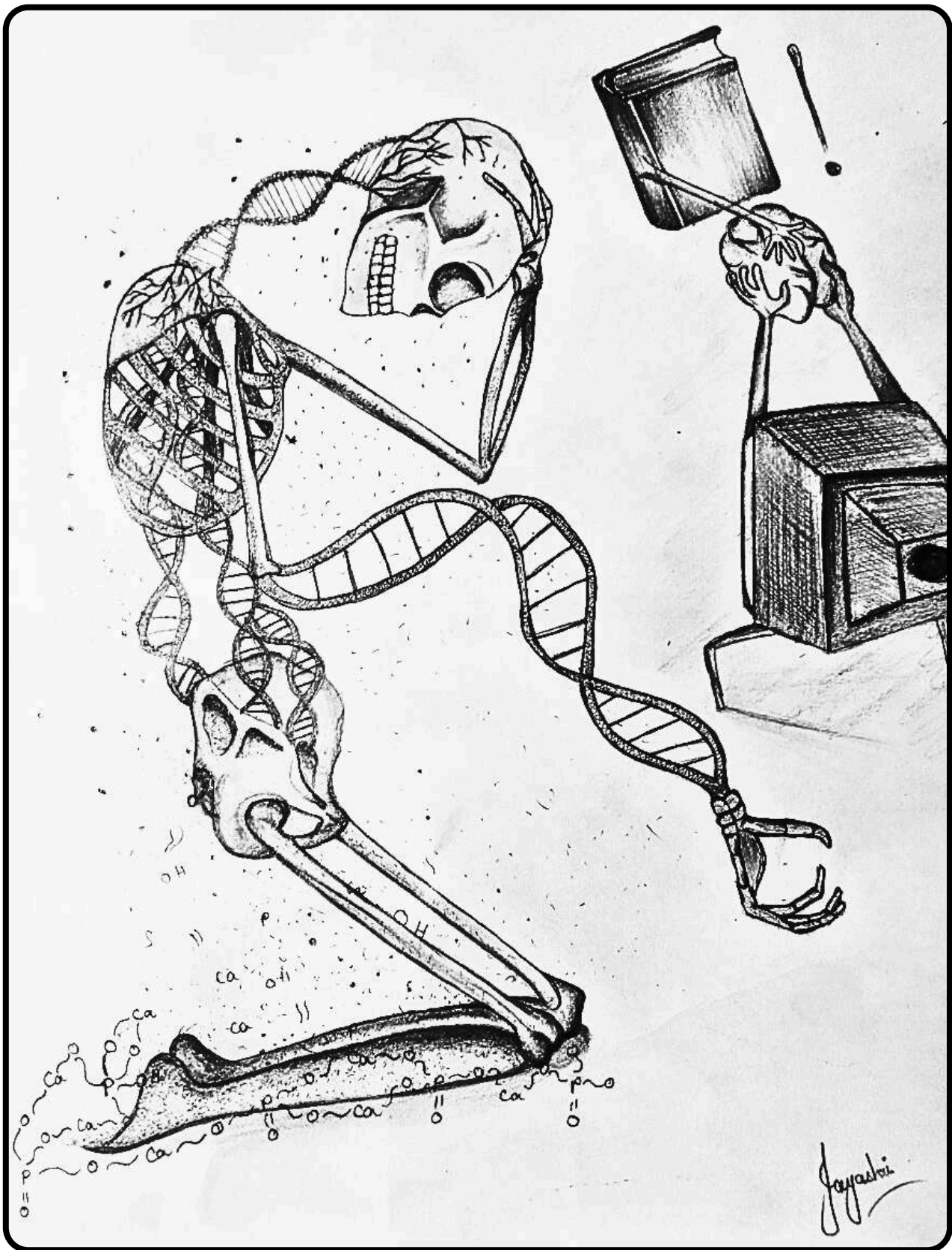
10. Artistic Expressions



Artwork 1 (By Jayashri Ghosh, Semester VI): Justice for R.G.Kar.

Chemazine 2024 Team stands by 'Tilottoma', Rape victim of the R.G. Kar Case, Kolkata and are hopeful that true justice will prevail.

Artistic Expressions



Artwork 2 (By Jayashri Ghosh, Semester VI): The Fight for Attention: Books v/s Digital Media.

Reading Books are equally important as getting familiar with technological progress of the ever-advancing Digital World.

11.

Water: The Elixir of Brain

*By Jayashri Ghosh, Riya Mukherjee,
Pritha Biswas; Semester-VI*

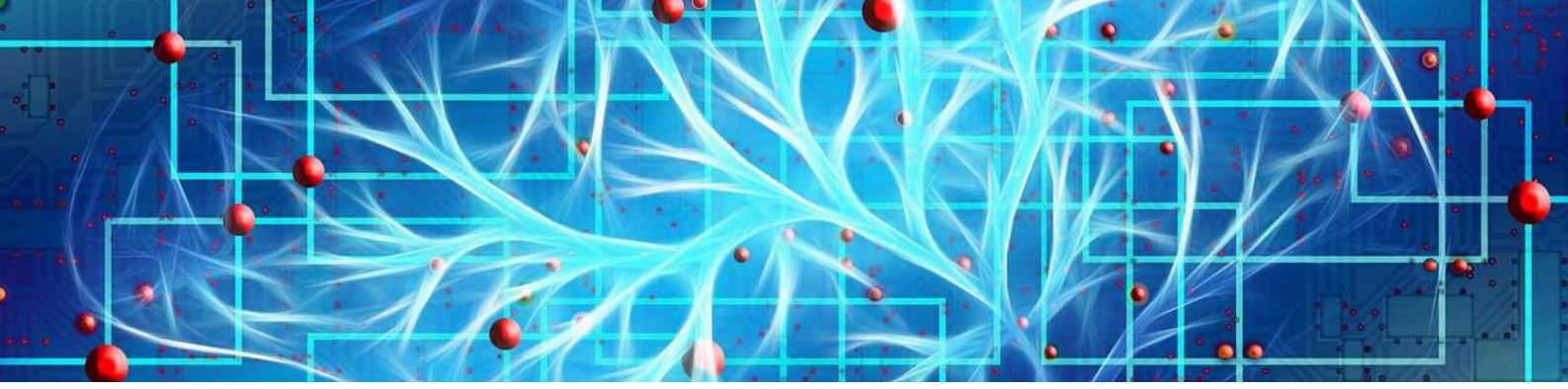
Water is the essential constituent of all living things. It's a molecule that consists of two covalently bonded hydrogen atoms to one oxygen atom. It is a polar molecule, and the formula for this molecule is H_2O . It plays an important role in biochemical reactions. Water is used to maintain homeostasis, catalyse metabolic reactions, serve as a vehicle for the transport of nutrients and waste products. Its high specific heat also enables it to play a role in regulating body temperature. Water acts in several physiological processes. These activities are solubilization of chemicals, catalysing enzyme action, and sustaining cellular turgor pressure. Its ability to dissolve a vast array of chemicals has proven essential for life.

Our brain on the other hand, is an organ responsible for cognitive function, processing of sensory information, and controlling body movement. It contains neurons, glial cells, and many other support structures. The functioning of the brain is crucial in managing one's behaviour, thought patterns, memory, and coordinated movements. Good brain functioning is crucial for the integrity of the cognitive aspect, as well as daily functionality. The brain needs a sensitive balance of electrolytes, neurotransmitters, and other chemical messengers to work correctly. This is held stable by a degree of hydration. Water constitutes about 60% of the human body and plays many important physiological functions.

Water helps with homeostasis, nutrient transportation into cells, as well as waste products removal. In the case of a healthy brain, water is an essential substance because the brain consists of great percentages of water, and its need supports cognitive functions in the body. The brain is one of the most complex organs, and it is about 75% water by weight. This high-water content is, thus important for maintenance of the structure and proper functioning of the brain (as artistically represented in figure 1). Water facilitates neural activities through impacts on the biochemical environment of the brain and on supporting cellular function. Therefore, understanding the association between water and brain health is important to maximize cognitive performance and general well-being.



Figure 1: Artistic representation of Watering the Brain which is essential for its functionality.



Water Composition in the Brain

The brain has a rather high content of water, which means maintaining proper hydration is important to its integrity and functioning. The following are significant in terms of the water content in the brain:

- **Cellular Function and Structure:** Neuronal and glial cells in the brain are surrounded by interstitial fluid that consists of water. This fluid maintains cellular turgor and structural stability. The intracellular fluid is an important part of a cell's water composition. It allows the cell to take nutrients, waste removal, and maintain osmotic balance. Water facilitates the diffusion of essential ions and nutrients and supports the metabolism of the cell.
- **Neurotransmission:** Water is crucial in maintaining the balance of the extracellular environment of the brain, which determines neurotransmission. The synaptic clefts of the brain, which are almost minute gaps created between neurons where the neurotransmitters are released, are highly sensitive to an equilibrium ionic environment. Hydration would thus keep this balance afloat so that neurotransmitters like glutamate and gamma-aminobutyric acid (GABA) could act to ensure proper signal across neurons. Proper hydration maintains synaptic transmission efficiently and cognitive functions depend on processes that involve learning and memory.
- **Cerebrospinal Fluid and Brain Volume:-** The brain has cerebrospinal fluid covering it as a clear fluid which cushions it from mechanical injury. CSF is predominantly water, so the right levels of water need to be maintained for the volume and, therefore the pressure within the brain. Adequate hydration will ensure appropriate levels of CSF within the brain, which can then avoid conditions such as

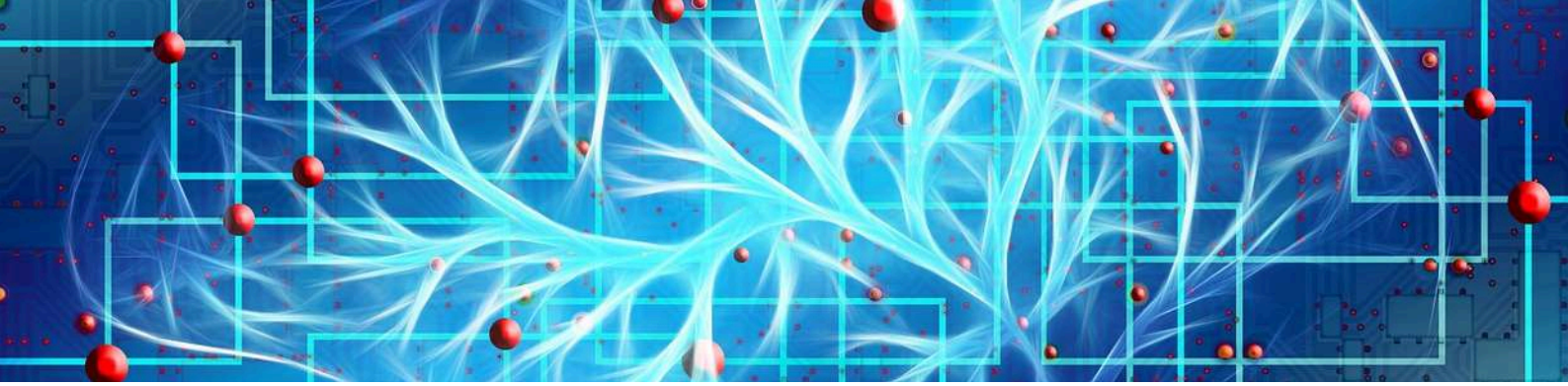
increased intracranial pressure or swelling of the brain. Although water serves to maintain the volume of the brain as a whole, it is critical in this regard to ensure proper neural functioning.

Biochemical Reactions: Water is a solvent for many biochemical reactions happening within the brain. It is involved in hydrolysis reactions that break the complex molecules into much simpler forms to be used in metabolic processes. The enzymatic activities, which are necessary to synthesize neurotransmitters and other metabolic activities, significantly depend on water as a medium. Dehydration implies that these biochemical reactions cannot take place well, thus dictating one's overall health and well-being in the brain.

In a nutshell, the water in the brain is significant for its structural integrity, neurotransmission, and biochemical functions. Water allows proper hydration of cells, supports synaptic transmission, and regulates cerebrospinal fluid-matters that are essential for cognitive performance and general brain health. As the brain functions with dependence on water for such purposes, hydrating oneself is important to optimize these abilities and prevent possible impairments.

Impact of Hydration on Cognitive Performance

Water consumption and brain function are integrally connected. Over 60% of the adult human body is composed of water and every system in the body is dependent on proper hydration, including the activities of the brain and nervous system. Research has demonstrated that lack of water to the brain can impair short-term memory function and the recall of long-term memory, as well as cause a variety of symptoms such as brain fog, exhaustion, headaches, sleep issues, stress, anger,

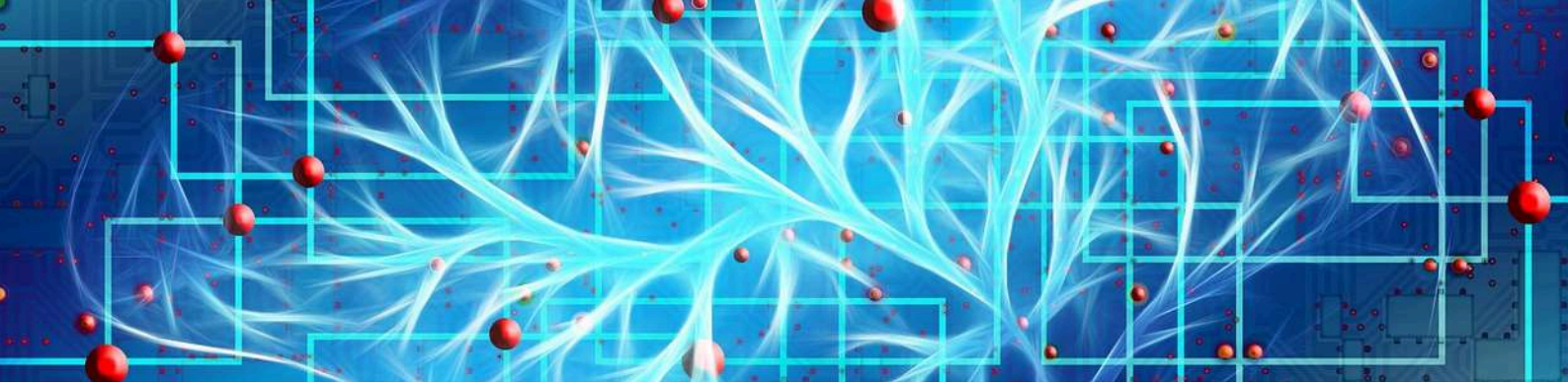


and depression. Drinking water can improve one's brain health (as mentioned graphically in figure 2) by simply increasing blood flow and oxygen to the brain – which, in turn, improves concentration and cognition (supporting memory function) and helps balance moods and emotions, reducing stress and headaches. Dehydration is one of the most frequent causes of hospitalization of elderly Canadians. Dehydration is particularly common among individuals living with Alzheimer's

disease and other dementias. Cognitive deficits were dependent on the severity of dehydration, which affected performance in all cognitive tasks when soldiers were in a severe state of dehydration (>2 % body mass loss). This study was the first to emphasize that cognitive abilities were sensitive to a suboptimal hydration state. Mild dehydration studies so far have failed to show a replicable impact on cognitive performance.



Figure 2: Benefits of Hydration on Brain activity and other Body parts



Consequences of Dehydration on Brain Function

The brains of dehydrated adults show increased signs of neuronal activation when performing cognitively engaging tasks. According to researchers, this indicates that their brains were working much harder than usual to accomplish the tasks they were presented with. Researchers in this study concluded that the performance of complex cognitive tasks was bound to decline due to the strain from dehydration. Additionally, it would appear that the impact of dehydration on the brain is particularly significant in women – specifically elderly women. In a study examining the hydration status of 2,506 adults over the age of 60, it was found that women with inadequate levels of hydration showed worse performance on cognitive tasks specifically related to attention and processing speed. While the performance of dehydrated men also declined.

This is because water is essential to keep all biochemical reactions in check, maintain the volume of the brain, and facilitate communication in the neurons. Hydrolysis and condensation are reactions that need to be carried out for metabolism in the brain. Hydrolysis involves the breakdown of polysaccharides such as glycogen into glucose, which then yields energy to the neuron. Condensation, on the other hand, is involved in the synthesis of neurotransmitters and proteins that are vital for the proper functioning of the brain. Such reactions illustrate the fine balance that exists between the different metabolic processes in the brain. Water is the solvent that keeps the environment ionic in the steady condition of the brain. Dissolving electrolytes such as sodium and potassium provide the necessary electrolytes/ions for producing electrical impulses within the neuron.

Glutamate and dopamine, being neurotransmitters, require a normal amount of water for smooth release and uptake at the synapses; otherwise, it disturbs the balance of ionic behaviour along with functions of neurotransmitters and subsequently cognitive activities. In the CNS, water provides a near-ideal environment for enzymatic activity, stabilizing the transition states in enzyme-catalyzed reactions. Carbonic anhydrase catalyzes the reaction of carbon dioxide and water to carbonic acid, an important enzyme in the maintenance of cerebrospinal fluid pH and neuronal gas exchange. Proper hydration is essential for maintaining osmotic pressure and supporting membrane potential in both nerve and glial cells. On the contrary, dehydration may impact normal neural function as well as impede cognitive performance.

Conclusion

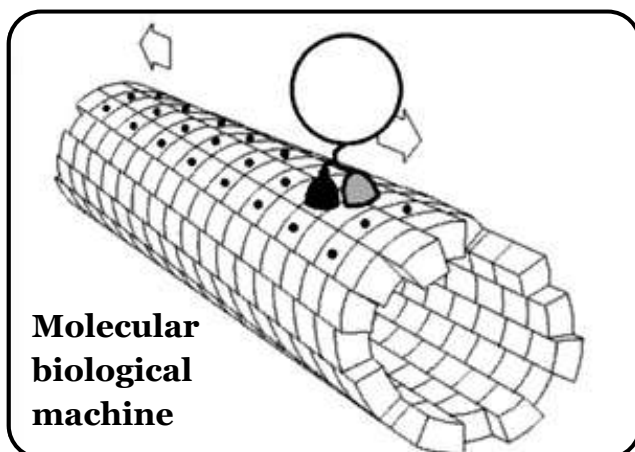
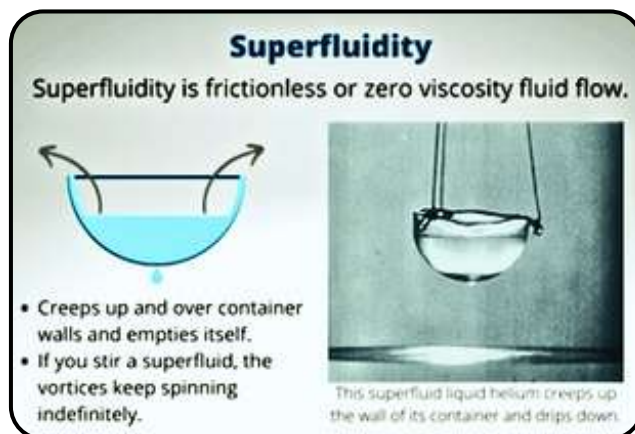
The daily hydration recommendation is 2.7 litres of water in women and 3.7 litres of water in men, but these will be supplemented by hydrating fluids consumed in food, though the actual need will change at different ages, sex, level of physical activity, or climatic conditions. These patients benefit from consistent hydration by staying alert, which probably improves attention and memory, but prevents mood disturbances linked with dehydration. It, therefore, implies that maintaining sufficient hydration is a critical aspect of maintaining cognitive function and overall brain activity.

12. Chemistry Fun Facts

By Rohan Singh, SK Absar Ali; Semester-IV

Anti-gravity Helium!

We all know about gravity and how it works. Right? However, did you know that a particular property of liquid Helium (He) defies gravity? According to chemists, liquid helium at a temperature very close to 0 (approximately -273.15°C or -459.67°F) becomes zero viscosity fluid which can then move in any direction without any resistance.

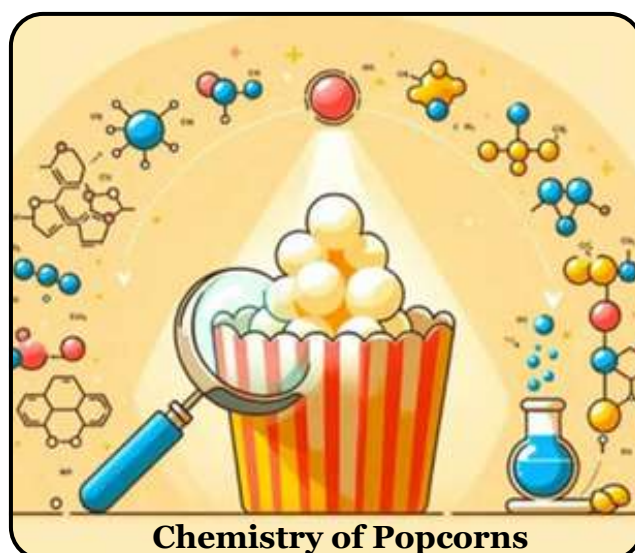


Can Molecules walk?

Yes! The team of Leigh and co-workers has reported molecular machines that appear to be walking at the molecular level. This work got awarded the Nobel prize in Chemistry in the year 2016.

Pop-Corn Chemistry

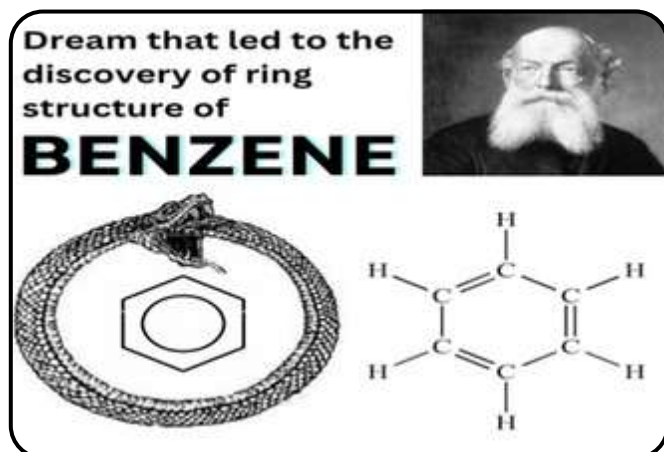
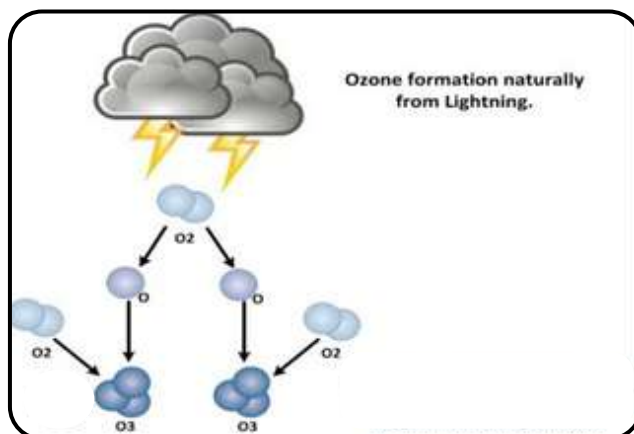
When heated, the moisture inside popcorn kernels turns to steam, building pressure until the kernels bursts open, transforming it into the fluffy snack we love.



Chemistry Fun Facts

Let the Lightning strike, and there's Ozone

Lightning splits nitrogen and oxygen molecules into atoms, which then reacts to form ozone. Ozone has a distinctive smell, similar to chlorine or cleaning product.



Kekulé's Dream

Friedrich Kekulé's dream of a snake biting its own tail helped form the benzene structure.

Chemical-Clock

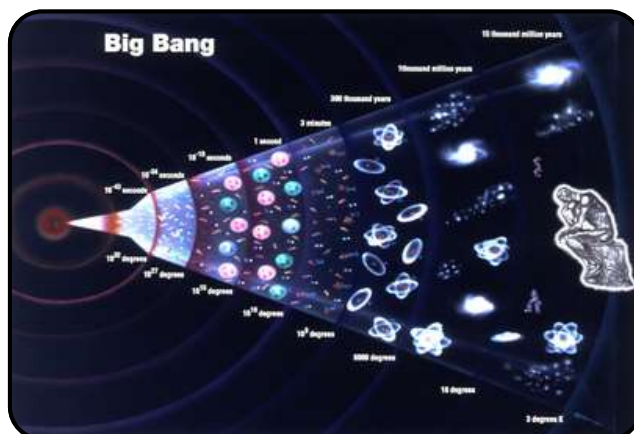
Belousov-Zhabotinsky ('BZ') reaction, exhibit oscillating colours over time due to periodic changes in concentration of reactants, creating a 'chemical clock' effect.



Chemistry Fun Facts

The Hydrogen atoms in our body are 13.8 billion years old

Hydrogen atoms, which make up about 75% of the ordinary matter in the universe, were formed shortly after the Big Bang, approximately 13.8 billion years ago.



Glass may be a liquid; it just flows very slowly



Glass is actually neither a liquid—supercooled or otherwise—nor a solid. It is an amorphous solid—a state somewhere between those two states of matter. And yet glass's liquidlike properties are not enough to explain the thicker-bottomed windows, because glass atoms move too slowly for changes to be visible.

Why are Hot peppers so hot?

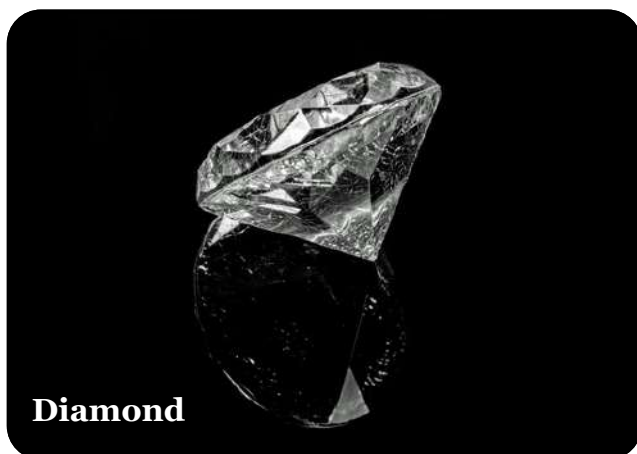
Hot peppers get their heat from a molecule called capsaicin. Capsaicin is the active compound in hot peppers that produces the sensation of heat or spiciness when consumed. It binds to receptors in the mouth that detect temperature and pain, leading to the perception of heat.



Chemistry Fun Facts

The toxic Chemistry in Car airbags can also Save you

Car airbags are packed with salt sodium azide, which is very toxic. Sodium azide (NaN_3) is a white, odourless, crystalline solid. It is used in car airbag systems to produce nitrogen gas that inflates the airbag upon impact (during accidents or other).



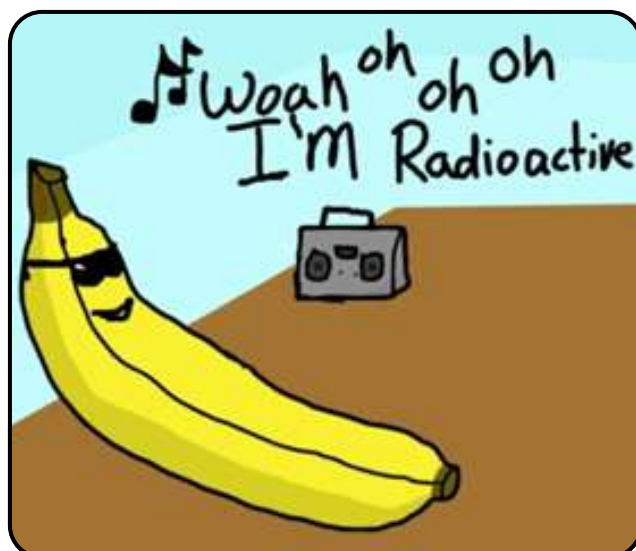
Diamond

Can you burn Diamonds?

Diamonds are made of pure carbon, so it's obvious to think that they cannot be burnt under a oxygen atmosphere to produce carbon dioxide. Since three-dimensional (3D) arrangement of the diamond is very tight and difficult to disrupt, very high temperature would be required to burn them down.

Radioactive Bananas

Bananas are slightly radioactive because they contain radioactive potassium.





13.

Methods in Chemical Science Communication

By Sibsanakar Palit; Semester-VI

Communicating Chemistry, simply

The need for effective science communication has never been more critical, especially as scientific literacy becomes increasingly important in addressing global challenges such as climate change, public health, and technological advancement. In the common public opinion chemistry is deemed to be complex and abstract, which makes it less appealing and understandable. But chemistry plays an influential role in our daily lives from the food we eat to what we wear. The complexity comes at the level of chemical concepts that often seem complex and lie beyond the understanding of common people. In such a case, effective communication of chemical science is the key! It can bridge the gap and create a greater appreciation of chemistry and relevance to social concerns.

With science more and more coming into policy decisions and mainstream public discourse, the ability to simply and effectively communicate science concepts would be desirable. In this article, one can explore some innovative methods of chemical science communication that can make chemistry and related topics more accessible to all audiences: students, in particular, and the common people. The article focuses more on identifying some interesting effective strategies based on expert input in communicating chemistry, gaining insights into challenges faced by chemistry educators and communicators, and suggestions on improving chemical science communication.

By examining the current landscape of chemical science communication, this is a humble attempt to inform on the development of new strategies and resources that can enhance public engagement with the central science i.e. Chemistry.

Expert Opinions

Three Chemical Science professionals were interviewed. A balance of inputs was ensured by interviewing two Chemistry Researchers and Educators more relevant to student education and one Freelance Science Journalist involved with public understanding of chemical science. Dr. Maya Gupta (Teaching Faculty, Department of Education, Jadavpur University, Ph.D. and Post Doctorate in Chemistry) and Dr. Arindam Rana (HOD, Associate Professor, City College, Kolkata and Science Communicator) were interviewed as Chemistry Researchers and Educators. Ms. Sanjukta Mondal (Freelance Science Writer, Journalist, and Consultant) was approached to receive inputs on Chemical Science Communication with relation to the general public. They provided additional insights into the challenges and best strategies in chemistry education and science communication:

1. Personal inspiration pointers on taking up Chemistry as a field of study.

For Dr. Maya it was more the colourful chemical reactions, observation of nature, and her desperation to learn a subject generally considered



hard by her peers inspired her to take up Chemistry as a career path. For Dr. Rana his interest sparked during high school days in 1983 when he first witnessed Science demonstrations and affordable DIY activities on the Quest TV program by Mr. Samar Bagchi and his Team broadcasted on the Indian National Television, on Doordarshan. For Sanjukta it was her School Chemistry Teacher who made the subject more fun and relatable to her. The hands-on laboratory work she was involved in high school also was a motivating factor behind going for further study in Chemistry.

2. Effective methods of chemical science communication and tailoring it as per target audience.

Dr. Maya emphasized more on fostering observation of nature and its changes among the students like in leaf or flower (colour changes with chemical reactions, slow and fast with time). Hands-on activities and Application-based learning can help a student better understand the subject matter. The Five E Model (Engage, Explore, Explain, Elaborate, and Evaluate) and Learning through collaboration, brainstorming, by-doing, project-based, group discussion, debate, wall magazines, etc. can be helpful on a case-to-case basis. She believes storytelling methods and traditional media like, nukkad natak (a traditional Indian street play), and anti-superstition campaigns can be instrumental in making chemistry more relatable to the common people. Dr. Rana advocates for using daily use items to explain concepts in chemistry and STEM (Science, Technology, Engineering, and Mathematics). After all that can make things affordable and accessible. He helps spread Science Awareness and Learning by Fun Stories & Activity based Learning.

Communicating in a multi-lingual approach (as per audience) can be more engaging. Dr. Rana has been conducting workshops under the name 'CHEMAGIC' for students, teacher trainings, rural and tribal people and for big procession or events taking the DIY approach (as in figure 1) using daily used items.



Figure 1: Science Activity Demonstration by Dr. Arindam Rana at Birla Industrial & Technological Museum, Kolkata on the occasion of an event to honour the legendary science communicator Mr. Samar Bagchi.

Sanjukta believes in communicating about Chemistry with better storylines and visuals rather than just facts and figures. Connecting to popular Science shows or movies (like Breaking Bad) and the stories of people involved with the invention, discoveries, or historical context helps make the content more human and interesting for the people. She doesn't use chemical symbols or reactions in her science communication works unless essential with supporting lucid explanation.

In Inreach, scientific communications can include a bit more jargon and facts given the target audience is more familiar with the fundamentals of the subject. However, for outreach science content storytelling and connecting to daily life activities



can help gain a better appreciation for the topic. Being open to feedback from different kinds of audiences (without bias) and improving accordingly is the key!

3. Challenges in chemical science communication.

A decline in the student interest in chemistry in recent times, corruption in the education system, lack of funds for fostering creative learning, and digital media addiction are some of the challenges faced by Dr. Maya in chemistry education. Dr. Rana emphasized that nowadays more emphasis is given to Teaching as a way of Preaching and not Co-learning. At times, existing people from within the field of chemistry tend to miss out on having a clear understanding of the concepts and thus can't initiate a sense of appreciation for the subject matter among others. Sanjukta mentions that while simplification of facts is important, oversimplification which may lead to misinterpretation of the facts is not desirable. Over-explanation of a topic also stands out as a challenge at times.

4. Role of Chemistry educators and science communicators.

All of the experts, Dr. Maya, Dr. Rana, and Sanjukta agree that the role of a chemical science communicator lies in making the content more engaging and accessible to various kinds of audiences. This can foster an appreciation for the subject and most importantly promote ethics and scientific temperament.

Conclusion

There's a need for innovative communication strategies in chemical science to enhance student education, public understanding, and engagement. Key challenges include the complexity of chemical concepts, difficulties in memorization, and insufficient practical experiences, which affect effective learning. To address these issues, it is recommended to increase hands-on experiments, utilize technology for interactive learning, and connect chemistry to real-world applications. Additionally, employing visual aids and fostering community engagement can make chemistry more accessible. Future directions should focus on policy changes toward developing tailored communication strategies that resonate with diverse audiences, ultimately promoting a deeper appreciation for chemistry and its relevance in everyday life.

Chemistry is not a bad subject. Fantastic subject! Fantastic history! Fantastic stories! Unfortunately, we don't remember them, we don't cite them, we don't quote them, we don't really tell people about it.

- Professor C.N.R. Rao, JNCASR, Bengaluru, India

14. Public Destinations of Science in Kolkata

By Sibsanakar Palit; Semester VI



Credits: bangla.hindustantimes.com

Destination 1: Professor Shonku Park (Inspired by Satyajit Ray's Sci-fi Book series)

Street Number 672, Action Area IID (Behind City Centre 2), Newtown, Kolkata, West Bengal 700157.



Credits: yometro.com

Destination 2: Birla Industrial and Technological Museum, BITM

19A Gurusaday Road, Ballygunge, Kolkata, West Bengal 700019.

Public Destinations of Science in Kolkata



Destination 3: Science City Kolkata
J.B.S Haldane Avenue, Kolkata, West Bengal 700046.



Destination 4: Indian Museum
27 Jawaharlal Nehru Rd, Kolkata, West Bengal 700016.

Public Destinations of Science in Kolkata

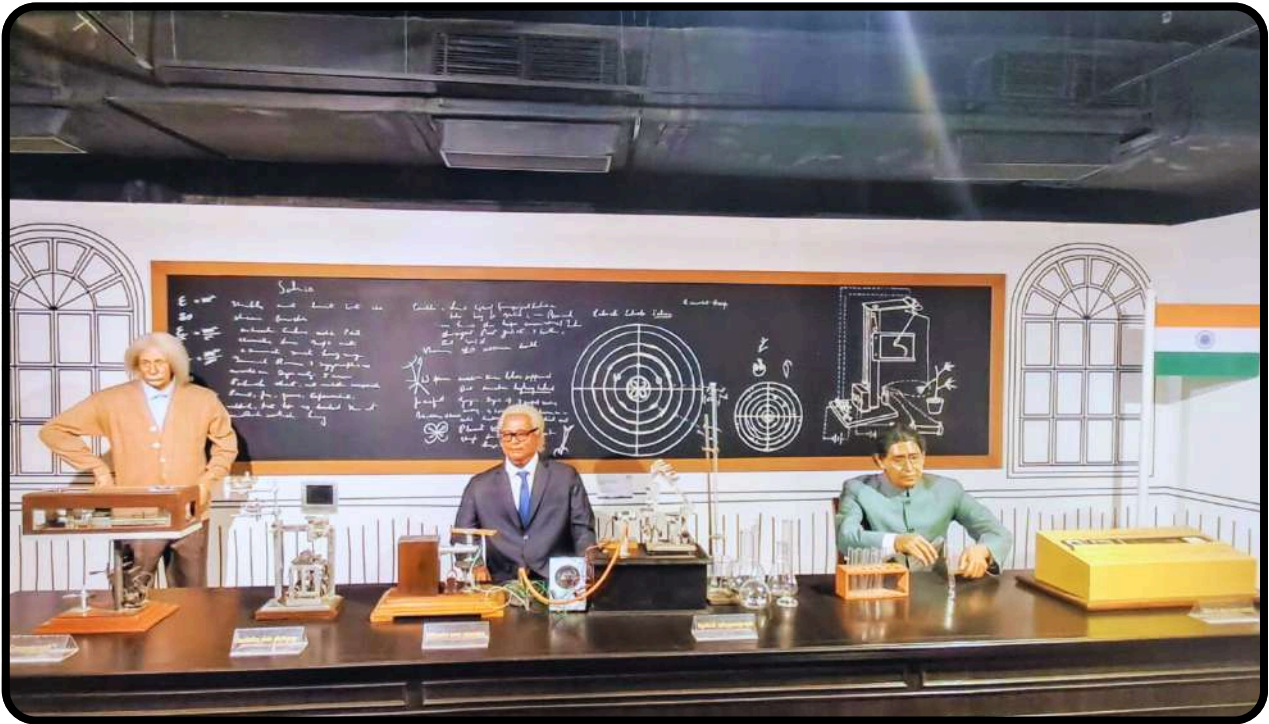


Destination 5: Birla Planetarium
496 Jawaharlal Nehru Road, Kolkata, West Bengal 700071.



Destination 6: Museum of Astronomy and Space Science
43/ Chalantika, Garia Station Road, Kolkata, West Bengal 700084.

Public Destinations of Science in Kolkata



Destination 7: Mother's Wax Museum

Opposite to Eco Park Gate no. 2, Kolkata, West Bengal 700156.



Destination 8: J.C. Bose Museum

Bose Institute (beside Rajabazar Science College) 93/1, Acharya Prafulla Chandra Road Kolkata - 700009, West Bengal, India.

Public Destinations of Science in Kolkata



Credits: telegraphindia.com

Destination 9: S. N. Bose Archive & Museum (Permit required for visit)

SNBNCBS campus, Salt Lake Bypass Road, Sector 3, Salt Lake City, Kolkata, West Bengal 700106.



Credits: reddit.com

Destination 10: Acharya PC Ray's Museum (Permit required for visit)

Palit Building, Rajabazar Science College campus, 92 Acharya Prafulla Chandra Road, Kolkata 700 009.

15.



Interview I: Back to College Days with City College Alumnus, Dr. Ardhendu Sekhar Dutta Gupta

By Subhronel Das, Sibsankar Palit; Semester-VI



Dr. Ardhendu Sekhar Dutta Gupta is an alumnus, former professor and guardian of another alumnus of Department of Chemistry, City College, Kolkata. This article briefs on the legacy of Dr. Ardhendu Sekhar Dutta Gupta a.k.a. ADG sir. It is based on a conversation organised by the Department of Chemistry, City College Kolkata with Dr. Ardhendu Sekhar Dutta Gupta who once was a student and then went on to become a professor in organic chemistry and also is a parent to another former student of our very own department. This conversation was inspiring enough and covers snippets from his college life, his mentor at the department, his comparative understanding of city of joy, Kolkata then and now and his experiences as a professor of chemistry and also a parent to his son, a departmental alumnus. In this interview article, we explore together about the motivational but underappreciated story of Dr. ADG.



1. Can you please share about your student life?

At the time of my college admission, my initial preference was to take up Physics as my Honours subject as there was a lot of scope in Physics those days. So, after finishing my school education when I went to take admission at the City College, the college office informed me that there were no more vacancies for Physics Hons. I was very sad and disappointed. I over-thought to pursue my college education in a general degree rather than Hons. degree. But then the college office informed me that only one seat in Chemistry Hons. was still left. So, out of no choice I filled the form. After a few days when we went to check the merit list, I was again dejected to not see my name on the list. While getting ready to return home, my friend came to me and said that we had been enlisted for admission. I got admitted to Chemistry Hons. Those days, the department was a small one unlike today and all my mentors and professors were very supportive. After a point of time, my interest in chemistry increased especially in Organic Chemistry and slowly, I fell in love with the subject. One of the major reasons behind this was undoubtedly my Organic chemistry professor who taught the concepts so well that it felt like magic. As I was not native to Kolkata, I stayed at the Rammohan hostel and continued my studies. After completing my graduation my initial desire was to pursue MSc. but due to some financial constraints in my family, my father advised me to get a job. One day I saw a recruitment advertisement in a newspaper in the Physiology department of Calcutta Medical College as a lab assistant and applied for it and eventually, I got the job. I spent 2 years there and learned a lot of things about the different analytical methods and practices in chemistry, biochemistry, and medicinal chemistry

and then I was transferred to another medical college. One day, one of my college friends came there for his checkup. We met after a long time, and he asked me what I was doing there. He asked me if I wished to pursue a MSc. I requested him to help me to get back into the academics. Eventually I applied for MSc. at the Jadavpur University and took admission there and completed my MSc. with a specialization in Organic Chemistry and got the opportunity to do my Doctoral work at the Bose Institute. After some initial years, I also used to do some works at the clinics to earn some extra money because during those days the stipend was very less to sustain one's family. I completed my Ph.D. in 3.5 years. One day I again went to the City College to give an exam of a government service and met one of my professors. He took me to our department and the then Head of the Department asked me to join as a lecturer at the department. Initially I was in a dilemma as it was a real surprise for me. Eventually I filled the application form. Finally, after a few days, I got the job as a Lecturer at the Department of Chemistry, City College, Kolkata.

2. Can you share your views about Kolkata as a city then and now?

Today's Kolkata has changed a lot from our time. During our college days, the city was less polluted compared to the increased pollution levels now. Also, there is a huge difference in population and number of private cars and other vehicles which has increased a lot now. Back in our time, public transport used to be the only major way of transportation. I remember that I explored many places without even any transport. Also, since my college and hostel were located almost at the heart of the city, so I got the opportunity to explore it even better.



3. Would you like to share more about your experience as a teacher at City College?

Joining as a Lecturer at the Chemistry Department at City College was a new and a bit challenging experience for me, which I enjoyed a lot. With time, I got promotions, and also the responsibilities kept on increasing. I became one of the in-charges of the students at Rammohan Hostel. I remember at that time some students from outside the hostel used to eat in the hostel mess, sometimes without paying the bills. So, I didn't want any conflict and settled many disputes on my own. One day some of the students from the hostel came to me and requested me to guide them in chemistry outside the college hours and I agreed to their request. Slowly, this news spread among students from the city college and other colleges.



Photo: Young Dr. Ardhendu Sekhar Dutta Gupta back in 1973.

Many of them approached me and requested to help them in chemistry and I agreed to give them tuition without charging a single penny from any of them. I always tried to help the students as much as possible, and the news spread even among the other professors. I started receiving many invitations as a guest lecturer at nearby colleges. My retirement ceremony in 1999 was graced by the presence of the principal who felicitated me and said to me, "From today you may not be a professor, but you will have to continue as a Guest Lecturer". I had to agree and continued as a guest lecturer at Chemistry Department at City College till the year 2002. Then I thought that finally I will get the chance to experience my long due retired life, but I was wrong as teaching life wasn't leaving me anytime soon. I continued as a guest lecturer in many other colleges till around the mid of last decade and finally now get a chance to enjoy a retired man's life.

4. Can you please share about your role as a guardian of Dr. Pranab Dutta Gupta who was is also a departmental alumnus at our college?

Many people may think that I admitted my son to my college, but the story was completely different. After finishing his school life, he himself came to me and said that he will only take admission in City College and nowhere else. I got into a dilemma and finally agreed to his wish as he was insisting on his point. I tried my best to guide him as a mentor and eventually he pursued his own career. Now he is an Associate Professor in the Chemistry Department at Serampore College.

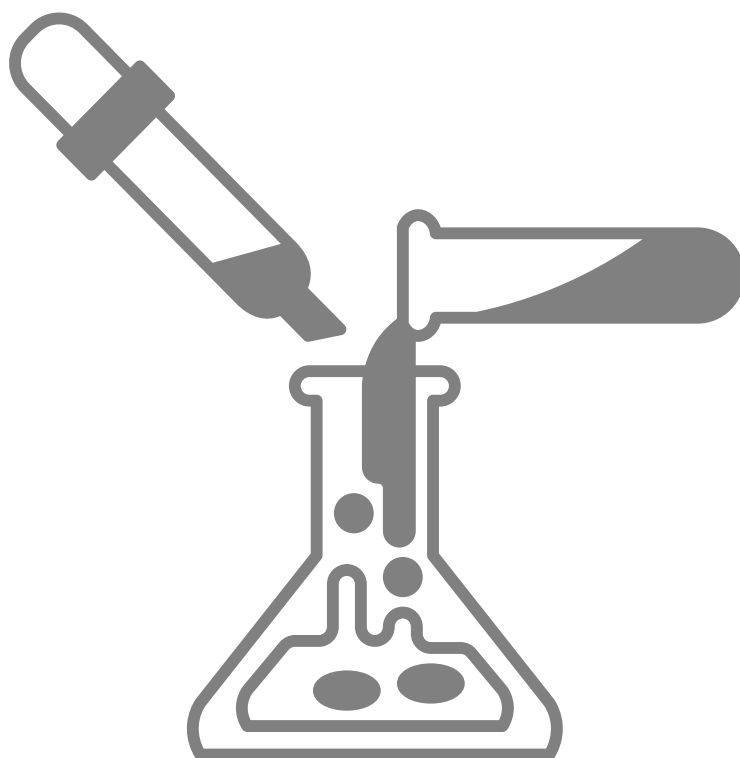
5. What message do you want to give to the present and future chemistry aspirants?

See, firstly one should not fear the subject. The



only way to learn and remember Chemistry is to read and practice in writing on a daily basis. One will have to work hard. There is no alternative for this. Remember one thing, the more effort and hardwork you put into one thing, the more it will

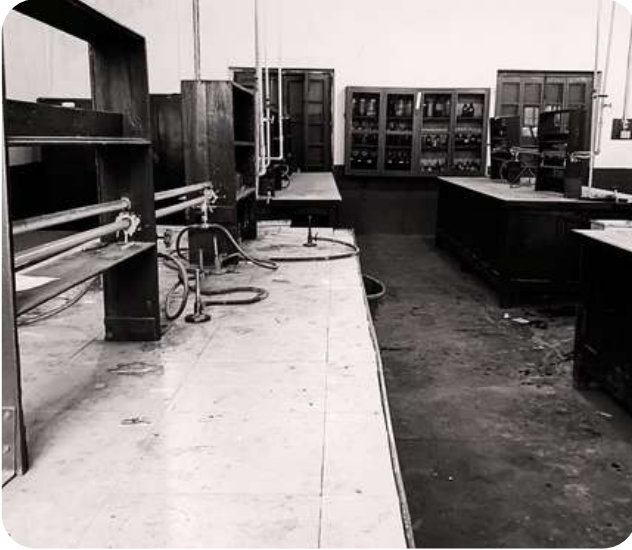
pay you back as results. Also, there are a lot of opportunities nowadays for the students to become successful compared to our time. One should continue to work hard in the right direction to achieve one's goals.



16. সিটি কলেজের দিনগুলো

-শাস্বত পাল, ষষ্ঠ সেমিস্টার

মধ্য কলকাতার একটা শান্ত বাড়ি
সাদা আর লাল রঙের প্রলেপ,
প্লাস্টার খসা দশ ইঞ্চির দেওয়াল
সত্যজিৎ রায়ের "অপরাজিত"-স্থান
কে জানতো? এখানেই সবার
দেখা হওয়ার কথা ছিল আমাদের
নভেম্বরের একটা সকাল
কত দূর দূরান্ত থেকে এসে
একশো দুটো সিঁড়ি ভেঙে
দেখা হল সবার সাথে
এই প্রিয়, কমিস্ট্রি ডিপার্টমেন্টের মাঝে
গল্প শুরু, মজা শুরু,
প্রাকটিক্যাল ক্লাসগুলো রাঙিয়ে দেওয়া শুরু।



বন্ধুত্বের আলো আঁধারে,
একটা পরিবার তৈরী
সিনিয়র জুনিয়র অর্বাইটাল ওভারল্যাপ,
বন্ড গুলো আরও স্ট্রং হতে থাকলো
দিন এগোলো, মায়া বাড়লো
আজ আমরা লাস্ট সেম
এভাবেই প্রত্যেকটা ব্যাচ আসে
কত স্নেহভরে স্মৃতি তৈরি করে
তারপর একদিন যেদিন,
ক্লাসরুমটা আর তাদের থাকে না
কষ্ট হয় খুব।

সাথে সাথে মনে পরে যায়
সেই ক্লিপ নিয়ে খেলা
ক্লাসরুমে ক্রিকেট খেলার কথা
স্মৃতি তো চিরন্তন, তাই না!
ল্যাব গুলোতে পড়ে থাকা ধুলো,
উড়ে আসা পায়রা গুলো
একদিন খুঁজবে আমাদের সবাইকে,
মিস করবে আমাদেরও।



17.



Interview II: Back to College Days with City College Alumnus, Dr. Rupam Dinda, FRSC.

By Rounak Saha, Sibsankar Palit, Subhronel Das, Semester-VI



Dr. Rupam Dinda is an alumnus of the Chemistry Department, City College, Kolkata. After completing his graduation (in Chemistry) in 1996, he pursued M.Sc. in Chemistry and specialised in Inorganic Chemistry from Rajabazar Science College in 1998. He holds a Ph.D. (Chemistry) from Jadavpur University (IACS), Kolkata and had post-doctoral experience at the University of Missouri-Rolla, USA (presently known as Missouri University of Science and Technology) where he worked for 4 years. He then moved to Germany to University of Heidelberg where he worked for 1 year. Then he joined his current affiliation, NIT Rourkela in 2007 as a faculty.

This article briefs on the conversation with Dr. Dinda. He shared some insightful pointers covering his college life, his mentors at the department, his viewpoint on past and present Kolkata, his interests, works and achievements. In this interview article, we dive deep into the inspiring story of Dr. Dinda from being a student at our very department to becoming a Fellow of the Royal Society of Chemistry as an established Chemist from India.



1. Can you please briefly share about your college life?

The college life was good enough, I lived in the nearby hostel of our college in Rammohan Hall on the 2nd floor. I studied in the day college (City College). Classes started from 10 AM and continued till evening. Our department was on the back side of the 3rd floor. The journey was very good, still remember those days. Especially, the college was in front of the main road and near to the hostel, so the accessibility was not that hard. The college was located in the heart of the city, Kolkata. I could go anywhere like Hati Bagan, College Square, Shyambazar, Esplanade and many other places. Those were the enjoyable days of the college.

2. Can you share your thoughts about Kolkata and its atmosphere then and now?

Now I majorly stay outside of West Bengal, so it's a bit difficult to say about present Kolkata, but I regularly follow the news. During our time, back in the 90's the atmosphere was far better. Nowadays, protests and strikes occur at regular intervals (context: RG Kar Rape case). Due to this, the patients from rural areas are deprived of government health services, which I believe is not right. The political agendas, social activities, movements, and strikes due to social problems are not healthy for any kind of social incident occurring, but they will be looked at by law and order to make the situation better. Compared to our days the traffic in Kolkata has also increased substantially. Kolkata now, is busier and polluted than it was in my time.

3. Can you share about your experience as a student at City College and about some of your professors?

After 10+2, I approached to many colleges in North Kolkata but somehow, I got selected in the very 1st list of City College and I immediately got admitted there. After I started my classes in our college as a student, I felt good. I think it was a good decision of mine to opt for this college. At that time, we had good enough teachers. I can recall the names of some of my professors, Dr. Alok, Professor of Organic Chemistry, Dr. Manabendra (MNB), Professor of Inorganic Chemistry, Dr. Ardhendu (ADG), Professor of Organic Chemistry. Many others were also there, all of them were very good teachers. The laboratory was beside the Departmental staff room where we performed qualitative and quantitative analysis and various experiments. The theory classes were held in other floors as assigned in the routine. A cordial atmosphere, good relationships and interactions between students and teachers were there. I learnt many things. Other than academic part, the cultural part was very strong which were looked after by the College Union. The college fests and various programmes were held at the open space in the centre of the college. Sports activities also took place at our college, in some of which we participated. As a whole it was a good journey, still like it, if I get a chance, would love to go back to the college again.

4. Why did you choose Chemistry as a subject and how did your interest towards inorganic chemistry come about? Can you share about your current work?

I liked chemistry during 10+2 with respect to other subject so I chose it. During the course, among all the branches, I was particularly interested in organic and inorganic chemistry. Manabendra sir taught us inorganic chemistry at college, and I took extra tuition from K.N. Ghosh sir from



Scottish Church College and organic chemistry tuition from our college teacher Dr. Alok Ghosh. Somehow between 2 subjects at that time. I preferred inorganic chemistry. I took up a specialisation in inorganic chemistry during my master's.

As a working professional now, I deal with inorganic chemistry as a researcher and teaching faculty. Currently, I am working on the pharmacological, catalytic and magnetic chemistry of a wide range of transition metals, both in artificial and biological settings. The work is based on medicinal inorganic chemistry. Initially I worked on coordination and bioinorganic chemistry and now more specifically on metallo-based drugs i.e. medicinal inorganic chemistry. We just developed some metal-based drugs which can be called a metallo-based complexes with their bio relevance. We developed some molecules that were fluorescence active. We first synthesised them then characterised and then by establishing, we saw their application. Now at present in the last 3-4 years we have been focusing on the anti-cancer activity of transition metalogue drugs as well as their bio imagined characteristics i.e. both as diagnosis and therapy. That's my current field of research.

5. Certainly, it's a pleasure to interview a Fellow of Royal Society of Chemistry. Can you please share more about this prestigious recognition that you have been honoured with?

Royal Society of Chemistry, UK is one of the biggest societies in the world. They recognise researchers and scientists from across the world who have significant contributions to research and academic activity. They consider everything depending on network and publications, the

impact factor, citation and output of research, published in peer-reviewed indexed journals i.e. the quality of research and also academic experience, overall bio data. Based on the aforementioned they invite one as a Fellow of the Royal Society of Chemistry. Last year, I was invited to become a fellow of Royal Society of Chemistry and I got awarded this year in 2024. That was basically an invitation given by the president of Royal Society of Chemistry from UK, on the basis of which some documentation one has to submit, and they send awards, certificate and memento. That certainly is a great achievement.



6. Would you like to share any message for the students?

Nowadays after 10+2 students move either to become an engineer or a doctor. This is a bad concept! The general line is very much good enough. One can also go for a B.Sc., then masters in any University or IIT or NIT and then Ph.D. and post-doctoral work. Research life is also good, but one has to be patient. It is a long journey but there is a very good scope. If you have a wish, you can explore and move forward. Also, as a researcher you can be a part of new things, new methodology which is another level of accomplishment.

18. Moments & Memories together (2021-2024)



Picture 1: City College, Kolkata Building (2023)



Picture 2: Our Former HoDs and professors

Moments & Memories together (2021-2024)



Picture 3: Professors with Students during Prize Distribution ceremony (2024)



Picture 4: Departmental Laboratory

Moments & Memories together (2021-2024)



Picture 5: Teacher's day celebration (2023)



Picture 6: Departmental Faculty with Ex-faculty and Ex-students

Moments & Memories together (2021-2024)



Picture 7: Our Departmental students at College Science Seminar



Picture 8: Semester VI students

Moments & Memories together (2021-2024)



Picture 9: ATOMIX, Freshers Party (2022)



Picture 10: ATOMIX, Freshers & Farewell Party (2024)

Moments & Memories together (2021-2024)

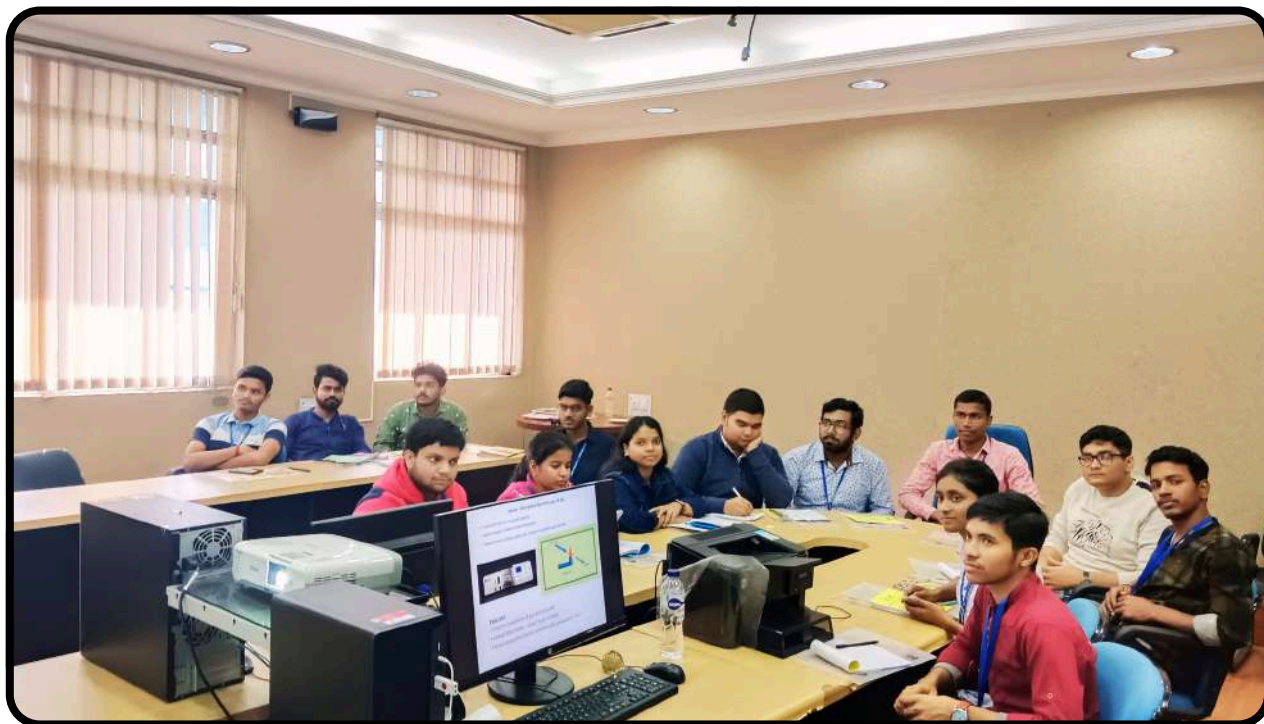


Picture 11: Semester VI Students with Lab Staff



Picture 12: Semester VI Students doing Lab work

Moments & Memories together (2021-2024)



Picture 13: Semester VI at CSIR-CGCRI Training



Picture 14: Semester VI students at Birla Industrial & Technological Museum, Kolkata with Dr. Arindam Rana (HOD)

Moments & Memories together (2021-2024)



Picture 15: Semester IV Students at CSIR-CGCRI Training



Picture 16: Semester VI Students with Dr. Biswajit Panda

Moments & Memories together (2021-2024)



Picture 17: Laboratory Work by Departmental Students at CSIR-CGCRI



Picture 18: Departmental Student winning Best Presentation Award at Inter-college Seminar

Thank you to All



In Picture (Left to Right): Departmental Faculty, Dr. Shreyasi Dutta, Dr. Biswajit Panda, Dr. Arindam Rana (HOD), Dr. Sitangshu Sekhar Bhattacharjee, Dr. Timir Hajari, Mr. Manish Das, Dr. Sharmila Basu Sarkar and Dr. Pampa Guha.

Thanks for all of your support!

**Published by Dr. Arindam Rana,
Head of the Department, Department of Chemistry,
City College, Kolkata
On The Behalf of the Principal, City College,
102/1 Raja Rammohan Sarani, Kolkata-700009**





Artwork 3 (By Jayashri Ghosh, Semester VI): Save More, Sustain More!
Save Water not just for one's current needs, but to sustain the future generations.