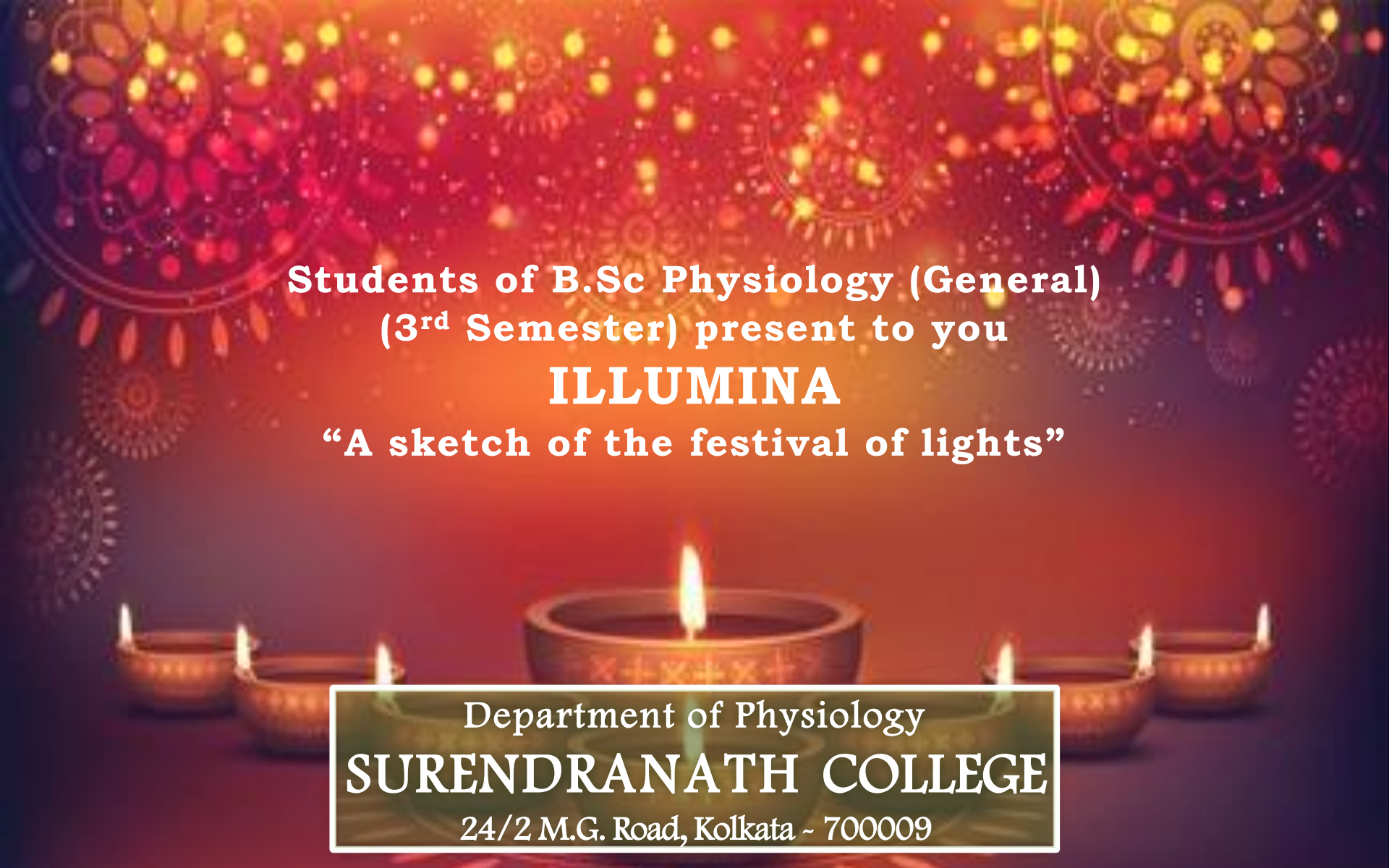


ILLUMINA

NOV'2021



**Students of B.Sc Physiology (General)
(3rd Semester) present to you**

ILLUMINA

“A sketch of the festival of lights”



Department of Physiology

SURENDRANATH COLLEGE

24/2 M.G. Road, Kolkata ~ 700009

FROM THE DESK OF THE PRINCIPAL

It gives me immense pleasure to share my views on “ILLUMINATE”, an e-magazine from the Department of Physiology structured by 3rd Semester Physiology General students.

In Surendranath College, we always try our best to make education more enjoyable with learning and gaining experience by doing. I firmly believe that every child has the potential to achieve excellence.

ILLUMINATE is a blend of traditional insight of festival of light and the proper understanding to enjoy it. I must congratulate the mentor and her team for their endeavour. I extend my best wishes.

- Dr. Indranil Kar



Dr. Indranil Kar

[Principal, Surendranath
College]

FROM THE DESK OF THE IQAC CO-ORDINATOR

I am glad to know that Department of Physiology, Surendranath College is going to publish the first issue of another e-magazine ILLUMINA with their 3rd Semester General students on a very relevant theme "light and crackers used in Diwali and their adverse effects on human health". It is really a nice gesture by the department to incorporate general students in such creative pursuits. I do sincerely appreciate the effort put in by all the faculty members specially Mallika and those 3rd Semester students from general stream to publish this valuable issue. Hope to see many more issues of ILLUMINA in future. I believe all the readers will utterly enjoy reading this issue.

Happy reading to all!

Best Wishes,

- Dr. Suchandra Chatterjee



Dr. Suchandra Chatterjee

[IQAC Co-ordinator]

FROM THE DESK OF THE H.O.D.

Covid-19 and the associated lung inflictions made us think about the deteriorating air that we inhale .Lung immunity is a serious concern nowadays with respiratory infections on the rise. We all depend on air for our oxygen demands. Needless to mention that the aged, the patients suffering from lung conditions like asthma are seriously affected after the festive season not only because of air quality but also in terms of noise created by bursting crackers. Numerous accidents also do happen and the already burdened health infrastructure can be saved with a little constraint and refrain. Spreading love and happiness in the festivals with a connect and concern for others will not only contribute to human kind but also benefit others whom we share the world with the animals, birds and pets .Our earth is a heavenly planet and we are blessed with a human life with our sensibilities. Lets not transgress from our values and make this planet a friendly happier place to live in . In the words of our famous poet Sukanto Bhattacharya :

“এ বিশ্বকে এ শিশুর বাসযোগ্য করে যাব আমি-
নবজাতকের কাছে এ আমার দৃঢ় অঙ্গীকার। “



Subharajit Banerjee

**[HOD, Department of
Physiology]**

- Subharajit Banerjee

FROM THE DESK OF THE MENTOR

All students of Surendranath College are unique. They are a very talented lot and have lots of potential in them. We try to find out such talents and groom them properly. We, the teachers of the Physiology department always motivate our students to participate in different extracurricular activities like games, quizzes, creative writing, seminars, debates, cultural programs etc, apart from their studies. Some students of Sem-3 Physiology (general) expressed their interest to bring out an e-magazine "ILLUMINA" in this festive season. Through this magazine they have tried to give our society a small message as to how we can celebrate our Kali Pujo and Diwali festivals safely without hampering our health and the environment at large. They have really worked hard and tried their level best to prepare this magazine. Being a mentor, I feel proud of their initiative in this regard to spread such awareness in our society. We cordially request all readers to go through it and give their valuable remarks. It will encourage them further to contribute towards a greener planet.

- Mallika Bhattacharjee



Mallika Bhattacharjee

Education is the most powerful weapon that you can use to change the world

-Nelson Mandela

EDITORIAL

Keeping in mind the current pandemic scenario the students of Physiology Department [Physiology General – 3rd Semester] have published the first issue of our e-magazine, “**ILLUMINA**”. Every single member of this team has showcased their creative abilities, through articles, and pictures and made it possible to make this magazine. The present edition of “**ILLUMINA**” (2020-21) includes sections based on the worship of Goddess Kali and the festival of Diwali, along with the various current environmental stresses that follow this festival. This magazine was published under the able guidance of our mentor and respected teacher **MALLIKA BHATTACHARJEE**, who was the backbone to this project and provided all the necessary help whenever needed.

The readers are welcome to connect to us and place any demands for any particular topic that they want us to integrate and make this e-magazine even better for the next issue.

Edited by :

Sayak Das, Sharadsree Banerjee, Shidhanta Kumar Das

B.Sc Physiology (General)

3rd Semester



ABOUT OUR DEPARTMENT

- Department of physiology was founded in 1958 and the honours course started in the year 1978
- The department is housed on the ground floor of the main building and the second floor of the science building.
- Department faculties and support staff put in their best efforts to cater to the need of the students
- Since last year in the pandemic era physiology department is in the virtual mode of the teaching learning process and has close contact with the students in all aspects
- Department of physiology of surendranath college is a place for students who want to learn and think logically act responsibly and grow with optimum potential

Respected Faculty Members of Physiology Department



Dr. Mira Ghosh



Dr. Susanta Kumar Patra



Dr. Sukti Chakraborty



**Subharajit Banerjee
[HOD]**



Dr. Barnali Ray Basu



Firdous Ahamed



Mallika Bhattacharjee

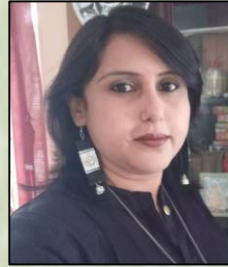


Olivia Chowdhury

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INDEX

Sl. No.	Contents	Page no.
1.	Worship of maa kali	I
2.	Legend of Kali Puja	2
3.	How it all began	3
4.	Naihati's boro maa kali : Where grandeur meets devotion	4
5.	Dakshineswar Kali Puja	6
6.	Kalighat Kali Puja	7
7.	Belur Math Kali Puja	8
8.	Prasad for Kali Puja	II
9.	Diwali; the festival of light and joy	12
10.	History and significance of Diwali	13

Sl. No.	Contents	Page no.
11.	What are Fireworks?	14
12.	How are Aerial Fireworks made?	15
13.	Composition of Fireworks	17
14.	Effect on Environment due to fireworks	19
15.	What verdict did the High Court provide to control pollution during Diwali ?	22
16.	Eco-friendly Diwali	25
17.	What are green crackers?	26
18.	Green crackers : Facts at a glance	28

Worship of maa kali

1



-Shidhanta Kumar Das

Kali Puja is one of the most significant festivals of Bengal and is celebrated with great pomp and show. On this day Kali Maa is worshipped and offered a number of bhog items. Maa Kali's favourite flower is said to be red hibiscus, which is why she is draped in a stunning red hibiscus garland on the day of Puja. Kali comes from the Sanskrit word 'Kal' which means "dark, time, and death." The universe is represented by Kali, which means that the good and the terrible, the positive and the negative, all coexist. Goddess Kali's idol represents the same thing. Goddess Kali is Maa Durga's invincible incarnation, depicting a woman in her rudra avtar with four hands, dark skin, and a mund mala of beheaded demons. She wears Kharga, a sword, and her long flowing hair symbolises a woman's incessant power.

Legend of Kali Puja



Goddess Kali's right hands portray the Abhaya Mudra, which is said to preserve the universe, while the left hand is Varada Mudra, which represents her motherly affection towards her devotees. As Kali is also the goddess of Preservation, she is worshiped as the preserver of nature.

Goddess Kali's fierce tandav, according to Hindu legend, proclaimed her victory over demons, causing the earth to tremble. When Lord Shiva observed her approaching the point of destroying the earth, he laid down in front of her to stop the tandav and calm her down, which is why her tongue protruded when she stepped on his chest by accident.

How it all began!

The festival of Kali Puja is not an ancient one. Kali Puja was practically unknown before the 16th century; famous sage Krisnananda Agambagish first initiated Kali puja, also a late 17th- century devotional text Kalika mangalkavya mentions an annual festival dedicated to Kali. In Bengal during the 18th century, King (Raja) Krishnachandra of Krishnanagar, Nadia, West Bengal also made this puja wide spread. Kali Puja gained popularity in the 19th century, when kali saint Shri Ramkrishna became popular among the Bengalis ; wealthy landowners began patronizing the festival on a grand scale. Along with Durga Puja, Kali Puja is the biggest festival in Tamluk, Barasat, Naihati and Barrackpore.

- Sayak Das



Naihati's Boro Maa Kali: Where grandeur meets devotion

- A brisk five-minute walk from the Naihati railway station is the abode of one of the most opulent idols of goddess Kali anywhere in West Bengal. Standing at a height of 22 feet and venerated for the last 94 years, Naihati's most famous manifestation of Kali is unanimously hailed by locals as Boro Maa.
- Built over 15 days (with the foundation of the idol being laid on Lakshmi Puja) and decked in 12 kilograms of gold and 200 kilograms of silver, Boro Maa draws thousands of devotees each year, with pre-pandemic numbers surging close to 60,000 on the days of Kali Puja and Diwali.
- About a century ago, a young man named Bhavesh Chakraborty went to experience Bhanga Rash at Nabadwip accompanied by four friends. The incredible heights of the idols in Nabadwip made for a spectacle none of them could forget. After returning to Naihati, Chakraborty had a dream where Kali, at the time a small deity of the family, instructed him to mould her into a gigantic idol, similar to the ones in Nabadwip.





For five days each year, Boro Maa, whose lotus eyes exude a sense of controlled rage, is decorated in grand fashion and worshipped in adherence to the traditions first established by Bhavesh Chakraborty. In keeping with Chakraborty's wishes, no money is collected from locals to organise the Puja. Whatever sum devotees contribute voluntarily is what the Puja Samiti works with.

Around 4,000 people are fed as part of the Puja annually, with a group of 15 to 20 cooks preparing all the meals. The bhog that is offered to Boro Maa herself always comes from the family of Bhavesh Chakraborty.

- Sayak Das

Dakshineswar kali puja

6



At a distance of 9 km from Kolkata Railway Station, Dakshineswar Kali Temple is a famous Hindu temple located in Dakshineswar locality of Kolkata, West Bengal. Situated on the eastern bank of Hooghly River, it is one of the largest temples in Kolkata.

Dedicated goddess Kali, the temple was built in 1855 CE by Rani Rashmoni, a Philanthropist and a devotee of Kali. According to history, Dakshineswar was a mere village nestled along the eastern bank of the River Ganges in the early phase of the 1800s. It is said that Rani Rashmoni of Janbazar, while on her pilgrimage to Varanasi, had a dream, where she was instructed to build a Kali temple. She was intensely moved by the dream and to materialize it, she instructed her people to search for suitable plots to erect the Kali Temple. After a long hunt for land, eventually, a 20-acre plot was selected in the village

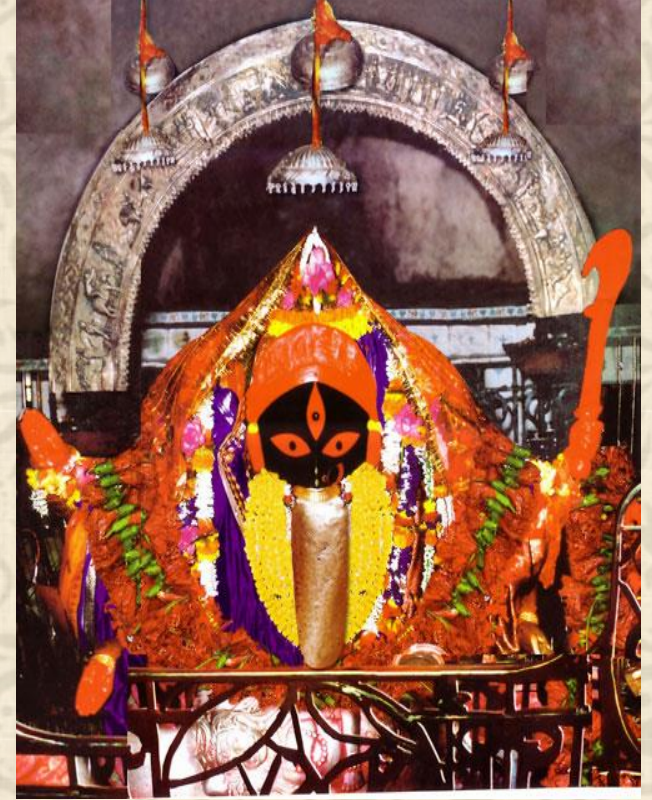
Dakshineswar. The construction of Dakshineswar temple was initiated in 1847 and it was completed in 1855. The temple is famous for its association with Ramakrishna Paramhansa, a mystic of 19th century Bengal.

- Sayak Das

KALIGHAT KALI PUJA

7

কালীঘাট মন্দিরটি হল ৫১ টি শক্তি পীঠস্থান এর মধ্যে একটি, যেখানে সতীর পায়ের ডান আঙ্গুল পাওয়া গিয়েছিল। এটি হুগলি নদীর তীরে অবস্থিত, ২০০ বছরের পুরোনো একটি মন্দির, যেখানে কালীর অর্চনা করা হয়। কথিত আছে, এক পুরোহিত যখন হুগলি নদীর তীরে বসে সাধনা করছিলেন, তখন নদীর দিকে থেকে এক আলো দেখে তিনি আকৃষ্ট হন। তারপর তিনি কাছে গিয়ে দেখতেই আঙুলের আকারের একটি পাথর খুঁজে পান এবং তুলে নিয়ে এসে পূজা অর্চনা শুরু করেন। বর্তমানে মন্দিরটি ৬ টি ভাগে বিভক্ত, রাধাকৃষ্ণতলা, কুণ্ডপুকুর, ষষ্ঠী তলা, নাটমন্দির, জোড়বাংলা, হারকাঠতলা। প্রতিমা টি কোষ্ঠি পাথরের তৈরি, সোনার ও রূপার কাজ করা। প্রায় ৪০ বছর পর, ২০১৬ সালে মায়ের জিভটি পাল্টানো হয়। বর্তমানে জিভটি - ২kg সোনা, ৫৭৮gm রূপার তৈরি, মায়ের খড়্গটি বদলে সোনার খড়্গ তৈরি করা হয়েছে। লোকমুখে শোনা যায় আগে নিয়মিত বলিদান করা হত মায়ের চরণে, তবে এখন বিশেষ অনুষ্ঠানে বলিদান করা হত। প্রতিদিন মন্দিরটিতে শতাধিক পূণ্যাথী আসেন মায়ের চরণে। মন্দির টি খুব জাগ্রত, লোক মুখে শোনা যায় মা কাউকে খালি হাতে ফিরিয়ে দেন না।



- Shampa Halder

BELUR MATH KALI PUJA

বেলুড়মঠ হলো রামকৃষ্ণ পরমহংসের প্রধান শিষ্য স্বামী বিবেকানন্দ কর্তৃক প্রতিষ্ঠিত রামকৃষ্ণ মঠ ও মিশনের প্রধান কার্যালয়। ভারতের পশ্চিমবঙ্গ রাজ্যের হাওড়া জেলার বেলুড়মঠ অঞ্চলে হুগলি নদীর পশ্চিমপাড়ে অবস্থিত বেলুড়মঠ কলকাতা সন্নিহিত অঞ্চলের অন্যতম দ্রষ্টব্যস্থল। এই মন্দিরটি হিন্দু ইসলামি বৌদ্ধ ও খ্রিস্টান স্থাপত্যের মিশ্রণে নির্মিত একটি গুরুত্বপূর্ণ স্থাপত্য নিদর্শন। স্বামী বিবেকানন্দের পূর্বপরিকল্পনা অনুসারে মন্দিরের নকশা নির্মাণ করেছিলেন রামকৃষ্ণ পরমহংসের অপর সাক্ষাৎ শিষ্য স্বামী বিজ্ঞানানন্দ। বেলুড়মঠ ভারতের একটি প্রধান পর্যটন আকর্ষণ এবং ভক্তদের নিকট একটি পবিত্র তীর্থ।

- Tiyasa Naskar



মা তোর কত রঙ্গ দেখব বল

9

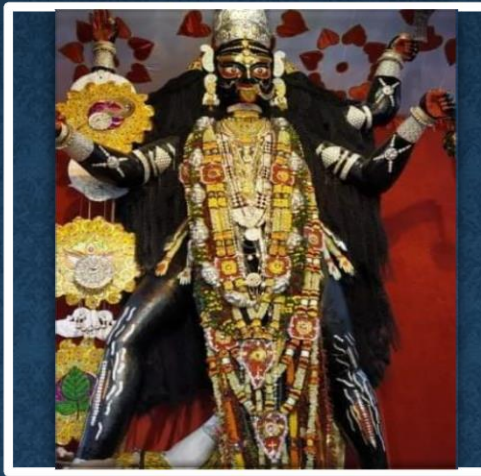


Kali pujas
in Barasat





Kali puja at Contai



Naihati boro maa



Hajar-haat kali, Howrah



Kali puja at Digha



Kalighat sosan kali



Dakat kali, Chetla

PRASAD FOR KALI PUJA



Some classic bhog items that are offered to Kali Maa are Khichuri bhog, Niramish Mangsho (mutton without onion and garlic), Fish Curry, Payesh, Basanti Pulao, Bhapa Doi and Bhaja (fritters). Kali Maa is probably the only Indian Goddess to whom a mix of veg and non-veg food items are offered. A special dish called 'Choddo Shaak' which is made using fourteen different types of green vegetables is also a special item prepared for Kali Puja.

The dual nature of Kali – one is the tantric Kali, who is linked with ferocity and violence, and the more sanitised, Brahminized mother goddess, who supposedly regrets stomping on her husband Shiva, inspired two types of ritual offerings. On the one side, there are fruits and sweets, and on the other, there is sacrificial meat.

-Shidhanta Kumar Das

DIWALI; THE FESTIVAL OF LIGHT AND JOY

12

Diwali (Deepavali or Deepawali or Dipawali) is one of the India's biggest festivals. Diwali means rows of lighted lamps. Diwali is an important religious festival originating in India. People often think of Diwali as a Hindu festival, but it is also celebrated by Sikhs and Jains. In India, Diwali is now considered to be more of a national festival, and is enjoyed by most Indians regardless of faith. Diwali is an official holiday in India, Nepal, Sri Lanka, Singapore. Diwali takes place annually and lasts for five days, marking the start of the Hindu New Year. The exact dates change each year and are determined by the position of the moon - but it usually falls between October and November. For many people, Diwali honours the Hindu goddess of wealth, Lakshmi. The lights and lamps are said to help Lakshmi find her way into peoples' homes, bringing prosperity in the year to come! Hindus light up their homes and shops, to welcome Goddess

- Shampa Halder

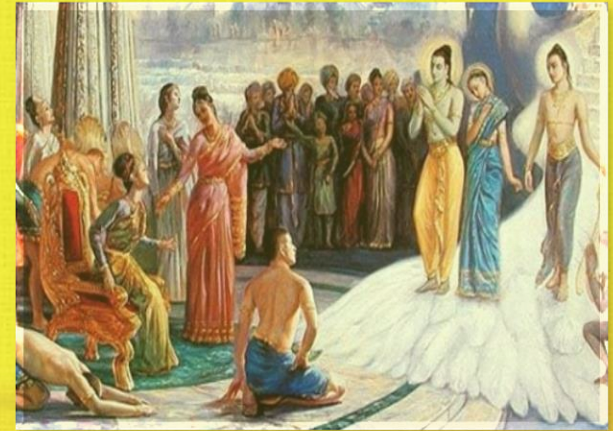


History and significance of Diwali :

According to Hindu mythology, the Prince of Ayodhya, Lord Rama, returned home with his wife Mata Sita and brother Lakshmana on the auspicious occasion of Diwali. They came back to Ayodhya after spending 14 years in exile and defeating the King of Lanka, Ravana. People of Ayodhya had celebrated their return with great enthusiasm by lighting rows of lamps and diyas. The tradition has continued till date and is celebrated as the festival of Diwali.

Diwali is the festival of lights which signifies the victory of good over evil and the eradication of dark shadows, negativity, and doubts from our lives. It is a celebration of prosperity in which people give gifts to their loved ones. The festival also sends the message of illuminating our inner selves with clarity and positivity.

- Sayak Das



What are fireworks?

Fireworks are a class of low explosive pyrotechnic devices used for aesthetic and entertainment purposes. The most common use of a firework is as part of a fireworks display (also called a fireworks show or pyrotechnics), a display of the effects produced by firework devices.

Fireworks take many forms to produce the four primary effects: noise, light, smoke, as well as floating materials (confetti most notably). They may be designed to burn with coloured flames and sparks including red, orange, yellow, green, blue, purple and silver. Displays are common throughout the world and are the focal point of many cultural and religious celebrations.

The earliest fireworks came from China during the Song dynasty (960–1279).



- Sharadsree Banerjee

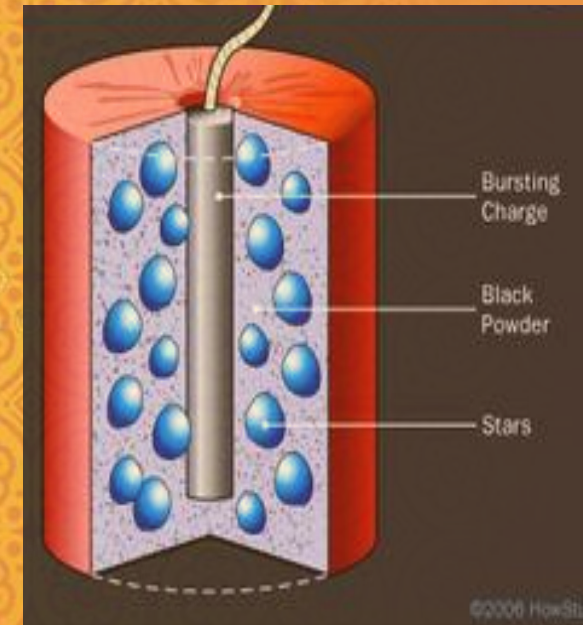
How are aerial fireworks made ?

15

Aerial fireworks are usually made as a shell that has four parts. The container consists of pasted paper. The fuse allows the shell to reach the desired altitude before exploding. A bursting charge made of black powder (like a firecracker) is at the center of the shell. Stars (sparkler-like substances shaped into small spheres) are mixed throughout the inside of the shell.

These shells are usually launched into the sky from short pipes filled with a lifting charge of black powder. The lifting charge also lights the shell's fuse, which burns as the shell rises into the sky. When the flame along the fuse hits the bursting charge inside the shell, the shell explodes. That's when the magic begins!

The explosion ignites the stars. The stars burn to produce the bright sparks of light we see in the sky. The explosion pushes the stars in all directions, which creates beautiful displays.



- Sharadsree Banerjee



Ghengis

HOW FIREWORKS are made

16

Time Delay Fuse

As the firework ascends in the sky, the time-delay fuse keeps on burning. When the firework is near its summit, the fuse has burned enough to ignite the black powder confined in the first break or compartment. Timing is critical here.

Stars

An unlit star is nothing spectacular – it is basically a tiny, dull black lump. But looks can be deceiving. When ignited, stars create amazing flashes of light and colour.

Launch Tube

Most professional fireworks are launched from steel or fiberglass tube rows that are secured in wooden racks. The mortars or tubes generally have the same diameter but they are three times longer than firework shells.

Main Fuse

The main fuse ignites the two secondary fuses at the same time. One is the time-delay fuse that is buried inside the shell that leads to the heart of the firework and the other is a side fuse that acts fast to ignite the lift charge.

Black Powder

10% sulphur, 15% charcoal, and 75% potassium nitrate. Black powder is a "low explosive" and lends itself to fireworks. Firework manufacturers use a number of different ways to control the powder's rate of burn.

Lift Charge

When black powder burns in the open air, the gas and heat it generates quickly dissipate. But if the black powder is confined, the trapped gas and heat will push vigorously at the inside of the launch tube until an explosion occurs.

Composition of fireworks :

- KNO_3
- BaCl_3
- Astatine
- Carbon
- Calcium
- Copper
- Chlorine
- Iron
- Lithium
- Magnesium
- Oxygen
- Phosphorous
- Perchlorate
- NaHCO_3
- Sulphur
- Strontium Nitrate
- Titanium
- Zinc



FIREWORKS KILL YOU, PART BY PART

CHEMICALS IN FIREWORKS HAVE MANY PHYSIOLOGICAL EFFECTS ON YOUR BODY

● TOXIC ELEMENT ● USAGE ● TOXIC EFFECT

● ALUMINUM

- COLOURING AGENT - WHITE
- SKIN CONDITIONS, ACCUMULATION WITHIN THE BODY, CAUSE OF ALZHEIMER'S DISEASE

● NITRIC OXIDE

- BY-PRODUCT
- POISONOUS, REACTS WITH LUNG TISSUE

● CADMIUM COMPOUNDS (BANNED)

- COLOURING AGENT
- LUNG DAMAGE, CANCER, GASTROINTESTINAL PROBLEMS

● LITHIUM COMPOUNDS

- COLOURING AGENT-RED
- POISONOUS, RESPIRATORY IRRITATION

● LEAD DIOXIDE/NITRATE/CHLORIDE

- OXIDIZING AGENT
- POISONOUS TO PLANTS AND ANIMALS, DETRIMENTAL TO PHYSICAL AND MENTAL GROWTH IN INFANTS AND UNBORN CHILDREN ACCUMULATION WITHIN THE BODY

● OZONE

- BY-PRODUCT
- RESPIRATORY IRRITATION, CAUSE OF GLOBAL WARMING

● STRONTIUM COMPOUNDS

- COLOURING AGENT - RED
- DETRIMENTAL TO PHYSICAL GROWTH IN INFANTS, POISONOUS

● NITROGEN DIOXIDE

- BY-PRODUCT
- HIGHLY POISONOUS, FATAL FOR INFANTS, SOURCE OF ACID RAIN

● PERCHLORATE (AMMONIUM AND POTASSIUM)

- OXIDIZING AGENT
- POISONOUS, CONTAMINATED GROUND AND SURFACE WATER, LUNG CANCER, CAUSE OF THYROID COMPLICATIONS

● ANTIMONY SULPHIDE

- COLOURING AGENT - GLITTER EFFECT
- RESPIRATORY IRRITATION, LUNG

● POTASSIUM NITRATE

- FUEL
- POISONOUS, LUNG CANCER

● ARSENIC COMPOUNDS

- COLOURING AGENT
- LUNG CANCER, SKIN CONDITIONS

● MERCURY (CHLORIDES)

- REDUCING AGENT
- POISONOUS, ACCUMULATION WITHIN THE BODY

● BARIUM NITRATES

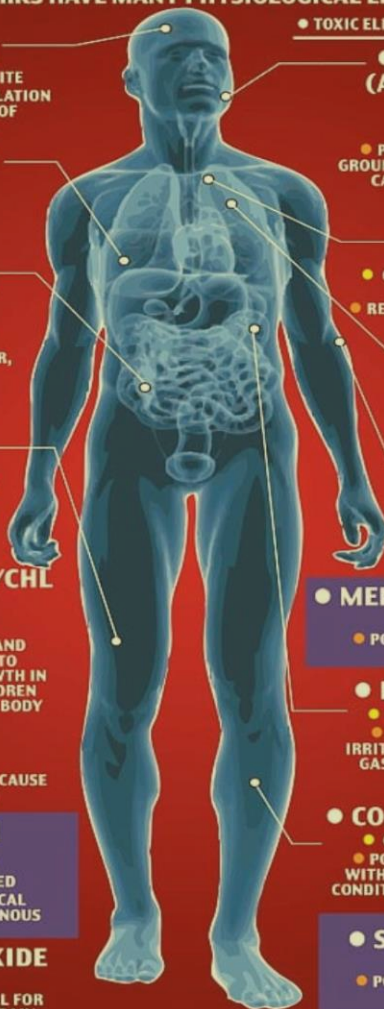
- COLOURING AGENT - GREEN
- POISONOUS, RESPIRATORY IRRITATION, RADIOACTIVE EFFECTS, GASTROINTESTINAL PROBLEMS, MUSCULAR WEAKNESS

● COPPER COMPOUNDS

- COLOURING AGENT - BLUE
- POISONOUS, ACCUMULATION WITHIN THE BODY, CANCER, SKIN CONDITIONS, HORMONE IMBALANCE

● SULPHUR DIOXIDE

- BY-PRODUCT
- POISONOUS, SOURCE OF ACID RAIN



Source: Attri, Arun K. "Microclimate: Formation of Ozone by Fireworks." *Nature* Volume 411, June 28, 2001 Russell, Michael S. *The Chemistry of Fireworks*. 2000 Stiehlhauser, Georg. "Heavy metals from pyrotechnics in New Years Eve snow." *Atmospheric Environment* Volume 42, Issue 37, December 2008 "Hexachlorobenzene (HCB) in Fireworks - Guidance Note" The Environment Agency, September 2010

Effect on environment due to firecrackers :

Air Pollution:

A heavy smog hangs low in the air of Diwali night and a few days after that resulting in the increased levels of sulphur nitrate, magnesium, nitrogen dioxide which are injurious to our respiratory passages.



Noise Pollution:

Bombs lead to noise pollution and prolonged exposure to such loud noises can lead to permanent damage to eardrums.



Garbage:

Approximately 4000 additional metric tonnes of garbage are released in Delhi alone, and twice the amount in Mumbai. It comprises of chemicals like phosphorous, sulphur and potassium chlorate that are harmful for the environment.



Water Pollution:

The runoff from fireworks that mix with groundwater form harmful and toxic chemicals which when consumed by humans and animals can cause serious health issues. Polluted water also causes long-term damage to the ecosystem.



- Tiyyasa Naskar

Your annual fun comes at a huge cost



BIRDS

➤ Birds suffer burns and loss of vision due to cracker bursts. Jain Charitable Hospital in Chandni Chowk alone received 700 such cases last Diwali

➤ High levels of heavy metal and nitrogen oxide in the air affect avian respiratory systems



➤ Birds also get disoriented and hit buildings, thereby getting hurt, or choose wrong nesting places

DOGS AND CATS

➤ They have more sensitive auditory system, and cracker noise can affect their hearing

➤ They also stop eating, shiver and howl

➤ Most cases that vets receive are of shock and burns

CATTLE | Milk output decreases as anxiety due to crackers causes hormonal changes

WHAT TO DO

Ensure a noise-free Diwali

➤ Keep pets indoors with closed doors and windows as animals in shock try to flee

➤ Call wildlife SOS if you find an injured animal, bird

What verdict did the High Court provide to control pollution during Diwali ?

The High Court of West Bengal has issued an order regarding the banning of the firecrackers during this festive season. This decision was taken in order to reduce the air pollution during this covid-19 pandemic which may also have severe effects on the covid patients. Moreover every year during this time, the burning of firecrackers increases the rate of air pollution in our country significantly. Previously we have witnessed the formation of a blanket of smog over metropolitan cities like Delhi, which is alarming.

The Supreme Court of India has set aside a blanket ban on firecrackers imposed by the Calcutta High Court in West Bengal. Certified green crackers can be sold and burst in areas where air quality is "good" or "moderate", the bench ruled.

An order in this regard was passed by a vacation bench of the Apex court comprising Justices AM Khanwilkar and Ajay Rastogi. The bench was hearing two petitions challenging the Calcutta HC's blanket ban on firecrackers, including green crackers. The petitions were filed by firecracker dealers.

The two-judge bench stated that the Apex court's order dated October 29, 2021, was clear. Authorities concerned informed the court that they would abide by the regime laid down in that order.

In addition, the Supreme Court has allowed both petitioners and the state of West Bengal to submit data regarding their arguments.

The West Bengal government has also been instructed to ensure that there is no import of banned firecrackers or related items into the state.

Stating that only wax or oil-based diyas may be used for the occasions, the high court's order had said, "The state should ensure that there is no use or display or bursting of firecrackers of any type at all during Kali Puja, Diwali celebrations as well as Chhath Puja, Jagadhatri Puja, Guru Nanak's birthday and Christmas and New Year's Eve celebrations this year."

- Sharadsree Banerjee

Considering the present circumstances where global warming is not only a national issue but also it is a matter of concern for the whole world. We cannot completely stop the air pollution but at least we can switch to green crackers over the conventional crackers on this Diwali in order to have a better healthy future for us and our next generation.

Eco-friendly Diwali

25



1. Organise and Celebrate in Community/Society : Community celebrations give more pleasure than individual celebrations. Gated communities in the city should come forward to enjoy the festival without causing damage to the environment. It does not cost the society much to organise this celebration.
2. Limit Your Celebration : Fix the time of Celebration say from 10 PM till midnight. Care for new born babies, toddlers and senior citizens. They are at high risk of health hazards linked to excessive noise and air pollution.
3. Eco-Friendly Decorations : Use organic colours and real flowers and leaves for Rangoli instead of plastic flowers. Decorate home with some bright and colourful duppattas and sarees instead of plastic ribbon.

- Neha Ansari

What are green crackers ?



As the name suggests, they are less harmful as compared to conventional firecrackers.

In green cracker, commonly used polluting chemicals like aluminium, barium, potassium nitrate and carbon are removed or sharply reduced so that the emissions come down by 15 to 30%.

CSIR&NEER jointly made these environment friendly firecrackers and developed new formulations for reduced emission light and sound emitting crackers with a 30% reduction in particulate matter.

They successfully developed various eco friendly fireworks such as sound emitting crackers flowerpots pencils chakkars and sparklers etc.

- Sharadsree Banerjee

WHAT ARE 'GREEN CRACKERS'?



Expected
to hit the
market in

**4-5
years**



**Being
developed by**
CSIR's National
Environmental
Engineering
Research
Institute

Production
after it's
approved by
Petroleum
and Explosives
Safety
Organisation
(PESO)

Firecrackers that have **"less
dangerous"** and **"less harmful"**
chemicals than conventional ones

GREEN BECAUSE...

- they have a chemical formulation
that produces water molecules
- this substantially reduces
emission levels and absorbs dust
- is basically a light and sound
show that produces lower emissions
- promise **30-35% reduction**
in particulate matter, nitrous oxide and
sulphur oxide



OTHER INITIATIVES



Crackers
with lower
aluminium
to reduce
emissions
substantially



'Anar' or flower
pots made using
"eco-friendly
material" that can
reduce particulate
matter by 40%



Bijli crackers
that eliminate
use of ash as
desiccants



Firecrackers
without antimony,
lithium, mercury,
arsenic and lead
as directed by
PESO last year



**ALSO IN THE
WORKS...**

E-CRACKERS BEING DEVELOPED BY CSIR'S CENTRAL
ELECTRONICS ENGINEERING RESEARCH INSTITUTE

Green Crackers: Facts at a Glance

- Green Crackers are formulated by CSIR-NEERI that has no barium nitrate which is one of the key ingredients of traditional firecrackers.
- Names of these crackers are: "safe water releaser (SWAS)", "safe minimal aluminium (SAFAL)" and "safe thermite cracker (STAR)".
- These crackers will release water vapour or air as a dust suppressant and diluent for gaseous emissions.
- These products can only be manufactured by those who have signed a non-disclosure agreement (NDA) with CSIR-NEERI.
- Only those green crackers will be sold that consist of a unique logo on the box, and also have a QR code with production and emission details.

THE FORMULA FOR A 'GREEN' DIWALI

Green 'crackers' have a chemical formulation that produces water molecules

The generation of water molecules within the firecracker's mechanism acts as a dust suppressant

It absorbs particulate matter and significantly reduces nitrous oxide and sulphur dioxide

Production starts once the government's Petroleum and Explosives Safety Organisation approves the formulation

So, it's a light and sound system that produces low emissions



About SWAS and STAR

- The reduce particulate matter including sulphur dioxide and nitrogen oxide by at least 30 percent and also eliminate the use of potassium nitrate and sulphur.

The two types have matching sound intensity with commercial crackers, that is, in the range of 105-110 dB.

About SAFAL

- Minimum use of aluminium that results in at least 35 percent reduction in a particulate matter as compared to commercial crackers.

- Its sound intensity matches with commercial crackers in the 110-115 dB range.

- Sharadsree Banerjee

BATTLE FOR GOOD AIR

Green firecrackers have been defined as those made with a reduction in size of shell, elimination of ash, reduced use of raw materials and/or use of additives as dust suppressants to reduce emissions

Coming this Diwali, 'green' crackers with logo, QR codes

Hitam.Halder@timesgroup.com

New Delhi: This Diwali, emission "green" cracker with a unique logo and QR code on the boxes will be available in Delhi. According to CSIR-National Institute for Research in Commonwealth Science (NIRCS), a cracker is "green" if it has 30-35% lower emissions of particulate matter (PM10 & PM2.5) than commercial crackers.

WHAT IS IT?

Sept 24 2019

WHAT ARE THE STANDARDS?

- > Minimum particulate matter reduction of 30%
- > Barium nitrate replaced by potassium nitrate to reduce emissions ranging 30-90%

TYPES OF GREEN CRACKERS

- > **SAFAL** (Safe minimal aluminium cracker) | **STAR** (Safe thermite cracker) | **SWAS** (Safe water releaser)

Cost: Less than or equal to commercial firecrackers

What they do | Reduce PM, SO₂ and NO_x emissions

HOW TO IDENTIFY THEM

- > A green fireworks logo will be displayed on boxes along with a QR code that a customer can scan to find its composition. Boxes without any of these two are fake





THANK

YOU!