TARANGA

Chief Editors
Sanatan Kumar Nath
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TARANGA

A Compilation of Science Articles

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PRINCIPAL'S COLUMN

I am delighted to know that the 'B. H. College Science Forum' brings out a book – 'TARANGA' containing important issues pertaining to different fields of science. I appreciate the noble idea and sincere efforts of B. H. College Science Forum to disseminate the knowledge of science among the student community. The publication of this book is a step forward to our endeavor to spread the message of basic science and its relevance to the present-day world. The humble contributions of eminent scholars, scientists and researchers of different institutions and teachers of our college to this book are praiseworthy. The present generations of students are imbued with a lot of creativity, originality, enthusiasm and dynamism. They need right kind of support and encouragement. Hope, the science forum will also take effective step to encourage the students community to contribute towards creative writings in different fields of science. The editorial board has taken pains to bring out the book in a very short time. I appreciate the good effort and congratulate the team behind the book.

(Dr. Bhushan Ch. Pathak)
Principal, B.H. College, Howly.

From the desk of the Editors

The B. H. College Science Forum is a Students' Extension Activities Cell which includes four other cells namely Life Science Cell, Chemical Science Cell, Mathematical Science Cell and Physical Science Cell. It was formed for the all round development of the students in particular and socio-economic development of this region in general. It was formed on 4th September, 2003 under the presidentship of Dr. R.K. Das, the then Principal, B.H. College, Howly. Since its inception, the forum has organized varieties of programme that include Departmental Seminars, Health Check up Camp, Field study for Environmental education of surrounding areas of B.H. College, Tree plantation etc. The forum has been regularly publishing science based articles of the students in particular & teachers in general on the Wall Magazine of the forum to improve their writing skills and to inculcate knowledge in them in partial fulfillments of the aims and objectives of the forum. Keeping this noble aims & objectives in view, the forum has made this noble venture to spread scientific knowledge of various science based topics having scopes for further study/ research among the students in terms of publishing books.

This year, the B.H. College Science Forum has decided to publish in book form 15 numbers of science based articles written by Science teachers of different institutions. This book, entitled 'TARANGA', synchronizes with the Grand occasion of Golden Jubilee of B.H. College. The book is a bilingual publication – English and Assamese. The English section accommodates 12 articles while the Assamese section

accommodates only 3 articles. One article has been republished considering its importance and merit. It is expected that the compilation of these articles, will certainly enthuse and inspire the students in their pursuit knowledge in science.

The book has been entitled 'TARANGA' which means 'wave' because these articles will certainly create scientific knowledge on the students which will spread like a wave and inspire them for further study. We would like to thank to each of the contributors of this book who spared their valuable time in preparing their scholarly articles.

We must acknowledge and thank the co-operation and support received from the Editorial Board. We would like to offer our warm thanks to Dr. B.C. Pathak, honourable principal, B.H. College, Howly, who leaves no stone unturned in the matter of publishing books. The members of the Science Forum also deserve appreciation for their decision to undertake projects to publish the books. Our savant colleagues also deserves Kudos for their encouraging words in realizing the project. The group of Editors claims no authority and expertise in this domain. We are looking forward to suggestions as well as constructive criticism.

We must place on record the services, extended by Sanjit Kumar Sarma and Bhabani offset and Imaging System Pvt. Ltd., Guwahati in publishing the book with professional care and zeal.

Date : 20th April, 2016

Sanatan Kr. Nath
Pranab Ch. Debnath

Sketches of Spreading Scientific Temper in Colonial and Post-Colonial Assam

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Scientific temperament represents a spirit of query and as such involves the process of logical reasoning. Scientific temperament always tries to find out the cause and the rational justification of an event objectively and is free from all prejudices. It always attempts to explain the cause-effect relationship between two. That is why, a man with scientific outlook never believes in unjustified things, irrational beliefs and superstitions.

In India the concept of Scientific temperament was first articulated in Nehru (1946) in "Discovery of India". Referring to science as a way of life, he said it as a process of thinking, a method of acting and associating with our fellowman. Recently Markandeya Katju. Hon'ble Chairman of Press council of India and former Judge of Supreme court of India, said in an International conference on science communication for scientific temper that-the purpose of doing science is to harness it for the benefit of mankind to their lives better and happier. He observed that only science can solve the problems of backward country like India. Highlighting the ancient India's achievements e.g.

decimal system in mathematics, plastic surgery in medicine and town planning (Indus Valley Civilization) etc. he said that we subsequently took to unscientific path of superstitions and empty rituals, which lead to disaster. Today we are far behind the western countries in science and that is the real cause of our poverty and other social evils. Including scientific temperament on a massive scale is the need of the hour. For the progress of any society it is a paramount importance to acquire scientific temperament. Scientific temperament has its distinctive creatings to its credit bearing upon hilarious progressive societies with better and greater outlook.

The concept of scientific temperament in Assam spread out nook and corner in the pre colonial period under the initiative of a handful of leading Assamese headed by Anandaram Dhekiyal Phookan (1829–1859). Late Dhekiyal Phukan was popularly termed as "Raja Rammohan Roy" of Assam for striking endeavour to create a circle in the concept around the state. He was inclined to "Young Bengal Movement" of the early nineteenth century. The movement was a renaissance to usher in the temperament of scientific desire. Considerable pioneers of the movement were profilic thinkers of rational justification from the Hindu College of Calcutta who moved for the progression of scientific out look against the uncultured scientific disposition prevailing the societies at that time.

A luminary of Assamese literature Hemchandra Barua, who has left an everlasting impression for his remarkable social performances expounded the need of widow marriage and thus excelled his scientific temperament in the early nineteen century. An orthodox Brahmin by caste late Barua had to learn English from the missionaries in the safe distance in hide because learning

English was considered to be an anti-social practice in those days. An ardent supporter of woman emancipation and empowerment late Barun authored a number of books in vernacular viz "Kaniar Kirtan". "Bahire Rong Chong Bhitore Kuwabhatury" to his credit that uphold rational reflections on different topics.

Late Gunaviram Barua contemporary of Late Hem Chandra Barua a celebrated historian of Assam caused an example first ever amongst the literary circle by tying the nuptial knot with a widow Bishnupriya Devi following the untimely death of his wife. He even performed marriage of his widow daughter with all solemnity and dignity. It is a glaring instance of scientific temperament that Barua upheld in a society where conservatism surrounded all the times. Thus scientific temperament arose in Assam in the early nineteen century. These illustrious persons did their best to curb obscurantism and arrived at a position to overcome superstitions and blind beliefs. The eminent social workers deeply felt the need of proper education to eradicate such beliefs. They wanted to bring clarity and precision against the orthodox outlook and called upon one and all to acquire knowledge from western science, literature and philosophy, where scientific concepts predominantly occupied a vast place.

Laxminath Bezbarua deserves special mention for his relentless affords against social evils through his powerful writings. He also went a step ahead marrying Pragyan Sundari, a Bengali girl from the family of late Rabindra Nath Thakur to break the barrier of inter caste marriage. The first president of Assam Sahitya Sabha Padma Nath Gohain Barua made an important statement regarding the seriousness of the matter. He highlighted the urgency of the need to fine wage and means

toward off the disasterous and evil consequences brought about by superstitious beliefs and customs by culminating the minds of the gullible masses in his address as president of Assam Chatra Sammilan in 1918 at Dibrugarh. Kaliram Medhi (1878-1954), Ex-President of Assam Sahitya Sabha also reflected a rational bent of mind in his writings once underlines an impressive article in vernacular entitled "Ku-Sanskar" (Uncultured disposition) against the rising tendencies for superstitious belief which was published in the "Assam Bandhav", (Voll-II, No-9, 1911) was highly acclaimed by and all.

But the scientific temperament movement in Assam gain momentum in an organized manner only after post colonial period. It was after the creation of "Gauhati Scientific Society" established in the year 1953 and subsequently renamed as "Assam Science Society". The society was established to encompass entire state of Assam to cater its humble service by developing scientific temperament and also to create an environment of scientific research. With more than 100 branches and about 5000 life members it is one of largest scientific societies of India. Since its inception it is continuously disseminating scientific knowledge in Assam and north east by holding seminars, symposia and discussions. The Assam Science society is relentlessly working for science popularization and simulating scientific mindset among the people of Assam since its inception. Society is also publishing a popular Bi-monthly science magazine, "Bigyan Jeuty" in Assamese.

The campaign for scientific temperament gain momentum in Assam very recently after the establishment of "Ellora Vigyan Mancha" (EVM). It is a non-governmental organization formed in May 2004 in hallowed memory of Ellora

Roy Choudhury an activist of All India Democrativ Woman Association and member of CPI(M). She is the first woman in the whole of the north-eastern part of India to have donated her body for medical research. It may be mentioned here that in India posthumous body donation is not gaining the momentum because of various social and religious reasons. Now many eminent personalities of the state have put their signature on their last will to pledge their whole body after death for medical research The EVM since its inception has been running a movement to spread scientific temper amongst the people and to fight against all forms of superstitions, obscurantism and blind belief. EVM has been organizing workshops, seminars etc. in all parts of the state and campaigning and encouraging people for blood donation, eye donation or other human organs after one's death for transplantation or medical research. For the spread of scientific temperament EVM has set the following objectives.

(a) To inculcate scientific temper in people and to arouse in them awareness to problems of health and hygiene, the environment, disease and their treatment and such other issues.

(b) To fight against all forms of obscurnatisms. To help people to overcome superstition and blind belief and to inspire them to a scientific way of life in preference to age old dogma and practice. EVM is also publishing an Assamese bi-annual magazine viz "Samikshan".

Another organization viz. "Yukti Vikash Samity Asom was establish in Dibrugharh in 2004 has published several booklets with a view to spreading scientific temperament among the masses.

The 'Pragjyotish College Vigyan Samity' another organization with same objectives have made some outstanding contributions by publishing several books in Assamese for promotion and spread of scientific temperament in Assam.

It is a matter of surprise as well as great concern that witch-hunting is on the rise again in Assam. The practice of witch hunting reflects the status of women in a society. It is a shame for the civilized society. Till now a number of cases of witch hunting have been reported from various parts of the State, particularly from districts like Goalpara, Bongaigaon, Baksa, Kokrajhar, Chirang and Sonitpur. The belief in the existence of witches is deep-rooted, especially in tribal communities. Elderly women especially widows, are suspected to have an evil eye considered unfavourable. These days not only the women but also innocent men are punished in the name of witch hunting.

Presently in Assam Birubala Rava, a 59 year old widow from Thakurbilla village near Meghalaya border of Goalpara district is working relentlessly to create awareness against the practice of witch hunting. Her determination, practice, hard work has brought results and her name was nominated for Nobel Prize in 2005 for social work. Till date Birubala has saved 34 persons mainly women who were declared witches. According to Birubala the Assam Mahila Samata Society (AMSS) is helping her in preventing incidence of witch hunting in Goalpara district.

In addition to the aforesaid persons and organizations the following eminent writers of the state who are deeply involving themselves in spreading scientific temperament through their writings are Dr. Kulendra Pathak, Harendra Nath

Sarma, Dr. Dinesh Chandra Goswami, Dr. Chandra Mohan Sarma, Dr. Abani Kumar Bhagabati, Dr. Joy Dev Sarma, Kshiradhar Barua, Prasenjit Choudhury, Devakanta Handique, Paramananda Mazumdar, Indibar Deury. They all deserve special mention for their relentless afford in the field of creating scientific temperament.

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Plasma and its Role in Sterilization

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Plasma is known as the fourth state of matter. We all are familiar with three states namely solid, liquid and gas. It is possible to convert one state to the other state with the application of energy.

A solid typically consists of a large number of atoms, which are bound together with some definite structures. Now if we supply enough energy (heat) to a solid, we shall find that it will melt and eventually become a liquid. In this state, the atoms only loosely interact with each other and the liquid is able to flow. If we once again add enough energy to the liquid, it will become a gas.

In an ordinary gas, each atom contains an equal number of positive and negative charges; the positive charges in the nucleus are surrounded by an equal number of negatively charged electrons, and hence each atom is electrically "neutral." A gas becomes plasma when the addition of energy causes a significant number of atoms to release some or all of their electrons. The remaining parts of those atoms are left with a positive charge,

and the detached negative electrons are free to move about. Those atoms and the resulting electrically charged gas are said to be "ionized." When enough atoms are ionized to significantly affect the electrical characteristics of the gas, it is plasma. Both electric and magnetic field can influence plasma state.

Generally, a plasma can be defined as a collection of charged particles in a neutral background moving in random directions that is, on the average, electrically neutral. The term "*plasma*" for an ionized gas was introduced in 1927 and it was coined by Irving Langmuir. Langmuir worked for the General Electric Research Laboratory dealing with electronic devices based on ionized gases. The way the electrified fluid carried high velocity electrons, ions and impurities reminded him of the way blood plasma carried red and white blood corpuscles and germs. The collection of particles in plasma is quasi-neutral and displays collective behavior. Quasi-neutral means the negative and positive charges balance each other. Collective behavior means that the particle motions are controlled by the plasma as a whole rather than by local collisions.

Depending on the degree of ionization, plasma can be classified into weakly ionized and strongly ionized plasmas. The degree of ionization can vary from 100% for high temperature or fusion plasmas to very low values for low temperature plasmas or gas discharge plasmas. A weakly ionized plasma is one, which has many more neutral particles than charged particles, and these include electrical discharges called glows, hot cathode and coronas, which are produced at low currents. Strongly or highly ionized plasmas include high current arc discharges produced at gas pressures of around 1bar, and thermonuclear plasmas,

produced at gas pressures of the order of mili-torr. The latter sometimes contains no neutral particles, being made up entirely of positive ions and electrons. Plasmas in nature include the ionosphere, which is weakly ionized. The ionosphere surrounds the earth about 100 km or more above its surface, and is due to ionization of air molecules by photons from the sun.

Again depending on gas temperatures, plasma can be classified into hot and cold types. High temperature or hot plasmas are created in stars or in fusion. The electron and gas temperatures of hot plasmas are usually higher than 10^5 K.

Low temperature or cold plasmas are formed in the low-temperature plasmas mostly obtained through gas discharge in low pressure system and widely applied in modern age technology. In the cold plasmas the temperature of the electrons is much higher than that of the gas molecules. The electrons can reach temperatures of 10^4–10^5 K (1–10 eV), while the gas phase temperature can be as low as room temperature. The low temperature plasmas have been developed specifically and purposefully based on their non- thermodynamic equilibrium properties and their ability to cause physical and chemical reactions with the gas at relatively low temperatures.

In laboratory, most simple and usual way to produce plasma is by passing a current through a neutral gas at atmospheric pressure or at pressure lower than atmospheric pressure. To create low pressure, either rotary pump or diffusion pump backed by rotary pump is used to evacuate the plasma producing chamber. After achieving the desired low pressure, plasma producing gas is injected at a constant pressure.

In any volume of gas, there will always be a few electrons

produced by cosmic radiations and radioactive radiation from the surroundings. The presence of the electric field in the gas causes the electrons to move towards anode colliding with the neutral gas molecules or atoms on the way. If the voltage is sufficiently high, electric breakdown occurs by ionizing the gas and current is established in the circuit. As sufficiently ionized gas emits in the visible range, it is also known as glow-discharge. The plasma produced by glow discharge process at low pressure is generally weakly ionized-cold plasma.

The success of weakly-ionized, cold plasma in processing technology is based on its nonequilibrium nature, which provides a large amount of chemically active species. These chemically active species can react with various surfaces to change surface chemistry as well as surface properties without affecting the bulk properties of the materials. Hence, they are getting very much importance in modern technology because of its practical applications in material processing such as plasma etching, chemical film deposition, surface modification and cleaning. Most recent application of such plasma is in the field of medical science. Recent application of plasma is in Sterilization process.

Sterilization:

Sterilization is a physical or chemical process to destroy or eliminate unfavorable microorganisms. Sterilization mainly used in medical science to destroy germs from different equipments. Common sterilization methods include heat sterilization (pressurized steam autoclaving or dry heat oven), gaseous chemical sterilization (ethylene oxide, ozone or formaldehyde), irradiation sterilization (electromagnetic

irradiation, particle irradiation and ultraviolet irradiation), and filtration sterilization.

Why Plasma?

The above mentioned conventional Sterilization methods have some limitations or disadvantages. Heat sterilization methods are usually used to kill bacteria and viruses in heat resistant materials. But heat sterilization is an extremely time consuming process and is not suitable for articles made of heat sensitive materials such as plastics and fabrics. Gaseous chemical sterilization is capable to sterilize at low temperature but limited by its use of highly toxic gases. Irradiation sterilization may cause undesirable changes of the materials. Both chemical and irradiation sterilization technique require professionally well-trained personnel to operate and the cost of operation is also high. Filtration sterilization is mostly used in pharmaceutical industry, but it is not strictly a sterilization process because it cannot destroy or remove all microorganisms. For these reasons, there is a need to develop a safe, rapid, less article damaging sterilization method in order to overcome the drawbacks of conventional sterilization processes and that is the new process "plasma sterilization".

Plasma sterilization:

A new sterilization technique for sterilization of medical articles and instruments is the gas discharge plasma sterilization. This technique possesses a number of advantages compared to conventional sterilization processes. Principal advantages are low heating of the articles, short time of sterilization and ecological purity.

Under appropriate conditions, plasma sterilization can be applied to articles at relatively low temperature (below 50^0C) and preserve the integrity of polymer based articles. This technique is not only capable of killing bacteria and viruses but also removes dead bacteria from the surface being sterilized.

The main sterilizing factors in plasma are (a) chemically active but electrically neutral plasma particles (excited atoms and molecules) (b) ions and electrons of the plasma and (c) ultraviolet radiation of the plasma.

Low temperature plasma, which can be easily created at low pressure by applying electric field, contains a huge amount of reactive species including various atoms, ions energetic electrons, UV radiation. Regarding plasma sterilization, following observations has been made experimentally,

1. The genetic material of the microorganism is destroyed by UV irradiation of plasma.
2. The charged particles of the plasma don't play major role in sterilization and principal sterilizing agents of plasma sterilization are ultraviolet radiation and electrically neutral species.
3. Efficiency of the sterilization by UV radiation of plasma is higher than standard UV sources.
4. For plasma sterilization most efficient plasma generating gas is the oxygen subsequently followed by air, carbon dioxide, hydrogen, argon, nitrogen.
5. The most efficient radiation for plasma sterilization is in the wavelength range 160–240nm. The DNA of most of the bacteria can be broken by high energy radiation with wavelengths below 240 nm.

6. Sterilization time for the instruments with complex shape is determined by chemically active neutral plasma particles.

In the initial stage of plasma sterilization, low-pressure plasmas were used. In such plasmas, the article has to be inserted into the plasma chamber. So it was only possible to sterilize articles having smaller volume than the plasma chamber. Further need of external pump to create low pressure also increases the cost of the sterilizing process.

But new development technique like atmospheric plasma brush eliminates such limitations. Plasma flame can be produced at atmospheric pressure in such a device; therefore no external pump is needed to create low pressure.

The plasma brush device consists of a discharge chamber made of insulating materials, such as ceramic and Teflon. Two cylindrical metal rods (with a diameter of 0.75 mm) operating as electrodes set a certain distance (scaled up to 15 mm) apart inside the discharge chamber are powered by a dc power supply (500 W maximum power). One of these two electrodes is connected to a ballast resistor (100 K&!), which is used to suppress the electrical field fluctuations in the cathode region, in turn, significantly improving the stability of the atmospheric plasma source. Moreover, the resistor also restrains the electrical current so that only a limited amount of current is allowed to pass through the discharge. The arrangement of plasma brush setup is shown in figure.1

Introduction of the working gas (argon) and control of the electric parameters are also very important for generating uniform and stable plasma. Argon, which is controlled by a

mass flow controller to maintain a certain flow rate, enters by inlet port and flows through the discharge chamber. With a proper electrical field applied to the two electrodes, a stable gas discharge plasma can be formed between the electrodes and extended as a stable, brush-shaped low temperature atmospheric plasma out of the chamber through the narrow outlet slit (width 1 mm, length 15 mm). Because of the narrow outlet slit, the plasma working gas passes through the chamber at a relatively high flow rate, which helps to maintain the stability of the discharge by taking away any heat that is built up in the discharge process. The temperature of the plasma is about 50^0C. A plasma flame of plasma brush on finger tip is shown in figure.2

The brush-like shaped plasma extends beyond the exit of the chamber, and possesses the reactive features of low-pressure or cold plasmas. Such ignition can be spread all over the article to be sterilized. In addition to plasma sterilization, the plasma brush apparatus can be readily used for material processing, surface treatment especially for the objects with complicated structures or large surface areas that are susceptive to high temperature.

Although plasma sterilization is a newly developed promising technique, still it is not fully developed yet. The interaction of plasma sterilization with living cells and bacteria cell is not fully understood and need careful investigation.

Other possible applications in medical science:

In the medical field, the plasma is used for sterilizing heat sensitive re-usable tools in a rapid, effective and safe way. Plasma being capable of killing a wide variety of microorganisms

such as disinfectant and antibiotic resistant bacteria, Hepatitis and HIV virus could be another target in near future.
In the food industry, the use of plasma sterilization will lead to put in safe and longer shelf life.

The recent studies of cold atmospheric plasmas have shown great potential for the use in biomedical applications. Their distinguished physical and chemical properties are defined by the uniqueness of the non-thermal non-equilibrium plasmas. Depending on their configuration they can be used in the following areas: wound healing, skin diseases, antifungal treatments, dental care, cosmetics targeted cell/tissue removal, and cancer.

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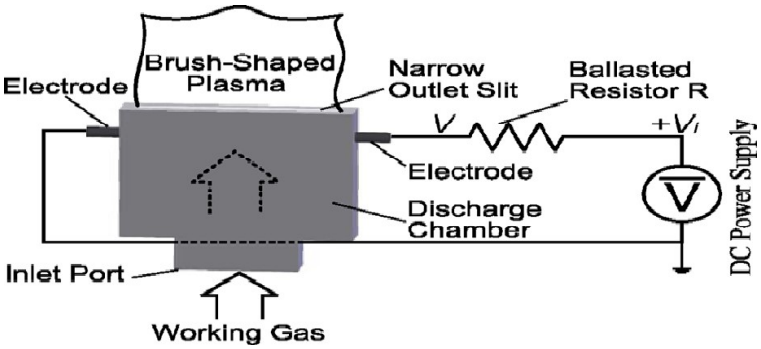

Figure.1 Arrangement of Plasma Brush setup

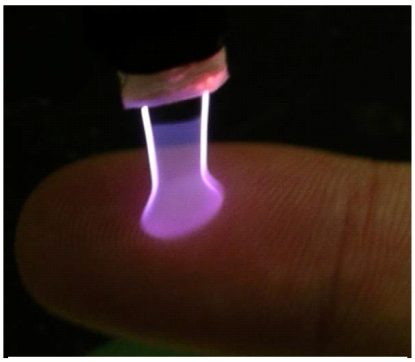

Figure.2 The flame of plasma brush

An Introduction to the Fuzzy Set Theory

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Preliminaries

In normal set theory which is termed as Crisp Set, we only have two choices either YES or NO. When we emphasise on the percentage of Trueness and Falseness then we follow the fuzziness of the situation. Beyond the simple TRUE or FALSE we get better approximation with the help fuzzy notion. It gives more accurate result.

Most of our traditional tools for formal modelling, reasoning, and computing are crisp, deterministic, and precise in character. Crisp means dichotomous, that is, yes-or-no type rather than more-or-less type. In traditional dual logic, for instance, a statement can be true or false-and nothing in between. In set theory, an element can either belong to a set or not; in optimization a solution can be feasible or not. Precision assumes that the parameters of a model represent exactly the real system that has been modelled. This, generally, also implies that the model is unequivocal, that is, that it contains no ambiguities. Certainty eventually indicates that we assume the structures and parameters of the model to be definitely known and that there are no doubts about their values or their occurrence. Unluckily these assumptions and beliefs are not justified if it is important,

that the model describes well reality (which is neither crisp nor certain). In addition, the complete description of a real system would often require far more detailed data than a human being could ever recognize simultaneously, process, and understand. This situation has already been recognized by thinkers in the past. In 1923, the philosopher B. Russell referred to the first point when he wrote: 'All traditional logic habitually assumes that precise symbols are being employed. It is, therefore, not applicable to this terrestrial life but only to an imagined celestial existence'. For a long time, probability theory and statistics have been the predominant theories and tools to model uncertainties of reality. They are based-as all formal theories-on certain axiomatic assumptions, which are hardly ever tested, when these theories are applied to reality. In the meantime more than 20 other 'uncertainty theories' have been developed, which partly contradict each other and partly complement each other. Fuzzy set theory-formally speaking-is one of these theories, which was initially intended to be an extension of dual logic and/or classical set theory. During the last decades, it has been developed in the direction of a powerful 'fuzzy' mathematics. When it is used, however, as a tool to model reality better than traditional theories, then an empirical validation is very desirable.

History

Plato who laid the foundation for what would become fuzzy logic, indicating that there was a third region (beyond T and F) where these opposites "tumbled about." A short historical review may be useful to better understand the character and motivation of this theory. The first publications in fuzzy set

theory by Zadeh and Goguen show the intention of the authors to generalize the classical notion of a set and a proposition to accommodate fuzziness in the sense that it is contained in human language, that is, in human judgment, evaluation, and decisions. Zadeh writes: 'The notion of a fuzzy set provides a convenient point of departure for the construction of a conceptual framework which parallels in many respects the framework used in the case of ordinary sets, but is more general than the latter and, potentially, may prove to have a much wider scope of applicability, particularly in the fields of pattern classification and information processing. Essentially, such a framework provides a natural way of dealing with problems in which the source of imprecision is the absence of sharply defined criteria of class membership rather than the presence of random variables'. 'Imprecision' here is meant in the sense of vagueness rather than the lack of knowledge about the value of a parameter (as in tolerance analysis). Fuzzy set theory provides a strict mathematical framework (there is nothing fuzzy about fuzzy set theory!) in which vague conceptual phenomena can be precisely and rigorously studied. It can also be considered as a modelling language, well suited for situations in which fuzzy relations, criteria, and phenomena exist. The acceptance of this theory grew slowly in the 1960s and 1970s of the last century. In the second half of the 1970s, however, the first successful practical applications in the control of technological processes via fuzzy rule based systems, called fuzzy control (heating systems, cement factories, etc.), boosted the interest in this area considerably. Successful applications, particularly in Japan, in washing machines, video cameras, cranes, subway trains, and so

on triggered further interest and research in the 1980s so that in 1984 already approximately 4000 publications existed and in 2000 more than 30,000. Roughly speaking, fuzzy set theory during the last decades has developed along two lines:

1. As a formal theory that, when maturing, became more sophisticated and specified and was enlarged by original ideas and concepts as well as by 'embracing' classical mathematical areas, such as algebra, graph theory, topology, and so on by generalizing or 'fuzzifying' them. This development is still ongoing.
2. As an application-oriented 'fuzzy technology', that is, as a tool for modeling, problem solving, and data mining that has been proven superior to existing methods in many cases and as attractive 'add-on' to classical approaches in other cases. In 1992, in three simultaneous conferences in Europe, Japan, and the United States, the three areas of fuzzy set theory, neural nets, and evolutionary computing (genetic algorithms) joined forces and are henceforth known under 'computational intelligence'. In a similar way, the term 'soft computing' is used for a number of approaches that deal essentially with uncertainty and imprecision.

Applications

The first significant real-life applications of fuzzy set theory and fuzzy logic began to appear in the late seventies and early eighties. Among such applications were fuzzy logic-controlled cement kilns and production of steel. The first consumer product was Matsushita's shower head, 1986. Soon, many others followed, among them home appliances,

photographic equipment, and automobile transmissions. A major real-life application was Sendai's fuzzy logic control system which began to operate in 1987 and was and is a striking success. In the realm of medical instrumentation, a notable real-life application is Omron's fuzzy- logic-based and widely used blood pressure meter.

Applications of fuzzy theory can be found, in artificial intelligence, computer science, medicine, control engineering, decision theory, expert systems, logic, management science, operations research, pattern recognition, and robotics. Mathematical developments have advanced to a very high standard and are still forthcoming to day. Since 1992 fuzzy set theory, the theory of neural nets and the area of evolutionary programming have become known under the name of 'computational intelligence' or 'soft computing'. The relationship between these areas has naturally become particularly close.

Mathematical programming is one of the areas to which fuzzy set theory has been applied extensively. Primarily based on Bellman and Zadeh's model of decision in fuzzy environments, models have been suggested which allow flexibility in constraints and fuzziness in the objective function in traditional linear and nonlinear programming, in integer and fractional programming, and in dynamic programming. These models in turn have been used to offer computationally efficient approaches for solving vector maximum problems. The past two decades have witnessed a significant change in the nature of applications of fuzzy logic. No engineering applications have grown in number, visibility, and importance. Among such

applications are applications in medicine, social sciences, policy sciences, fraud detection systems, assessment of credit-worthiness systems, and economics. Particularly worthy of note is the path-breaking work of Professor Rafik Aliev on application of fuzzy logic to decision making in the realm of economics. Once his work is understood, it is certain to have a major impact on economic theories.

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Radioactivity and its Biophysical Effects

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Radioactive materials that decay spontaneously produce ionizing radiation which has sufficient energy to strip away electrons from atoms (creating two charged ions) or to break some chemical bonds. Any living tissue in the human body can be damaged by ionizing radiation in a unique manner. The body attempts to repair the damage but sometimes the damage is of a nature that cannot be repaired or it is too severe or widespread to be repaired. The most common forms of ionizing radiation are alpha and beta particles or gamma and X-rays.

The radioactive contamination can cause health hazard to the human body in different ways:

- Direct inhalation of air borne particulates
  - Isotopes of radon (inert gas but may decay in lung)
  - Dust, e.g., our main source of uranium is due to re-suspension of dust particles from the earth. Uranium is ubiquitous, a natural constituent of all rocks and soil.
- Ingestion through mouth
- Entry through skin
- Direct radiation of skin

A certain amount of radioactive material enters into the bloodstream by inhalation into the lungs and into body fluid by

ingestion. In both the cases the amount of radio nuclides passing depends on the nature of radio-material and on the physiology of the person concerned. Some of the radio-elements distribute uniformly and irradiate the total body at the same rate. Some of them tend to concentrate in particular organs resulting different dose rate in different organs, e.g. plutonium concentrates in lungs and bones, iodine concentrates in thyroid gland, strontium and radium tend to concentrate in bones and teeth etc.

There are two broad categories of health effects:

Stochastic health effect:

Associated with long term, low level (chronic) exposure to radiation.

- Cancer is considered to be the most primary health effect from radiation exposure. Ordinarily, natural processes control the growth rate of cells. Damage occurring at the cellular or molecular level disrupts the controlled process-permitting uncontrolled growth of cells known as cancer. The ionizing radiation is a potent carcinogen as it has ability to break the chemical bonds in atoms and molecules.
- Radiation can cause changes in DNA- which is known as mutation. The mutations are two types: teratogenic and genetic.

Teratogenic mutations result from the exposure of fetuses (unborn children) to radiation. They can result in smaller head or brain size, poorly formed eyes, abnormally slow growth and mental retardation. Studies indicate that fetuses are most sensitive between eight to fifteen weeks after conception.

Genetic effects are those that can be passed from parent to child. Health physicists estimate that about fifty severe

hereditary effects will occur in a group of one million live-born children whose parents were both exposed to one rem.

Non- stochastic health effect:

Appear in case of exposure to high levels of radiation and become more severe as the exposure increases. Short-term high level exposure is referred to as acute exposure.

- Acute exposure to radiation appears quickly e.g. burns and radiation sickness. Radiation sickness or radiation poising cause premature aging or even death. The symptoms of radiation sickness includes- nausea, weakness, hair loss, skin burn diminishes organ function.

Dose:

The amount of energy imparted to a target underlies the concept of radiation dose defined as the energy absorbed per unit mass of the object exposed.

The dose equivalent (H) represents the product of the absorbed dose (D) in the tissue and quality factor (Q) which depends on the ionizing ability of the radiation i.e. H=DQ.

The effective dose equivalent (H_E) is to provide by a means for handling non-uniform irradiation situations. The effective dose equivalent (H_E) is the sum, over the selected tissues, of the product of the dose equivalent (H_T) in tissue T and the weighting factor W_T. The tissue weighting factor (W_T) takes into account the relative detriment to each organ and tissue including the different mortality and morbidity risks from cancer, the risk of severe hereditary effects for all generations, and the length of life lost due to these effects W_T represents the ratio of the total stochastic effects resulting from irradiation of this tissue to the total risk when the whole body is exposed uniformly.

$$H_E = \Sigma W_T H_T$$

To account for the continuing irradiation of organs and tissues after intake, there is the committed dose concept.

The committed equivalent dose H_T (t), is the time integral of the equivalent dose-rate in a specific tissue (T) following intake of a radionuclide into the body.

The committed effective dose equivalent H_E (t), for each internally deposited radionuclide is calculated by summing the products of the committed equivalent doses and appropriate W_T values for all tissues irradiated.

$$H_E (t) = \Sigma W_T H_T (t)$$

Total effective dose equivalent is the sum of the dose equivalent (for external exposures) and the committed effective dose equivalent (for internal exposures).

For radionuclides with an effective half-life, exceeding three months, the committed equivalent dose and the committed effective dose are greater than the equivalent or effective dose received in the year of intake because they reflect the dose that will be delivered in the future as well as that delivered in the year of intake.

Units of radiation dose:

Roentgen (R): The first radiation unit to be defined was roentgen (R). 1 R is defined by the energy produced by gamma radiation in a cubic centimeter of air. This can only be used to describe an amount of gamma and X-rays and only in air. One roentgen is equal to depositing in dry air enough energy to cause 2.58E-4 coulombs per kg. It is a measure of the ionizing of the molecules in a mass of air. The main advantage of this unit is that it is easy to measure directly but it is limited because it is only for

deposition in air and only for gamma and X-rays.

Rad (Radiation Absored Dose): Different materials that receive the same exposure may not absorbed dose. The rad is a unit used to measure a quantity called absorbed dose. One rad is defined as the absorption of 100 ergs per gram of material.

Gray (Gy): Gray (Gy) = 1 joule/kg. The gray is a unit to measure absorbed dose. This relates to the amount of energy actually absorbed in some material and is used for any type of radiation and any material. One gray is equal to one joule of energy deposited in one kg of a material.

Rem (Roentgen Equivalent Man): The rem is a unit of equivalent dose is often expressed in terms of thousandths of a rem, or mrem. To determine equivalent dose (rem), we multiply absorbed dose (rad) by a quality factor (Q) that is unique to the type of incident radiation.

Sivert (Sv): 1 Sv = 1 Gray x Q, where Q is a "Quality Factor" based on the type of particle. The sievert is a unit of equivalent dose. This relates the absorbed dose in human tissue to the effective biological damage of the radiation. One sievert is equivalent to 100 rem.

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Nanoscience and Nanotechnology

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The discipline of nanoscience and nanotechnology has recently become one of the most important areas of knowledge encompassing various scientific discipline including physics, chemistry, biology and engineering. Around the country and the world this burgeoning science of nanotechnology has changed the interdisciplinary research. Nanoscience and Nanotechnology have been phenomenal in improving the quality of life globally and have emerged as a promising field to have mammoth impact on the sectors of medicine, energy, environment and materials. Numerous novel applications and the products are being developed and commercialized all over the world. The science of nanotechnology could lead to radical improvements in myriad fields of life.

The idea of nanoscience and nanotechnology goes well back to the 2nd half of the last century. Work done early that century clarified the nature of matter and atoms, showing how atoms combine. Research by chemists in the 1950s showed the working of natural molecular machines. On December 29, 1950 physicist Richard Feynman delivered a legendary talk entitled "There is plenty of room at the bottom" in the Annual general

meeting of the American Physical society [1] at California Institute of Technology. In this famous lecture he said, "The principles of physics, as far as I can see, do not speak against the possibility of maneuvering things atom by atom". He also envisaged building circuits having sizes few nanometers that can be used as elements in more powerful computers. In the talk, he proposed that tiny robots might be able to build chemical substance. These ideas, though, were regarded 'too speculative' initially, but nearly twenty years later, many inventions and discoveries began to appear justifying Feynman's time ahead ideas. Soon importance of these discoveries was realized and thus nanotechnology came into existence. Eric K Drexler expanded Feynman's ideas and definition in a stimulating and lateral thinking way in his book, 'Engines of Creation, the coming Age of Nanotechnology' [2]. According to Drexler: "Nanotechnology is the principle of manipulation atom by atom, through control of the structure of matter at the molecular level. It entails the ability to build molecular systems yielding a variety of nano machines". At MIT in 1977, as an outgrowth of studies of naturally occurring molecular machines, Drexler developed the essentials of the current concept of nanotechnology. These ideas were first presented in a scientific journal in 1981 and in a book in 1986. He taught the first course on the subject at Stanford University in 1988.

Although nanoscience and nanotechnology is a new word, but in nature there were many objects that function on a micro and nanoscale. For example, abalone, which is a kind of mollusk, can create a shell around his body which is very hard having a high fracture toughness. It was later analyzed to reveal that this

shell is constructed by nanostructured bricks of CaCo3 which were put together by a glue of carbohydrate and protein mixture. As another example, the flagella, a type of bacteria can rotate at over 10,000 rpm [3]. This is an example of a biological molecular machine. Actually this flagella motor is driven by proton flow caused by the electrochemical potential difference across the membranes. In eighteenth and nineteenth centuries the art and science of photography was to produce nanosize silver particles by interacting visible light with silver halide. These silver nanoparticles act as a pixels of images. George Eastaman, who was the founder of Kodak company, first prepared a long strip of paper coated with silver halide, which was actually the 1st generation of Photographic film. Probably this was the first commercialization of nanotechnology idea.

The Prefix 'nano' is derived from a Greek word 'nanons' which means 'dwarf', but in scientific jargon, 'nano meams one billionth. Nanoscience is an interdisciplinary field that seeks to bring about mature nanotechnology. Focusing on the nanoscale intersection of fields such as physics, biology, engineering, chemistry, computer science & more, nanoscience is rapidly expanding.

Many potential applications of nanotechnology have already been identified. These include consumer electronics and computing, chemicals and basic materials, pharmaceuticals and medical products, communication, architectural industries, energy and so on. Using nanosystems, better and cheaper products can be made than using conventional materials. In the future, we can expect computers controlled molecular machines. The military has a great interest in nanotechnology, especially

optical system, and also in nanorbotics, nanomachines, smart weapons, nanoelectronics, virtual reality, massive memory, new ultra hard materials for armour, new energy-absorbing nanbased materials for stopping bullets and bionanodevices to detect and destroy chemical and biological agents.
In 20 years or so all devices and computer chips will be nanodevices. Nanoscale magnetic or optical memories are also coming soon. They will be extremely dense and cheap: many full stress movie could be stored on one small disc.

Nanomaterials
Materials consisting of or containing nanoparticles which can improved properties, such as lower weight or higher strength are said to be nanomaterials.
Nanomaterials can be categorized on those having structured components with at least one dimensional less than 100 nm. Materials that have one dimension in the nanoscale (and are extended in the other two dimensions) are layers, such as this films or surface coatings. Some of the features on computer chips come in this category. Materials that are nanoscale in two dimensions (and extended ion one dimension) include nanowires and nanotubes. Materials that are nanoscale in three dimensions are particles, for example precipitates, colloids and quantum dots (tiny particles of semiconductor materials). Nano crystalline materials, made up of nanometer-sized grains also fall into this category. Some of these materials have been available for some time, others are genuinely new.

Two principal factors cause the properties of nanmaterials to

differ significantly from other materials: increased relative surface area and quantum effects. These factors can change or enhance properties such as reactivity, strength and electrical characteristics. As a particle decreases in size, a greater properties of atoms are found at the surface compared to those inside. For example, a particle of size 30nm has 5% of its atoms on its surface, at 10nm 20% of its atoms, and at 3nm 50% of its atoms. Thus nanoparticles have a much greater surface area per unit mass compared with larger particles. As growth and catalytic chemical reactions occur at surfaces, this means that a given mass of material in a nanoparticulate form will be much more reactive than the same mass of material made up of larger particles.
In tandem with surface-area effects, quantum effects can begin to dominate the properties of matter as size is reduced to the nanoscale. These can affect the optical, electrical and magnetic behaviours of materials, particularly as the structure or particle size approaches the smaller end of the nanoscale. Materials that exploit these effects include quantum dots, and quantum well lasers for optoelectronics.

For other materials such as crystalline solids, as the size of their structural components decreases, there is much greater interface area within the material. This can greatly affect both mechanical and electrical properties. For example, most metals are made up of small crystalline grains. The boundaries between the grains slow down or arrest the propagation of defects when the material is stressed, thus giving it strength. If these grains can be made very small, or even nanoscale in size, the interface area within the material greatly increases, which enhances its strength. For

example, a nanocrystalline nickel is as strong as hardened steel. Understanding surfaces and interfaces is a key challenge for those working on nanomaterials, and one where new imaging and analysis instrument are vital.

Nanomaterials are not simply another step in the miniaturization of materials. They often require very different production approaches. There are several processes to create nanomaterials, classified as 'top-down' and 'bottom-up'. Although many nanomaterials are currently at the laboratory stage of manufacture, a few of them are being commercialized [4].

Major nanomaterial currently in research and development and their potential applications may be summarized as given below :

Material	Properties	Application
Clusters of atoms		
Quantum wells	Ultra-thin layers-usually a few nanometers thick – of semiconductor material (the well) grown between barrier material by modern crystal growth technologies. The barrier materials trap electrons in the ultra-thin layers, thus producing a number of useful properties. These properties have led, to the development of highly efficient laser devices.	CD players have made use of quantum well lasers for several years. More recent developments promise to make these nanodevices commonplace in low-cost telecommunications and optics.

Quantum dots	Fluorescent nano-particles that are invisible until 'lit up' by ultraviolet light. They can be made to exhibit a range of colours, depending on their composition.	Telecommunications, optics
Polymers	Organic-based materials that emit light when an electric light is applied to them and vice versa.	Computing, energy conversion
Grains that are less than 100 nm in size		
Nano-capsules	Buckminsterfullerenes are the most well known example. Discovered in 1985, these C60 particles are 1nm in width.	Many applications envisage e.g. nanoparticulate dry lubricant for engineering.
Catalytic nano-particles	In the range of 1-10nm, such materials were in existence long before it was realized that they belong to the realms of nano-technology. However, recent developments are enabling a given mass of catalyst to present more surface area for reaction, hence improving its performance. Following this, such catalytic nano-particles can often be regenerated for further use.	Wide range of applications, including materials fuel and food production, health and agriculture
Fibres that are less than 100 nm in diameter		
	Two types of nanotube exist: the single-wall	

Carbon nanotubes	carbon nanotubes, the so-called 'Buckytubes', and multilayer carbon nanotubes. Both consist of graphitic carbon and typically have an internal diameter of 5nm & an external diameter of 10 nm. Described as the 'most important material in nanotechnology today', it has been calculated that nanotube based material has the potential to become 50-100 times stronger than steel at one sixth of the weight.	Many applications are envisaged: space and aircraft manufacture, automobiles and construction. Multilayered carbon nanotubes are already available in practical commercial quantities. Buckytubes some way off large-scale commercial production.
Films that are less than 100 nm in thickness		
Self-assembling monolayers (SAMs)	Organic or inorganic substances spontaneously form a layer one molecule thick on a surface. Additional layers can be added, leading to laminates where each layer is just one molecule in depth	A wide range of applications, based on properties ranging from being chemically active to being wear resistant
Nanoparticulate coatings	Coating technology is now being strongly influenced by nano-technology. Eg. Metallic stainless steel coatings sprayed using coatings sprayed using nanocrystalline powders have been shown to possess increased hardness when compared with conventional coatings	Sensors, reaction beds, liquid crystal manufacturing, molecular wires, lubrication and protective layers, anticorrosion coatings, tougher and harder cutting tools.

Nanostructured materials		
Nano composites	Composites are combinations of metals, ceramics, polymers and biological materials that allow multi-functional behavior. When materials are introduced that exist at the nanolevel, nano-composites are formed and the material's properties – e.g. hardness, transparency, porosity – are altered.	A number of applications, particularly where purity and electrical conductivity characteristics are important, such as in microelectronics. Commercial exploitation of these materials is currently small, the most ubiquitous of these being carbon black, which finds widespread industrial application, particularly in vehicle tyres.

Semiconductor Quantum Dots

Ever since Faraday, in the 19th century made a dispersion of nanosized particles of gold in water, chemists have been devising ways of creating fine dispersions or colloids of a variety of materials.

New physical techniques, including scanning probe microscopy, now permit the accurate characterization of particle sizes. It has also been realized that the physical properties of such finely divided matter particularly the electrical and optical properties are strongly influenced by quantum effects. Nanoscale particles of semiconducting materials, such as cadmium selenide and gallium arsenide, are known as quantum dots- their size is such that quantum effects change the energy levels of their electrons. This means that their optical and fluorescence spectra depend on their dimensions. In other words, their colour changes

with size. These have potential applications in new kinds of lasers and light emitting diodes.

Particles can be made to emit or absorb specific wavelengths (colours) of light, merely by controlling their size. Recently, quantum dots have found applications in composites, solar cells (gratzel cells) and fluorescent biological labels which use both the small particle size and tunable energy levels. Recent advances in chemistry have resulted in the preparation of monolayer-protected, high quality, monodispersed, crystalline quantum dots as small as 2nm in diameter, which can be conveniently treated and processed as typical chemical reagent. They can also be used instead of dyes as markers for molecules in biological experiments.

To detect cancer, scientists can design quantum dots that bind to sequence of DNA that are associated with the disease. When the quantum dots are stimulated with light, they emit their unique bar codes, or labels, making the critical, cancer associated DNA sequences visible. The diversity of quantum dots will allow scientists to create many unique labels, which can identify numerous regions of DNA simultaneously. This will be important in the detection of cancer, which results from the accumulation of many different changes within a cell. Another advantage of quantum dots is that they can be used in the body, eliminating the need for biopsy. The emergence of this wonderful technology has opened up avenues for other technologies to grow which would find its applications in different fields and shape the future in a different form.

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Banana Fibre - A Means for Self Employment

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Global warming brings a great threat to our environment as well as mankind. This threat can be overcome by the replacement of non-renewable, non-biodegradable and synthetic materials with the renewable, biodegradable and natural materials. One of the most important and innovative use of agriculture waste is in banana trunk. It was reported that approximately 5 lakh tones of banana pseudo stems were found as agriculture waste materials every year after harvesting. Instead, it is possible to use these pseudo stems for extraction of banana fibre which can be used for making different clothes and other decorative items like bags, papers, composite materials etc. In Japan and Nepal, high quality textiles product is found to be very popular and has great demand.

In India, the technology of banana fibre extraction has been developed in South India where in a good number of banana fibre extraction units have been running very successfully. Some firms are exporting the banana fibre products.

In north-east India, banana (Musa paradisiaca Linn.) is a very popular crop and now a days the north-east states have adopted the technology from south and started production of banana fibre and fabric. In Assam, banana has a very great

demand due to its nutrient rich and it is popularly known as 'Kol'. It belongs to under the family Musaceae.

Uses of Banana Fibre:

Earlier, there was a very limited use of banana fibre and was primarily used for making only a few items like ropes, mats, and some other composite materials. But in recent time, the uses of banana fibre become very popular and used for different purposes. Some uses of banana fibre is as follows.

- Since the fibre is very hard and it can last for about 100 years, it can be used to make currencies, bond papers etc.
- It can be used in paper industry for its high cellulose content
- It can be used as a replacement of fibre glass
- Mattresses, pillows, cushions etc. can be made from banana fibre
- Different decorative items such as bags, sarees, neckties, table cloths, rugs, purse, mobile phone covers, door foot mats, curtains, hats, photo frames, belts, baskets, chappals, mats are also possible to make from banana fibre
- Different textiles can be manufactured
- A very hard and best quality rope can also be made.

Characteristics of Banana Fiber:

Banana fiber is a natural fiber. It has some own physical and chemical properties which
make fiber quality fine and hard.

- The fineness, hardiness and spinnability of banana fibre is comparatively better than bamboo fiber and ramie fiber though the appearance of all these fibres are almost similar.

- The chemical composition in banana fiber contains cellulose, hemicellulose, and lignin.
- Banana fiber is very strong.
- It has smaller elongation.
- Its shiny appearance becomes very attractive depending upon the extraction & spinning process.
- Light in weight.
- Both absorption and release of moisture capacity is high.
- It is easily decomposable and bio- degradable and so an eco-friendly fiber.

Method of extraction of Banana Fibre:

Banana fibre is extracted from the pseudostem of the plant. Three different methods viz. manual method, chemical method and mechanical method for extraction of banana fibre are practiced by the people. Out of these three methods, the mechanical method is considered as the best because of its fastest way of fibre extraction, production of good quality fibre can be extracted without effecting the environment. The extraction of the natural fibre from the plant required certain care to avoid damage. Initially, the banana plant sections (pseudostem) are cut in to pieces of about 1.5 – 2.0 m long from the main pseudostem. Impurities in the rolled fibres such as pigments, broken fibres, coating of cellulose etc. are removed manually through combing.

The manual extraction of banana fibres is tedious, time consuming, and causes damage to the fibre. It also cause wound in nails of fingers. Therefore, this technique is not useful for industrial application.

In mechanical method, cut sheath of pseudo stem is inserted into the machine one by one. The machine removes the non-fibrous tissues and coherent materials from the fibres present in the sheath and ultimately produce the fine fibre as output. Based on the variety of banana pseudo stem and the capacity of the machine, it is possible to extract at least 40 kg of fibre in 8 hours.

Drying of banana fibre:

The extracted banana fibres should be beaten in stone or hard beds to remove the non-fibrous tissues and coherent materials from the fibres. Then the fibres are dried properly so that moisture is removed from the fibre. After complete drying, it becomes ready for bagging.

Dying of banana fibre:

The extracted fibres of banana can be dyed using both natural and chemical dyes. Different natural dyes like Mejankori (Senduriya), turmeric, silikha etc. can be used for dying the fibres. After dying, the fibres are ready to use for weaving. The fibres should be dried under shade after dying instead of sun dry.

Packaging and storing of fibre

After dying and drying, the fibres should be combed without pith content and should be 100% dried and packed, by air tight polythene Bags. The fibres should be stored in dry places so that air moisture cannot be absorbed by the fibre which helps in maintaining the quality of fibre.

Advantages of banana fibre extractor machine

1. Banana fibre extractor machine is very simple
2. Easy to mobilize (portable in nature)
3. Women also can operate, less maintenance and safe to operate.
4. User friendly & economic least cost effective.
5. Clean work atmosphere.
6. Fifty times increase in fibre production compared to manual process.
7. Superior quality fibre in terms of length, softness and colour.

How many manpower is needed to operate the Machine?

Two persons (women) are sufficient to operate the machine. One woman is used to cut the trees into pieces and the other woman is to operate the machinery. It is possible to run the activity by a single person also if two persons are not available.

Space requirement for establishment of a unit

To establish a banana fibre extraction unit, it does not require a huge space because, the fibre extraction machine is very simple and portable in nature. A room with a size 15ft x 10ft is enough for running one unit. The raw materials and finished products can also be stored in the same room.

Who can carry out this unit?

1. Banana cultivating farmers
2. Self help Groups and NGOs
3. Entrepreneurs.
4. Rural unemployed youths
5. Rural women
6. Mahila samitis
7. Any other individual or group

Is it possible to grow this unit in urban areas?

The fibre production unit can be grown at any where as per ones convenient. To grow the unit in urban areas, the entrepreneurs must have to collect the required raw materials (pseudostems) from the areas where banana is grown. They can also encourage and engage rural youths/ farmers to grow banana plants on contract basis or by helping them with financial aids.

Market potential of banana fibre:

There is very great demand of banana fibre in the countries of United States, Europe, Japan and Nepal. Some machinery producing companies (e.g. Eco Green) have already made tie-up with the entrepreneurs for exporting their produce in different countries. In South India, there is a great demand of banana fibre and a very large marketing network has been developed by different Institutions for exporting the banana fibres. The products can be sold both as fibre and the value added products. To capture a good market network, the producer must have to confirm to produce a good quality fibre as well as final product so that it can stand in the Global market. In such cases, the entrepreneur should have make proper planning.

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Applications for Microbial Enzymes in Food Industry

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Introduction

Enzymes are produced by all living organisms as catalyst for various biochemical reactions. In food industries enzymes have been used to produce and to increase the quality and diversity of food. Microbial enzymes have been found to play a vital role in food processing industries and their impact going to be felt much more in coming years. The enzyme mediated processes are preferred due to their high specificity and least by-products. The food processed in this way is close to the natural products and are thus categorized as "Green". Some use of the products that we use microbial enzymes are cheese, yoghurt, bread, wine, beer, syrup etc. Early food processes involving proteolysis were normally the inadvertent consequence of endogenous or microbial activity in the food stuff.

The application of microbial enzymes in food processing industry has been known for ages and the oldest known enzyme mediated process is alcoholic fermentation involving yeast. Today enzymes are used in bakery, brewing, dairy, meat, sugar, fruit processing and other food industries.

The biochemical diversity of microbial enzymes makes them logical source of a wide variety of enzymes for use in the food and biotechnological systems. Genetic manipulation of microorganisms increases their potential for production of enzymes used for various industrial purposes. Thus possibilities of producing microbial enzymes to catalyze virtually any desired reactions are nearly endless.

Major microbial enzymes used in food industry

Some important enzymes used in the food industry are summarized here

1. Rennet:

The rennet enzyme is used in manufacture of cheese. The use of this enzyme in cheese production was among the earliest application of exogenous enzyme in food processing, dating back approximately 6000 BC. The use of rennet as enzyme in cheese manufacture is perhaps the largest single application of enzyme in food processing. In recent years proteinase has found additional application in diary technology, for example in acceleration of cheese ripening, modification of functional properties and preparation of dietic products. Many microorganisms are known to produce rennet like proteinases eg., Rhizomucor pusillus, Rhizomucor michei, Aspergillus oryzae, Irpex lactis etc.

2. Lacase:

Lactose, the sugar found in milk and whey, and its corresponding hyrolase, lactase or b-galactosidase, have been extensively researched during the past decade (Mehaiya, 1987). Lactase enzyme converts lactose in to lactic acid and responsible

for coagulation of milk protein (casein). Lactase treated milk increased the sweetness of the resultant milk, thereby avoiding the requirement for addition of sugars in themanufacture of flavored milk drinks. Manufacturers of ice cream, yoghurt and frozen desserts use lactase to improve scoop and creaminess, sweetness, digestibility, and to reduce sandiness due to crystallization of lactose in concentrated preparations. Cheese manufactured from hydrolyzed milk ripens more quickly than the cheese manufactured from normal milk.

The microorganisms producing lactase enzyme are–

Lactobacillus, bulgaricus, Lactobacillus delbruckii, Aspergillus niger, Aspegillus oryzae, and Kluyveromyces lactis etc.

3. Catalases

Catalase is an enzyme that can be produced from bovine livers or microbial sources. It catalyzes the decomposition of hydrogen peroxide to become water and oxygen molecules. The enzyme can be used in a limited amount in cheese production. Catalase effectively removes the residual hydrogen peroxide, ensuring that the fabric is peroxide-free and mainly used in food industry and also in egg processing with other enzymes. Catalase is a common enzyme found in nearly all living organisms which are exposed to oxygen, where it functions to catalyze the decomposition of hydrogen peroxide to water and oxygen (Chelikani P, Fita I, Loewen PC, 2004).

Glucose oxidase and catalase are often used together in selected foods for preservation. Superoxide dismutase is an antioxidant for foods and generates H_2O_2, but is more effective when catalase is present.

4. Lipases

A lipase is water soluble enzyme that catalyses the hydrolysis of ester bonds in water-insoluble, lipid substrates (Svendsen, 2000). Lipase is used as biocatalyst to produce free fatty acid, glycerol and various esters, part of glycerides and fat that is modified or esterified from cheap substrate i.e. palm oil. Those products are extensively used in pharmacy, chemical and food industry. Lipases (triacylglycerol acylhydrolases) are produced by microorganism in individual or together with esterase. Various animal or microbial lipases gave pronounced cheese flavour, low bitterness and strong rancidity, while lipases in combination with proteinases and/or peptidases give good cheese flavour with low levels of bitterness. In a more balanced approach to the acceleration of cheese ripening using mixtures of proteinases and peptidases, attenuated starter cells or cell-free extracts (CFE) are being favored. (Wilkinson, M.G., 1995).

Microorganisms that produce lipases are Psedomonas aeruginosa, Serratia ,marcescens, Staphylococcoccus aureus, Bacillus subtilis etc.

5. Proteases:

The Proteolytic system of lactic acid bacteria is essential for their growth in milk, and contributes significantly to flavour development in fermented milk products. The proteolytic system is composed of proteinases which initially cleaves the milk protein to peptides; peptidases which cleave the peptides to small peptides and amino acids; and transport system responsible for cellular uptake of small peptides and amino acids. Lactic acid bacteria have a complex proteolytic system capable

of converting milk casein to the free amino acids and peptides necessary for their growth. These prteinases include extracellular proteinases, endopeptidases, aminopeptidases, tripepticdases, and proline-specific peptidases, which are all serine proteases. Apart from lactic streptococcal proteinases, several other proteinases from nonlactostreptococcal origin have been reported. There are also serine type of proteinases, e.g. proteinases from Lactobacillus acidophilus, L. plantarum, L. delbrueckii sp. bulgaricus, L. lactic, and L. helveticus. Aminipeptidases are important for the development of flavour in milk products, since they are capable of releasing single amino acid residues from oligopeptides formed by extracellular proteinase activity. (Law, . J., Haandrikman, A., 1997)

6. Amylases:

They can be derived from bacteria and fungi. They play a major role in the food and benerages (baking), brewing, starch, sugar industries. This enzyme is used extensively in drink industry for example the production of High Fructose Syrup (HFS) or in textile industry. Amylases can be made from various microorganisms especially from Bacillus, Pseudomonas and Clostridium family. Potential bacteria that are recently used to produce amylases in industrial scale are-

Bacillus licheniformis, B. stearothermophillus, B. Stearothermophillus

Alpha amylases have significant effects on baked goods. If the content is low, this leads to low dextrin production and poor gas production. This in turn results in inferior quality bread with reduced size and poor crust color. To compensate for the

deficiencies of the grain, it is necessary to add either sugar or alpha amylase. The addition of enzymes offers certain advantages over sugar. At a flour mill, it is possible to standardize the enzyme content of the flour so that a uniform commodity can be supplied. Furthermore, enzymes bring about a gradual formation of sugar, which matches the needs of the yeast. When the dough is placed in the oven, the steadily increasing temperature leads to an increase in the enzymes' rate of reaction and more sugar is produced. Malt flour and malt extract can be used as enzyme supplements as malt is rich in alpha amylases. However, it is better to use a fungal alpha amylase.

PRODUCTION OF FERMENTED FOOD

(a) Food products from fermented milk:

Fermented products	**Microorganisms involved**
i) Cultured butter milk	Streptococcus lactis
	Streptococcus cremoris
	Leuconostoc citrovorum,
	Leuconostoc dextranicum
ii) Sour cream	Streptococcus spp.
	Leuconostoc spp.
iii) Bulgarian buttermilk	Lactobacillus bulgaricus
iv) Acidophilous milk	Lactobacillus acidophilous
v) Yogurt	Strepotococcus thermophilus
vi) Kafir	Streptococcus lactis
	Lactose fermenting yeast
vii) Kumiss	Streptococcus lactis
	Lactobacillus bulgaricus

Fermented food products:

Food Product	Raw materials	Microorganisms involved
i) Sauerkraut	Stredded cabbage	Enterobacter cloaca Erwinia herbicola Leuconostoc mesentheroides Lactobacillus plantarum
ii) Pickle	Cucumber	Leuconostoc mesentheroids Streptococcus faecalis Pediococcus cerevvisiae
iii) Green Olive	Olives	Leuconostoc mesentheroids Lactobacillus plantarum Lactobacillus bervis
iv) Sausage	Beef & Pork	Pediococcus cerevisiae Micecococcus spp.
v) Tempeh	Soybean	Rhizopus oligosporus
vi) Soy sauce	Soybean, Wheat	Aspergillus oryzae Tetragenococcus halophilus Zygosaccharomyces rouxi
vii) Miso	Rice	Aspergillus oryzae
viii) Idli	Black gram	Leuconostoc mesentheroides
ix) Poi	Taro	Psudomonas spp. Lactobacillus pasteurians Lactobacillus delbruckii Lactobacillus brevis Streptococcus lactis Geotrichum candium

Alcoholic beverages

Products	**Raw material**	**Microorganisms involved**
i) Beer	Grain mesh	Saccharomyces cerevisiae Saccharomyces carisbergensis
ii) Wine	Fruit juice	S. cerevisiae car. Ellipsoidens
iii) Rum		Sugarcane Saccharomyces cerevisae

Conclusion:

From the above discussion it may be concluded that, microbial enzymes play significant role in different food industries. They are directly or indirectly involved in our day to day life. Different food items of our day to day life are manufactured by applying various enzymes of microbial origin.

Carbon Nanoallotropes: Fullerenes, Nanotubes and Graphene

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1. Introduction:

The uniqueness about carbon is its ability of to participate in covalent bonding with carbon or nonmetallic elements in diverse hybridization states (sp, sp^2, sp^3). Centuries ago, natural carbon materials were found to exist as various types of amorphous carbon, diamond, and graphite. Diamond is a transparent electrical insulator and the hardest known material whereas graphite is a soft material with remarkable electrical conductivity. Diamond consists of tetrahedral sp^3 carbon atoms that form unique large crystals. In contrast, graphite consists of sp^2 carbon with stacked graphene monolayers are held together by van der Waals interactions.

Over the years, a range of new carbon materials known as carbon nanoallotropes exhibiting surprising and diverse properties have been identified. The first carbon nanostructure to be discovered was the C_{60} molecule, known as fullerene was initially reported in 1985.[1,2] Fullerene with C_{20}, C_{70}, and even

larger species were also subsequently discovered. However, C_{60} is by far the most widely studied and the smallest known stable carbon nanostructures till date. Each C_{60} molecule consists of 60 carbon atoms arranged in a series of hexagons and pentagons to form a spherical (truncated icosahedral) structure. Six year later to the discovery of fullerene, another important carbon nanomaterial known as carbon nanotubes (CNTs) is discovered.[3"5] The discoveries of fullerenes and CNTs, were followed by the discovery and isolation of another carbon nanostructures known as graphene in 2004.[6] Graphene family also includes several similar nanostructures that consist of a single graphene monolayer or a few graphene monolayers.

These carbon nanoallotropes consist primarily of sp^2 carbon arranged in a hexagonal network, can be regarded as members of the same group. They have similar structural components but their properties vary significantly due to their different sizes and shapes. Although, a few more nanoallotropes such as single-walled carbon nanohorns (SWNHs), onion-like carbon (OLC) spheres, carbon dots, nanodiamond, and carbon superstructures are discovered in recent years, this review is confined to different aspects of fullerene, CNTs and graphene only.

2. Classification of Carbon Nanoallotropes:

Carbon nanoallotropes can be classified on the basis of their morphological characteristics. First, contain nanostructures with empty internal spaces such as fullerene, carbon nanotubes. The guest molecules such as metals, atoms, or other nanostructures are accommodated within these voids as well as

can facilitate certain reactions. Nanostructures with no internal spaces such as graphene would belong to a separate second category under this scheme. Another approach to classify the carbon nanostructure is based on the dimension of the nanoallotropes. The concept distinguishes between nanoallotropes such as 0D fullerene, 1D CNTs and 2D graphene.

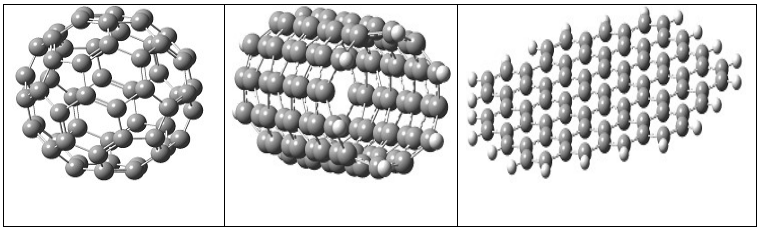

Fig: Fullerene (C_{60}), Carbon nanotubes (CNT), Graphene

2.1 Fullerene

The study of carbon nanostructures began with the discovery of the fullerenes. In general, fullerenes are closed hollow cages made of sp^2-hybridized carbon atoms arranged into 12 pentagons and a number of hexagons that can be calculated from the total number of carbon atoms. A fullerene with 20 + 2n carbon atoms will have n hexagons. The number of pentagons is predetermined by the closed shapes of the fullerenes and will always be 12. C_{60} is regarded as the smallest carbon nanostructure with an external diameter of 0.71 nm.

Although, fullerene soot consists of several similar structures with higher or lower numbers of C atoms (e.g., C_{70}, C_{76}, C_{82}, and C_{84}), C_{60} is the most abundant, the most widely studied. It takes the form of a truncated icosahedron containing 12 pentagons and 20 hexagons. All of its carbon atoms are sp^2-

hybridized. However, as the arrangement of carbon atoms is not planar but rather pyramidalized, a "pseudo"-sp^3-bonding component must be present in the essentially sp^2 carbons. Thus, C_{60} and other larger fullerenes can be viewed as a carbon nanoallotrope with hybridization between sp^2 and sp^3. The presence of pentagons is essential, introducing curvature and, hence, allowing closing of the cage. Two different types of bonds are identified from C_{60} X-ray diffraction pattern, viz. one bond with length 1.38 Å connecting C atoms common to the two adjacent hexagons and the other with length 1.45 Å connecting C atoms common to the pentagon"hexagon pair. In the solid phase, C_{60} either exists as aggregates or forms a crystalline structure with a face-centered cubic (fcc) lattice.[7] Fullerenes have been characterized using various spectroscopic techniques.[8-10]

2.2. Carbon Nanotubes

Carbon nanotubes were discovered and characterized several years before the isolation of graphene.[3"5] "Carbon nanotubes" is a general term that refers to a wide range of tubular nanostructures with similar structures and shapes. Ideally, they are based on a hexagonal lattice of sp^2 carbon atoms such as graphene. However, in nanotubes, the edges of the graphene sheet are fused to form a cylindrical tube with a high aspect ratio (i.e., length-to-diameter ratio). The simplest CNT has a single graphenic wall and is capped at both ends. Single-walled carbon nanotubes (SWNTs) have diameters of around 0.4"2 nm and are several micrometers long, with an empty internal space. CNTs can also be double-walled (DWNTs)[11] or multiwalled (MWNTs) carbon nanotubes depending on the number of graphenic layers

in the walls of the cylindrical structure.[11] CNTs are not dispersible in organic solvents or water and are usually held strongly together in bundles by significant van der Waals interactions.[12,13] A new similar group of cylindrical carbon nanostructures that have recently appeared are referred to as bamboo-like CNTs due to the division of their internal spaces into small cavities similar to those found in bamboo.[14]

2.3. Graphene

Graphene is a very abundant material, is the building block of natural graphite. Carbon atom in a graphene sheet is connected to three neighboring carbon atoms by covalent σ bonds, creating a robust honeycomb lattice (hcb). Graphene is currently the strongest known material. The unhybridized p-orbital of the carbon atoms are oriented perpendicularly to the planar structure of the graphene sheet and interact with one another to form the half-full π band that gives graphene its aromatic character. The optical transmittance of a graphene monolayer has been measured at nearly 97.5% [15] but the transmittance decreases rapidly as the number of stacked monolayers increases. Raman spectroscopy is a powerful tool for assessing the quality of graphene samples.

3. Methods for preparation of carbon nanoallotropes

Most carbon nanostructures are constructed from 2D hexagonal carbon lattices. However, in practice, it is not generally possible to fabricate carbon nanostructures using a carbon lattice as the starting material. In fact, apart from graphene nanoplates and multilayer carbon nanosheets that can be isolated from

naturally occurring graphite, graphitic nanostructures are generally produced from carbon sources such as graphite, organic gases, or volatile organic compounds by using instrumental techniques to reorganize carbon atoms. The most common such techniques are carbon vapor deposition (CVD), laser ablation, and arc discharge.

3.1 Fullerene

C_{60} and other fullerenes are produced from graphite by vaporization using arc and plasma discharges [2,10,16,17] or laser irradiation.[1,18] Alternative methods include naphthalene pyrolysis[19] and hydrocarbon combustion.[20,21] The crude products obtained using all of these methods contain a small proportion of fullerenes, with C_{60} being the most abundant. The fullerene mixture is isolated from the initially formed soot by simple extraction with benzene or toluene, after which the desired products are isolated by column or liquid chromatography.[9] One mechanism describing formation of fullerenes involves four steps.[22] First, vaporized carbon atoms from graphite tend to form carbon chains with a length of up to 10 atoms (up to C_{10}). These carbon chains then progressively grow to monocyclic rings (C_{10}-C_{20}). In the third step, further growth leads to three dimensional carbon networks resembling features of curved shells. The last step then involves growth of small fullerene cages due to the shell-closing mechanism.

3.2 Carbon nanotubes

Although CNTs have the same basic structure as graphene, their method of preparation differs from graphene.

There are several well-established methods for CNT production, [23] simplest one to prepare SWNTs is an arc discharge between two carbon electrodes in a chamber under an inert atmosphere.[24] In addition to gases such as He, CH_4, and H_2, various volatile organic molecules can be introduced into the chamber to influence the properties of the resulting nanotubes.[25] MWNTs are produced by arc discharges in the absence of a catalyst. DWNTs have also been produced by the arc-discharge technique under atmospheres of H_2 or Ar using a mixture of Ni, Co, Fe, and S as the catalyst [26] and by pulsed arc discharges with a Y/Ni alloy as the catalyst.[27] Most powerful existing method for preparing CNTs is CVD over a metal catalyst. The carbon vapor is usually methane, ethane, acetylene, ethylene, a H_2/CH_4 mixture, or ethanol, while the metal catalyst is usually nanoparticles of Fe, Co, or Ni, or some alloy of these metals.

3.3 Graphene

Graphene monolayers can be isolated by the liquid exfoliation of graphite using ultrasonication in specific organic solvents.[28,29] In some cases, surfactant molecules are used to stabilize graphene in liquid suspensions.[30,31] Cai et al. have reviewed the various methods of graphite exfoliation[32] although some challenges still left for large-scale production of graphene oxide (GO).[33,34] GO is produced by oxidizing graphite using strong oxidizing agents which results epoxy, carboxy, and hydroxy groups to the graphenic surface.[35] GO nanoplatelets are easily exfoliated in water and can then be partially reduced and transformed into graphene nanoplates.[36,37] The reduction process creates defects in the graphenic layer that are not completely

repaired during annealing.[38] Other methods for the preparation of graphene are based on CVD [39,40] the intercalative expansion of graphite [41,42] or the thermal annealing of SiC.[43,44]

3.4. Fundamental Physicochemical Properties of Carbon Nanoallotropes

The majority of the interest in carbon nanoallotropes relates to graphene and CNTs because of their outstanding mechanical and electronic properties and, especially, the ability to transfer these useful properties to composite materials. It is known that, on lowering the size, below a characteristic threshold value, the physicochemical properties of nanomaterials are governed by finite-size (quantum) and surface effects.[45] Besides, as the size of a nanomaterial is lowered, more and more atoms lie in its surface layers, promoting emergence of surface effects which evolve due to symmetry breaking and weakened and unsaturated chemical bonds. For graphene, only one dimension is confined while the other two are nonconfined. For nanotubes, two dimensions are confined while the remaining one is nonconfined. In the case fullerene, all three dimensions are confined. Due to the coexistence of confinement and the delocalization effect, 1D and 2D nanomaterials show mixed behaviors with continuous and discrete density of states.[46] Therefore, the evolution of size dependent band gaps and peaks and/or singularities with peculiar electronic states gives rise to interesting electronic properties. For 0D nanomaterials, the density of states is of a discrete nature, manifested by significant gaps and reflected particularly in optical features (e.g., photoluminescence).

4.1. Fundamental Properties of C_{60}

Due to its molecular character and limited size, pure C_{60} lacks many of the fundamental properties of other carbon nanostructures such as conductivity and mechanical strength. Despite lacking these properties, its structural morphology makes C_{60} a very useful radical scavenger. Due to its spherical shape and electron-deficient character, C_{60} reacts easily with all kinds of free radicals. Because of this ability, it has been evaluated as a radical scavenger that could potentially be used to protect polymers from harmful radicals [47,48] and as an antioxidant in cosmetics and biological systems.[49,50] Another fundamental property of C_{60} is its ability to act as an electron acceptor in the donor-acceptor units of energy conversion systems.[51-53] An interesting and widely studied property of fullerenes is their ability to form superconducting crystals when doped with alkali metals. C_{60} crystallizes in an fcc lattice with well-defined tetrahedral and octahedral cavities between the C_{60} molecules. These cavities can host several species, including alkali-metal and alkaline-earth-metal atoms without significantly changing the basic crystal structure.

4.2. Mechanical Properties of Graphene, Carbon Nanotubes

Due to the high strength of the covalent C-C bonds between adjacent sp^2 carbon atoms, graphene and CNTs are the strongest known materials with a high flexibility. Additionally, carbon nanotubes and graphene have rich nonlinear mechanical properties such as flexibility, buckling instability, and fracture strength.[54,55] They are found to be resilient, sustaining extreme

strains without any indications of brittleness, plasticity and atomic rearrangements. These impressive mechanical properties together with the other unique characteristics of graphene and CNTs (e.g., their flexibility, chemical inertness, and electrical conductivity) have shown their utility in technological applications.

4.3. Electronic and Related Properties of Graphene, Carbon Nanotubes

Graphene is characterized as a zero band gap semiconductor or semimetal because its density of states is zero at the Fermi energy level. The band gap of graphene can be tuned by applying a voltage across its structure. The high electrical conductivity of graphene monolayers and their capacity to carry large currents at room temperature studied. The high electrical conductivity is frequently explained in terms of the low defect density in the graphene crystal lattice, which increases the mean free path of electrons.[56-58] The charge carriers in graphene behave as massless relativistic particles with the properties of Dirac fermions. Graphene also exhibits an ambipolar effect, a feature whereby its charge carriers can switch from electrons to holes under the influence of an applied electric field. [56-58] The electronic properties of graphene have been found to strongly depend on the number of layers and relative positions of atoms in the adjacent layers (i.e., the stacking order). The properties of graphene are shared by carbon nanotubes, which can be regarded as cylindrically fixed graphene monolayers in the case of SWNTs or multilayers in the case of MWNTs.[59-61] The conducting properties of CNTs are determined by the way in which the graphene monolayer is rolled up to form the cylinder, which means

that CNTs can be metals or semiconductors. In other words, the electrical characteristics of carbon nanotubes are strongly governed by the diameter and chirality of the nanotubes. If carbon nanotubes are doped, the resulting materials may be p-type, n-type, or intrinsic semiconductors depending on the type and concentration of the dopant.[62] Its electronic features are dramatically altered by the presence of defects, vacancies, and impurities. In fact, metallic CNTs have excellent conductivities (i.e., low resistivities) and can carry very high current densities.[63] The electrical resistivity of individual CNTs varies with differences in the structure of the studied CNTs (which can be metallic or semiconducting). Carbon nanotubes also have interesting optical properties that may lend themselves to various noteworthy practical applications and sometimes regarded as "practical black bodies".[64] More interestingly, graphene exhibits electrochromic behavior; i.e., its absorption and emission of light are controllable by electrical stimulation.[65]

4.4. Magnetic Properties of Carbon Nanoallotropes

Carbon nanoallotropes such as fullerenes and carbon nanotubes are magnetically nonattractive. In a fullerene, short-ranged magnetic properties are, in general, governed by its structure, containing both pentagons and hexagons.[66] In fullerene, magnetic susceptibility includes two contributions, i.e., a diamagnetic term from the hexagonal rings and a paramagnetic term from the pentagonal rings. Despite of the fact that on increasing the fullerene size the number of hexagons increases, no relationship between the cluster size and enhancement of the diamagnetic contribution has been observed. Sometimes, the

paramagnetic term is strengthened by intercalated oxygen and intrinsic defects. Weak ferromagnetic behavior has been reported only in some fullerene derivatives, including C_{60} charge-transfer complexes.[67] In single-carbon nanotubes, the magnetic properties are driven, in particular, by spin polarization and ring currents surrounding the nanotube emerging if a magnetic field is applied along the tube axis.[68] Carbon nanotubes, single-walled or multiwalled show diamagnetic behavior.[69] Pristine graphene is metallic and is assumed to be nonmagnetic as a result of combination of the p-orbitals perpendicular to the graphene plane, forming an extensive π- bonding network with delocalized π-electrons.[70] However, it behaves in a magnetically ordered manner if defects such as adatoms, doping, vacancies are introduced.[70,71] The p (hole donor) and n (electron donor) character of the adatom influences the spin polarization and determines the magnitude and orientation of the net magnetic moment of the cluster around the adatom.

4.5. Chemical Reactivity

Carbon nanoallotropes are generally regarded as stable materials because of their low reactivity toward substances such as gases or acids during chemical processing. However, they do exhibit a degree of chemical reactivity and can undergo various organic reactions and modifications at their surfaces, and also in their internal spaces in certain cases. The main role of chemical modification is to modify the physicochemical properties of carbon nanoallotropes to increase their usefulness in specific applications. In addition, they have been found to form a range of noncovalent interactions with various chemical species. The

chemical reactivity of the fullerenes, particularly C_{60}, has been described extensively.[72,73] C_{60} behaves as an electron-deficient polyenic molecule with a conjugated π-system that has no boundaries. This means that its carbon atoms are connected only to other carbon atoms and have no covalent bonds to hydrogen atoms, unlike other polyenes. Their extensive π-systems allow fullerenes to participate in addition and redox reactions. Although, C_{60} is a quite stable structure, the geometric demands of its spherical shape force its C"C bonds to deviate from planarity, giving the molecule a degree of angle strain. This strain is responsible for much of its chemical reactivity. Therefore, C_{60} can participate in most organic reactions that involve sp^2 carbon atoms, such as additions of nucleophiles or radicals to C = C bonds, cycloadditions with dienes, and dimerization or polymerization processes, among others. The other carbon nanoallotropes i.e., CNTs, graphenes have similar structural elements and therefore exhibit similar chemical reactivities which can also be tuned by functionalization of CNTs,[74,75] graphenes,[76,77] have been in literature. In this review, the known procedures for the chemical functionalization of carbon nanoallotropes are categorized on the basis of the reactions involved.

4.5.1. Addition to sp^2 Carbon Atoms

Because of their many unsaturated carbon"carbon bonds, carbon nanostructures can participate in a wide range of functionalization reactions based on the addition of organic species to C = C bonds.[78] The most attractive and widely used organic species are organic free radicals[79] and dienophiles. Aryl diazonium salts are the most frequently used organic intermediates

in radical addition reactions involving CNTs[80] and graphene.[81,82] However, other radical precursors and initiators, including benzoyl peroxide[83] and tyrosine[84] have also been used. Dienophiles react readily with the sp^2 carbon atoms of C_{60}. The high reactivity of C_{60} in these processes is due to the great strain imposed on the C = C bonds due to the curvature of the spherical structure. The reactions of C_{60} are also facilitated by its high solubility in toluene. Similar strains (particularly true for SWNTs) exist for CNTs. Hoswever, the strain in CNTs is less pronounced than in C_{60}, it is still sufficient to increase the reactivity of their sp^2 carbon atoms.[73] Graphene theoretically has a planar structure, but its high surface area and minimal thickness give it locally a large number of anomalous or nonplanar domains with curvatures that impose strain on its C = C bonds. In addition, the sp^3 carbon atoms at the edges of the sheet and at defect sites weaken the aromatic character of the nearby sp^2 regions and enhance their chemical reactivity. Furthermore, the formation of a covalent bond on a graphitic surface transforms sp^2 carbon atom to one with sp^3 hybridization. As the number of sp^3 carbon atoms in the graphenic lattice is increased, the aromatic character of the surrounding C = C bonds is reduced, causing their reactivity to increase. In addition, the decoration of carbon nanostructures with organic substituents can profoundly modify their physicochemical properties, dispersibility in liquids and polymers as well as its hydrophilicity or superhydrophobicity.[85]

4.5.2. Reactions at Edges and Defect Sites.

Defects in the hexagonal lattices of graphitic nanostructures are formed during their preparation or purification

as a consequence of the strongly oxidative conditions that are often applied in these processes.[86,87] Defect sites and the open ends of tubular carbon nanostructures are usually rimmed with sp^3 carbon and oxygen containing functional groups, particularly carboxyl groups and epoxides. The reactivity of graphene oxide in particular is governed by the remarkably high concentration of such groups at its edges and defect sites. Two of the most reliable reactions involving carboxyl groups are esterification and amide bond formation. Both have been used extensively to functionalize CNTs[88-90] and graphene oxide.[91-94]

4.5.3. Noncovalent Surface Interactions

The large surface areas of graphene and the external surfaces of CNTs are ideal for the immobilization of metallic or metal oxide nanoparticles that are used in catalytic systems, supercapacitors, fuel cells, batteries, etc. The deposition of metal nanoparticles on CNTs and graphene monolayers has been reviewed extensively.[95-97] Apart from their large surface area, graphene and CNTs are excellent substrates due to their high chemical and thermal stability, electrical conductivity, and high mechanical strength. The aromatic character of graphitic nanostructures allows them to participate in π stacking interactions with aromatic molecules. Such noncovalent functionalization has the advantage of not disrupting the nanostructures' aromatic character. Functionalization produces magnetically modified CNTs which are easily dispersed in organic solvents due to the organic components of the magnetic nanoparticles. Alkali-metal and alkaline-earth-metal atoms can be intercalated into C_{60} crystals with an fcc lattice. When this happens, some of the metal's

electrons are donated to the conduction band. The combination of three alkali-metal atoms with one C_{60} molecule yields a superconducting crystalline structure.[98]

4.5.4. Internal Spaces as Nanoreactors

The internal spaces of CNTs can be regarded as nanoenvironments, provides an ideal arena for studying the physical and chemical properties of organic molecules or nanoscopic structures accommodated within them. These spaces could also potentially be used as nanoreactors that would enable the detailed study of various organic or inorganic reactions. Despite the strong interest in such nanoreactors, there have been relatively few published studies on the encapsulation and reactivity of molecules or nanostructures in CNTs because it is very difficult to manipulate the internal spaces of these nanostructures. Species that have been encapsulated inside SWNTs include C_{60}, metallofullerenes, small proteins, and simple organic molecules.[99-102] Fullerenes also have empty internal spaces that can accommodate guest molecules. However, access to these spaces is only possible during the formation of the fullerene cage, and only individual atoms, ions, or small clusters will fit. Due to the small size of the inner space of the most widely studied fullerene, C_{60}, only individual atoms or ions have been entrapped in the hollow C_{60} cage, forming so-called endohedral (metallo) fullerenes.[103]

5. Summary and Outlook

This review represents only three of the carbon nanoallotropes primarily in terms of their dimensionality (one from

each 0D, 1D and 2D) from a number of carbon nanostructures. Attempt has been made to mention the known methods for their synthesis, their chemistry, and their most important physicochemical properties. Finally, in this review, comprehensive discussions on applications individual nanoallotropes have not been described at length. However, some particularly interesting features and key applications of fullerene, nanotubes and graphene are incorporated.

Carbon is undoubtedly the element with the broadest and most diverse range of nanoallotropes.[104] Moreover, variety of structures obtained by exploiting the morphological transformations of these nanoallotropes results in diverse, extraordinary properties and exciting potential applications. However, it is worth mentioning that these nanostructures exhibit unique properties which are partly attributed to the presence of foreign elements or other functional groups. For instance, 0D carbon nanoallotropes contain some non-carbon atoms that have profound effects on their properties. Graphene often contains epoxy and carboxyl groups, mainly at their sp^3-hybridized edges. The stability, chemistry, and properties of 1D and 2D nanoallotropes are also strongly influenced by the presence of non-carbon atoms, which are generally incorporated during the synthesis of the nanoallotropes. For example, carbon nanotubes often contain traces of the metal catalysts used in their synthesis, which has important effects on their conducting/semiconducting properties.

Fullerenes have been studied extensively due to their superconductivity, which is retained at relatively high temperatures (up to 33 K) compared to that of other organic

superconductors.[105] If doped with foreign atoms, their critical temperatures can be raised even further.[106] If combined with a suitable polymer with a low band gap (e.g., one based on porphyrins), fullerene-polymer hybrids can be used to form heterojunctions for organic solar cells, light weight and low-cost energy sources with power-conversion.[107] With appropriate functionalization, they may have medical applications as antioxidants, neuroprotective agents, enzyme inhibitors, quenchers of reactive oxygen species, and antimicrobial agents and in targeted imaging.[108]

The single-walled and multi-walled carbon nanotubes might be useful for enhancing the strength of composite materials due to their very high Young's moduli and tensile strengths.[109] CNTs remarkable electrical, transport, and optical properties together with their high surface areas have increased the thirst of different groups for its applications in different dimensions such as in energy and gas storing devices,[110] building blocks of nanoelectronic, spintronic, and nanophotonic devices[111-113] drug-delivery and gene delivery systems.[114] CNTs have also expected to play significant role in environmental remediation because of their suitability to adsorb both organic and inorganic pollutants.[115]

Due to the remarkable properties of graphene and its derivatives, it is anticipated to have a very wide range of applications. In particular, its properties may enable the construction of robust lightweight, thin, and flexible display screens, field-effect and ballistic transistors, spin transistors and spin logic devices, photosensitive transistors, novel electrochromic devices (in the form of graphene oxide), transparent conducting electrodes for liquid crystal displays,

organic photovoltaic cells and organic light emitting diodes, components of optical modulators, and conductive plates in supercapacitors and lithium ion batteries.[116-125] In addition, functionalized graphene and its derivatives have promising uses in various fields of medicine, including drug/gene delivery and cancer therapy, biosensing and detection of neurotransmitters.[126-129]

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Traditional Bird Traping Methods of Assam

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Assam within North-East India is one of the most important areas in the Indian subcontinent for developing a comprehensive conservation network for avian fauna. Of all zones of India, it is perhaps the richest in communities, species and endemicity. It is also a part of global biodiversity hot spot (Myers, 1988, 1991) and one of the 'endemic bird areas' of the world (Collar et.al. 1994).

Diversified habitats and various ecological associations have significantly enriched the avian diversity in Assam with more than 950 species belonging to 302 genera and 68 families. The largest family being Sylvidae (115 species belonging to 37 genera) followed by Muscicapidae (62 species belonging to 22 genera), Accipitridae (44 species belonging to 23 genera), Corvidae (39 species belonging to 15 genera), Anatidae (29 species belonging to 14 genera), Scolopacidae (25 species belonging to 10 genera), Passeridae (23 species belonging to 7 genera), Picidae (22 species belonging to 11 genera), Columbidae and Cuculidae (18 species each belonging to 6 and 7 genera respectively), Phasianidae (18 species belonging to 11 genera)

and so on . Thus, the state represents 53.5% of the total birds species of the Indian subcontinent (Saikia, 2006).

Man has benefited himself by domesticating wild birds, such as the Red Jungle Fowl Gallus gallus, Mallard Anas platyrhynchos, Greylag Goose Anser anser, and the Blue Rock pigeon Columba livia. Various species of wild birds were hunted since times immemorial to supplement men's diet. Till today birds are killed by shooting, trapping and poisoning for human consumption. For the agriculturist, there cannot be a better friend than the birds. Because they are the most effective natural check of a variety of insects. The birds also admirably check the disease vectors such as mosquitoes and flies. The common Myna Acridotheres tristis is a known destroyer of agricultural insect-pest. The birds of prey, which are sometimes hated due to occasional loss of domestic chicken and ducklings, are also useful as they effectively control the rodents.

Hunting, trapping, poisoning and egg collecting are some of the threats to the survival of the birds. But none of these are more serious than the destruction of their habitat by man. Alternation of habitat by expansion of farming, encroachment for settlement, filling of trees, jhum cultivation of the hill tribes, draining of beels and marshes, and developmental activities such as construction of industrial units and highways, has pushed many of the common birds in to the verge of extinction. In Assam forests have disappeared at a rate of 200-250 sq.km.per year between 1972-1975 and 1980-1982 (calculated on the basis of National Remote Sensing Agency's Report, 1983). Since the later half of the last century, more than 2200 sq km. of prime habitat, mostly tropical rain forest, have been cleared for tea

plantation in Assam. In Balipara RF, Sonitpur district, c.100 out of 188 km sq.km is under encroachment and Forest Villages. Inter-state border problems often make biodiversity the worst sufferer. Almost the entire stretch of Assam-Arunachal Pradesh, Assam-Nagaland, and Assam-Meghalaya border is forested and is excellent natural habitat. Dispute over territory, confusion, break down of law-and-order and ultimately felling and encroachment in cleared and 'disputed' areas have already cost a few thousand square kilometers of prime habitat. The complete loss of once excellent forests comprising Nambor (south block), Doyang, Diphu and Rengma RF's in Golaghat district of Assam bordering Nagaland is solely due to this factor (Choudhary, 1999).

The main objective of the early hunters and trappers in killing or capturing birds was for food. To many of the present day hunters, shooting of birds is a hobby and pastime. Although birds are still eaten in large numbers, they no longer form a major supplement to diet. The handy and lightweight air rifles and air guns are widely used to shoot small and medium sized birds. For larger birds like hornbills and ducks, rifles and guns are used. The traditional techniques employed for hunting and trapping despite the accessibility to firearms still survive in many parts of Assam. Widespread traditional equipment is in the form of a catapult (slingshot). It is made up of a forked tree-branch (small and handy), rubber and a small piece of leather to hold the 'bullet', which is made of clay or small stone. One more type is akin to a bow made out of bamboo. These are very harmful weapons as more birds are maimed than killed. This is a common practice in villages and even in towns, especially with

the young men and boys. In the riverine areas of the village and also in some larger beels, a large number of wintering waterfowls including ducks and geese are caught live by using woven nets. The net is somewhat similar to the ones used while fishing. The best time is at dawn and early morning, when the air is still foggy.

Birds to primitive people were valued not only as food but also for making clothes which were perfectly insulated by the feathers to keep out the winter cold. Perhaps the best example of this today is the 'farming' of either ducks which is very much a part of Iceland's economy. The eider (Somateria mollissiama) lines its nest with a thick down plucked from its breast. During and again at the end of it, the breeding season down is harvested and used to line sleeping bags and bedding thus giving us the 'elderdown'. In some parts, these coverings have gone out of fashion, being replaced by the duvet, which is the French name for the eider. At one time, not so long ago, the feather industry almost reduced a very large number of bird species to total extinction.
There are conflicting reports regarding the origin of falconry, but it certainly did not originate as a sport. In North Korea, there are still falconers who make a living by selling birds killed by their hawks; the food is traditionally shared (however unequally) with the birds just to keep them sharp. It is reported that in Bangalore City, 28 species of native and 6 species of exotic birds are being sold. This trade was traditional and has been practiced for many generations. The birds being priced at Rs. 5 for Munias to Rs. 10,000 for Shaheen falcon. The peak

season for the trade of birds is from October to December. During this period, an average of 50 birds and in other months 25-30 birds are sold every day. Parakeets are brought partly for pests and partly for astrology use. Pigeons and Doves are sacrificed on religious and medical grounds. Doves, Munias and Mynas are also kept as pests. Farm owl for control of agricultural pests, quils, patridges and even pea fowl are used as food. In Coorg district of Karnataka, the green pigeon (Treron phoenicopters) are threatened due to killing for delicacy food.

1 Name of the Trap: PHAI

Building materials: Bamboo sticks, cane and rope (Synthetic nylon).

Specially meant for: White-Breast Waterhen (Amaurornis phoenicura).

Season: August- March.

Time: Whole day, basically during morning and evening time is the best.

Identification Characters of the Bird:

Sexes alike white forehead, dark salty grey above, silky white below, silky grey sides of breast, flanks; rufous on vent and under tail-coverts; solitary or in small parties.

Food: Insects, worms, mollusks, shoots of marsh trees.

Voice: Very noise when breeding during rains; silent during dry season.

Habitat: Reed covered marshes, ponds and tanks.

Procedure:

In this system, the small bamboo pegs are fixed firmly on the ground, preferably on the known tracks of birds. Then lassoes

made of nylon or other hard strings are placed in between the pegs. The birds are trapped by their legs.

2 Name of the trap: CHITKA

Specially meant for: Little egret (Egretta garzetta) Locally called Pani Bagali.

Season: August- March.

Time: Whole day, basically during morning and evening time is the best.

Identification Characters of the Bird:

Little egret's back is black in colour and the legs also similarly black. 65-cm. lanky snow-white marsh bird, black and yellow (breeding) yellow (non-breeding) beck.

When breeding, long fine plumes on back, usually solitary, rarely more than three or four birds scattered over a month, towering over other egrets.

Food: Small fishes, frogs, tadpoles, aquatic insects, worms, mollusks, shoots of marsh trees, crustacean.

Voice: An occasionally croak.

Habitat: Reed covered marshes, ponds and tanks, jheels, damp irrigated areas, some times tidal creeks.

Building materials and Procedure: Bamboo (about 2 feet long), cane, iron stick (about 3 feet long and rope (Synthetic nylon) and iron pins. For making the trap a Y-shaped branch is taken. The length of the branch is about 1.5 feet. A bamboo scale is fixed with both arms. Another small but sensitive scale is present under the first scale and its one end is fixed at the adjoining point of the Y. As a result, when small pressure is applied over the free end of the sensitive scale, it goes downward quickly. The free end which is laying puts under the first scale contains a

groove. A thin iron plate which is not banded easily is connected at the posterior portion of the Y. sometimes instead of iron plate bamboo stick of similar size is also used. A nylon rope about 2 to 3 feet long is also connected swing end of the iron like a lash. Then the rope is taken under the fixed scale with pulling the free end of iron in a downward position and kept in the groove of the second scale with the help of a very small object which is previously connected in the rope. The rope is again on the fixed scale and kept finally upon the sensitive scale with a ring which become loose and tighten easily. Inside the rope ring a small insect is kept for attraction the birds.

Mechanism of traping: The trap is keeping in a suitable place where birds are moving here and there for food. The captive insert trying hard and to free, when the hungry bird see the insect jumping there, immediately comes near the sensitive scale is push then the free end of the scale goes downward as a result the object which is keep in contact on the groove remove and ultimately the iron plate is going to swing. Then the loop of the rope which is keep around the insect tight automatically and bird is hanging. The whole process is completed quickly so that the bird cannot get any chance for escape. The hunter who is waiting far comes to the trap and catches the bird alive.

3 Name of the trap: FOR-ALA.

Building materials: Bamboo pole (about 1 merte long) bamboo sticks (4 Numbers.), cane and rope (Synthetic nylon).

Specially meant for: Common myna (Acridotheres tristis) Locally called Salika.

Season: August- March.

Time: Whole day, basically during morning and evening time

is the best.

Identification Characters of the Bird:

A very common bird of medium size seen almost everywhere in loose flocks or in pairs. A bird of starting family it wears a well-groomed dark brown pluage all over the body with patches of back shad on the forehead. Bill and legs are yellow with a yellow patch of featherless skin around the eye. A white patch of feather becomes prominent during flights.

Food: Omnivorous in food habit, it is a sociable bird leading a life of commensalisms with human being. Normally they feed on the ground picking up tidbits of discarded food materials and relishing insects, worms etc. in gardens, roads, open areas and house compounds, displaying no signs of fear or suspicion of man's approach.

Voice: Very noise during morning hours.

Habitat: Nests are created on branches of trees or even on housetops. Both sexes take part in nest building, incubating and feeding of the Youngs.

Procedure:

The For-ala consists of a bamboo pole and four bamboo sticks, of which one is pointed. While the three outer sticks are made sticky with gum collected and prepared from wild plants, in the central, pointed, stick one live termite is impaled as bait to attract birds, which in their attempt to catch would get stuck with the three sticks affixed with glue.

4 Name of the trap: DAUK-FAN

Specially meant for: White-Breast Waterhen (Amaurornis phoenicura).

Season: August- March.

Time: Whole day, basically during morning and evening time is the best.

Identification Characters of the Bird:

Sexes alike white forehead, dark salty grey above, silky white below, silky grey sides of breast, flanks; rufous on vent and under tail-coverts; solitary or in small parties.

Food: Insects, worms, mollusks, shoots of marsh trees.

Voice: Very noise when breeding during rains; silent during dry season.

Habitat: Reed covered marshes, ponds and tanks.

Building materials and Description of the trap: This type of trap is box like made up of bamboo, thread, cane materials etc. used for mainly to collect the Heron species alive.

This trap is box-shaped by approximately 4feet in length, 4 feet in breath and 1 foot in height. At first the frame is made by flat bamboo scales. The end of the bamboo scale is knitted with the height bearing two bamboo scales with fine cane thread. Then all the side of the box except the topmost part are matted by bamboo sticks and threads leaving just five hole on each side walls which are later utilized to trap the bird like heron with generally feed on aquatic species like fish. A special type of stick is made by the fine thread and hanged from the top of the each wall which finally camouflaged with the hole of the wall.

The topmost wall i.e., the roof of the trap is slightly convex. The roof is netted by bamboo and cane stick arranged in cross line. The cross point of the stick is later lightly stick with rough jute cores or sutli. From the inner side of the stick is a downwardly hanged thread is placed at the end of which a fresh fish is kept and it is found almost middle of the box. The fish is already

visible from the side holes of the each side walls and even from the roof of the box (trap). Now it is ready to trap the heron.
Mechanism of traping: Some birds feed on fishes. Taking this view this trap is made. Actually the herons are so hungry the fish by hook or by crook. This nature is suicidal to them. It is already mention that the hanged fish is visible from all sides of the box. The hunter of the birds by this method is so experience that they know where it will be successful. They place the trap in such a place that the heron could not imagine that actually a trap. Placing the trap in such a place the hunter watch it from a remote place. So, it looks like a no men area. When the hungry heron looks the living jumping fish inside the trap, they come near the trap and search for get to enter the trap and to eat the fish. They put their long bill and neck inside the trap. As a result the stick hole becomes smaller and smaller due to the disturbance of heron to this stick. When the disturbance gradually higher at last the neck of the heron is strangled itself. The heron start to strike her feathers and to cry. Then the hunter who is waiting from somewhere come to the trap and catch the heron alive by loosing the neck stick an watch for the second victim.
5 Name of the trap: JUTI TRAP
Specially meant for: Heron and White-Breast Water hen (Amauromis phoenicura).
Season: August- March.
Time: Whole day, basically during morning and evening time is the best.
Identification Characters of the Bird:
Sexes alike white forehead, dark salty grey above, silky white below, silky grey sides of breast, flanks; rufous on vent and

under tail-coverts; solitary or in small parties.

Food: Insects, worms, mollusks, shoots of marsh trees.

Voice: Very noise when breeding during rains; silent during dry season.

Habitat: Reed covered marshes, ponds and tanks.

Building materials and Description of the trap: This type of trap is box like made up of bamboo, thread, cane materials etc. used for mainly to collect the Heron species alive. This method of traping of bird is widely occurring in Bodo dominated areas of Barpeta District.

This trap is box-shaped by approximately 2feet in length, 1.5 feet in breath and 1 foot in height. At first the frame is made by flat bamboo scales. The end of the bamboo scale is knitted with the height bearing two bamboo scales with fine cane thread. Then all the side of the box except the topmost part are matted by bamboo sticks and threads leaving just five hole on each side walls which are later utilized to trap the bird like heron with generally

feed on aquatic species like fish. A special type of stick is made by the fine thread and hanged from the top of the each wall which finally camouflaged with the hole of the wall.

The topmost wall i.e., the roof of the trap is slightly convex. The roof is netted by bamboo and cane stick arranged in cross line. The cross point of the stick is later lightly stick with rough jute cores or sutli. From the inner side of the stick is a downwardly hanged thread is placed at the end of which a fresh fish is kept and it is found almost middle of the box. The fish is already visible from the side holes of the each side walls and even from the roof of the box (trap). Now it is ready to

trap the heron.

Mechanism of traping:

Some birds feed on fishes. Taking this view this trap is made. Actually the herons are so hungry the fish by hook or by crook. This nature is suicidal to them. It is already mention that the hanged fish is visible from all sides of the box. The hunter of the birds by this method is so experience that they know where it will be successful. They place the trap in such a place that the heron could not imagine that actually a trap. Placing the trap in such a place the hunter watch it from a remote place. So, it looks like a no men area. When the hungry heron looks the living jumping fish inside the trap, they come near the trap and search for get to enter the trap and to eat the fish. They put their long bill and neck inside the trap. As a result the stick hole becomes smaller and smaller due to the disturbance of heron to this stick. When the disturbance gradually higher at last the neck of the heron is strangled itself. The heron start to strike her feathers and to cry. Then the hunter who is waiting from somewhere come to the trap and catch the heron alive by loosing the neck stick an watch for the second victim.

6 Name of the trap: GULTI

Specially meant for: All types of small birds.

Season: All seasons of the year.

Time: Whole day, basically during morning and evening time is the best.

Building materials and Description of the trap: This type of trap is V-shaped made up of medium branch of trees, rubber, leather and some elastic threads. This trap is extensively used by the Bodo people. All types of small birds can be killed by this

trap. The trap is made up of V-shaped branch of tree both arms are about 4-5 inch in length, two 8-10 inch length and 0.5inch breath motor tube rubber and 4inch length and 1.5inch breath oval-shaped one piece of leather. At first, both rubber bands are bind tightly in each arm separately by the small elastic threads. Both oval end of the leather two whole is make. The free end of the rubber is penetrate through the leather whole and bind tightly by the elastic threads.

Mechanism of trapping: The hunter grasp the lower portion of the trap by his left hand (for the right handed person) and keep the great toe and fore finger of the right hand in the leather. When pulling the leather the length of the rubber is extended due to its elastic property. But suddenly when applied force in the leather is reduced to zero then the rubber attained its original shape and goes more onwards. The hunter used small rocks in the leather and the procedure which is mentioned previously is applied. As a result, the rock goes a head with a very high velocity towards the objects. And hit it. The successful of this trap is mainly depend upon the ability and experience of the trapper. The trap should not be defect able. If the length of the two rubber is not equal at the time of attempt then the rock does not touch the object and it will be hited the left arm.

7 Name of the trap: GHAR TRAP

Building materials: Bamboo sticks, cane and rope (Synthetic nylon), wood piece, iron stick etc.

Specially meant for: Spotted Dove (Streptopelia chinensis)

Season: August- March.

Time: Whole day, basically during morning and evening time is the best.

Identification Characters of the Bird:

Spotted dove is one of our most familiar birds seen everywhere in town and villages including also study area also. They are slime graceful birds with pointed tails. They wear brown feathers on the backs with grey tinge having slightly pinkish appearance on the frontal aspect. The hind neck bears decorative spots arranged in a haphazard manner and from this physical character this species can easily be recognized in its natural habitat.

Food: Mainly crops, insects, worms, shoots of marsh trees.
Voice: Very noise when breeding during rains; silent during dry season. The birds utter plaintive mournful calls.
Habitat: Nesting is rather a laborious job. Our Spotted doves are often seen in pairs, sparingly as a single individual and in the form of loose association.
They are encountered in scrub forests, open country, cultivated land, gardens, parks and in our house compounds. The aerial movements are accomplished by a kind of vigorous wing beats.
Procedure:
In this system, the trap is made up of bamboo frames like a triangular hut. There is an entry path guarded by special door fixed with a spring. When a bird enter to the hut then the door close automatically by spring.
8 Name of the trap: IRON TRAP (Kechi cal)
Specially meant for: White-Breast Water hen (Amaurornis phoenicura).
Season: August- March.
Time: Whole day, basically during morning and evening time is the best.

Identification Characters of the Bird:
Sexes alike white forehead, dark salty grey above, silky white below, silky grey sides of breast, flanks; rufous on vent and under tail-coverts; solitary or in small parties.
Food: Insects, worms, mollusks, shoots of marsh trees.
Voice: Very noise when breeding during rains; silent during dry season.
Habitat: Reed covered marshes, ponds and tanks.
Building materials and Description of the trap: It is an iron made trap and the use of this trap is found among the common people of the Gobordhana Block of Barpeta District. It is used for capturing White-Breast Water hen and other some common birds e.g., Heron species.

It has a round iron ring with ridges and folded only one side by the special joints and placed upon a long iron scale. The ring can be rounded or folded by adding an additional pressure upon the clip which is also on the long scale. On the long scale a special type of device is connected, consists of adjoining two small plate by which ring is keep round. It is constructed originally in the middle of the ring. When a small disturbance occurs in the plate, loath plate becomes folded.
Mechanism of trapping: The trap is placed only on such a place which is surrounded by water where chance of landing of birds is available. In the middle of the ring a fish or such type of particles is kept which can attract the victim. Except the ring the other parts of the trap is covered by the grass or leaves of trees. When the birds land on the ground and see the fish then they try to eat it and pressure applied ignorally upon the iron plate. Where fish is kept, the device disconnect and immediately

ring is folded with leg or neck portion of the bird. Thus the victim becomes captive and ultimately collected by the hunter.

9 Name of the trap: NALJARA

This is a peculiar type of trap mostly used by the Bodo and range people of this area and is made up of bamboo stick which is about 1-3 feet length. Large sized birds like kite (Milvus migrans), Shaheen Falcon, Owl and some times small birds like Dove can capture by this trap.

When a hunter see the birds which is resting on branch of tree, then he stand silently just beneath the bird and connect the stick one by one according to increasing order. At the topmost position of the stick a sharp arrow is placed, when arrow comes in contact with the bird he hit the bird through the arrow. The wounded bird does not got any change for fleet and fall down.

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Cloud Computing -An Overview

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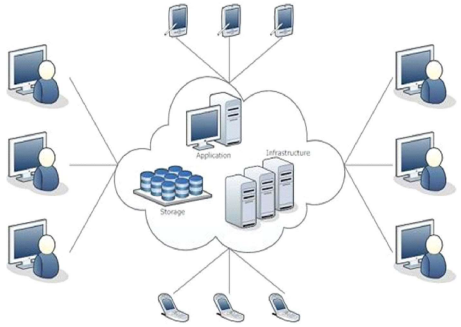
The concept of Cloud Computing came into existence in 1950 with implementation of mainframe computers, accessible via thin/static clients. Since then, cloud computing has been evolved from static clients to dynamic ones from software to services. Cloud Computing refers to manipulating, configuring, and accessing the applications online. It offers online data storage, infrastructure and application. The term Cloud refers to a Network or Internet. In other words, we can say that Cloud is something, which is present at remote location. Cloud can provide services over network, i.e., on public networks or on private networks, i.e., WAN, LAN or VPN. Applications such as e-mail, web conferencing, customer relationship management (CRM), all run in cloud.



Characteristics of Cloud Computing

Cloud computing has a variety of characteristics, with the main ones being:

- **Shared Infrastructure:-** Uses a virtualized software model, enabling the sharing of physical services, storage, and networking capabilities. The cloud infrastructure, regardless of deployment model, seeks to make the most of the available infrastructure across a number of users.
- **Dynamic Provisioning:-** Allows for the provision of services based on current demand requirements. This is done automatically using software automation, enabling the expansion and contraction of service capability, as needed. This dynamic scaling needs to be done while maintaining high levels of reliability and security.
- **Network Access:-** Needs to be accessed across the internet from a broad range of devices such as PCs, laptops, and mobile devices, using standards-based APIs (for example, ones based on HTTP). Deployments of services in the cloud include everything from using business applications to the latest application on the newest smart phones.
- **Managed Metering:-** Uses metering for managing and optimizing the service and to provide reporting and billing information. In this way, consumers are billed for services according to how much they have actually used during the billing period.

Cloud Computing Models

There are certain services and models working behind the scene making the cloud computing feasible and accessible

to end users. Following are the working models for cloud computing:

" Deployment Models

" Service Models

Deployment Models

Deploying cloud computing can differ depending on requirements, and the following four deployment models have been identified, each with specific characteristics that support the needs of the services and users of the clouds in particular ways.

" Private Cloud:- The cloud infrastructure has been deployed, and is maintained and operated for a specific organization. The operation may be in-house or with a third party on the premises.

" Community Cloud:- The cloud infrastructure is shared among a number of organizations with similar interests and requirements. This may help limit the capital expenditure costs for its establishment as the costs are shared among the organizations. The operation may be in-house or with a third party on the premises.

" Public Cloud:-The cloud infrastructure is available to the public on a commercial basis by a cloud service provider. This enables a consumer to develop and deploy a service in the cloud with very little financial outlay compared to the capital expenditure requirements normally associated with other deployment options.

" Hybrid Cloud:- The cloud infrastructure consists of a number of clouds of any type, but the clouds have the ability through their interfaces to allow data and/or applications to be

moved from one cloud to another. This can be a combination of private and public clouds that support the requirement to retain some data in an organization, and also the need to offer services in the cloud.

Service Models

Once a cloud is established, how its cloud computing services are deployed in terms of business models can differ depending on requirements. The primary service models being deployed are commonly known as:

" Software as a Service (SaaS) :- Consumers purchase the ability to access and use an application or service that is hosted in the cloud. A benchmark example of this is Salesforce.com, as discussed previously, where necessary information for the interaction between the consumer and the service is hosted as part of the service in the cloud.

" Platform as a Service (PaaS):- Consumers purchase access to the platforms, enabling them to deploy their own software and applications in the cloud. The operating systems and network access are not managed by the consumer, and there might be constraints as to which applications can be deployed.

" Infrastructure as a Service (IaaS):- Consumers control and manage the systems in terms of the operating systems, applications, storage, and network connectivity, but do not themselves control the cloud infrastructure.

Benefits of Cloud Computing

The following are some of the possible benefits for those who offer cloud computing-based services and applications:

i. Cost Savings:- Companies can reduce their capital expenditures and use operational expenditures for increasing their

computing capabilities. This is a lower barrier to entry and also requires fewer in-house IT resources to provide system support.
ii. Scalability/Flexibility:- Companies can start with a small deployment and grow to a large deployment fairly rapidly, and then scale back if necessary. Also, the flexibility of cloud computing allows companies to use extra resources at peak times, enabling them to satisfy consumer demands.
iii. Reliability:- Services using multiple redundant sites can support business continuity and disaster recovery.
iv. Maintenance:- Cloud service providers do the system maintenance, and access is through APIs that do not require application installations onto PCs, thus further reducing maintenance requirements.
v. Mobile Accessible:- Mobile workers have increased productivity due to systems accessible in an infrastructure available from anywhere.

Challenges of Cloud Computing

The following are some of the notable challenges associated with cloud computing, and although some of these may cause a slowdown when delivering more services in the cloud, most also can provide opportunities, if resolved with due care and attention in the planning stages.

" Security and Privacy:- Perhaps two of the more "hot button" issues surrounding cloud computing relate to storing and securing data, and monitoring the use of the cloud by the service providers. These issues are generally attributed to slowing the deployment of cloud services. These challenges can be addressed, for example, by storing the information internal to the organization, but allowing it to be used in the cloud. For

this to occur, though, the security mechanisms between organization and the cloud need to be robust and a Hybrid cloud could support such a deployment.

" Lack of Standards:- Clouds have documented interfaces; however, no standards are associated with these, and thus it is unlikely that most clouds will be interoperable. The Open Grid Forum is developing an Open Cloud Computing Interface to resolve this issue and the Open Cloud Consortium is working on cloud computing standards and practices. The findings of these groups will need to mature, but it is not known whether they will address the needs of the people deploying the services and the specific interfaces these services need. However, keeping up to date on the latest standards as they evolve will allow them to be leveraged, if applicable.

" Continuously Evolving:- User requirements are continuously evolving, as are the requirements for interfaces, networking, and storage. This means that a "cloud," especially a public one, does not remain static and is also continuously evolving.

" Compliance Concerns :- The Sarbanes-Oxley Act (SOX) in the US and Data Protection directives in the EU are just two among many compliance issues affecting cloud computing, based on the type of data and application for which the cloud is being used. The EU has a legislative backing for data protection across all member states, but in the US data protection is different and can vary from state to state. As with security and privacy mentioned previously, these typically result in Hybrid cloud deployment with one cloud storing the data internal to the organization.

Cloud Computing-Technologies

There are certain technologies that are working behind the cloud computing platforms making cloud computing flexible, reliable, usable. These technologies are listed below:

i. Virtualization
ii. Service-Oriented Architecture (SOA)
iii. Grid Computing
iv. Utility Computing

Virtualization

Virtualization is a technique, which allows to share single physical instance of an application or resource among multiple organizations or tenants (customers). It does so by assigning a logical name to a physical resource and providing a pointer to that physical resource when demanded.

Service-Oriented Architecture (SOA)

Service-Oriented Architecture helps to use applications as a service for other applications regardless the type of vendor, product or technology. Therefore, it is possible to exchange of data between applications of different vendors without additional programming or making changes to services.

Grid Computing

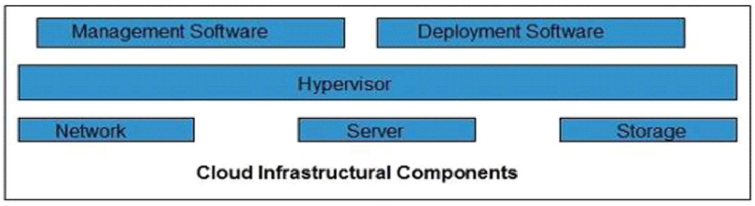
Grid Computing refers to distributed computing in which a group of computers from multiple locations are connected with each other to achieve common objective. These computer resources are heterogeneous and geographically dispersed. Grid Computing breaks complex task into smaller pieces. These smaller pieces are distributed to CPUs that reside within the grid.

Utility Computing

Utility computing is based on Pay per Use model. It offers computational resources on demand as a metered service. Cloud computing, grid computing, and managed IT services are based on the concept of utility computing.

Cloud Computing Infrastructure

Cloud infrastructure consists of servers, storage, network, management software, and deployment software and platform virtualization.



Hypervisor

Hypervisor is a firmware or low-level program that acts as a Virtual Machine Manager. It allows to share the single physical instance of cloud resources between several tenants.

Management software

Management Software helps to maintain and configure the infrastructure.

Deployment software

Deployment software helps to deploy and integrate the application on the cloud.

Network

Network is the key component of cloud infrastructure. It allows to connect cloud services over the Internet. It is also

possible to deliver network as a utility over the Internet, i.e., the consumer can customize the network route and protocol.

Server

Server helps to compute the resource sharing and offer other services such as resource allocation and deallocation, monitoring resources, security, etc.

Storage

Cloud uses distributed file system for storage purpose. If one of the storage resource fails, then it can be extracted from another one which makes cloud computing more reliable.

Mobile Cloud Computing

Cloud Computing offers such smartphones that have rich Internet media experience and require less processing, less power. In term of Mobile Cloud Computing, processing is done in cloud, data is stored in cloud. And the mobile devices serve as a media for display. Today smartphones are employed with rich cloud services by integrating applications that consume web services. These web services are deployed in cloud. There are several Smartphone operating systems available such as Google's Android, Apple's iOS, RIM BlackBerry, Symbian, and Windows Mobile Phone. Each of these platforms support third-party applications that are deployed in cloud.

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An International Year of Light and Light-based Technologies 2015

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A resolution welcoming and endorsing an International Year of Light in 2015 was adopted by the UNESCO Executive Board at its 190th session which took place at the UNESCO Headquarters in Paris from the 3rd – 18th October 2012, and by the UNESCO General Conference at its 37th session, on the 19th November, 2013.

Light science is one of the most accessible themes to promote cross-disciplinary education. Light has been a major factor in the evolution of humankind and our biosphere. People worldwide benefit from the advances in the fields of light science and applications, which help in achieving and in going beyond the United Nations Millennium Development Goals. Light-based technology, often referred to as photonics, describes a range of applications aimed at directly raising the quality of life worldwide by reducing child mortality, improving maternal health, and combating disease. Light-based technology is a major economic driver with potential to revolutionize the 21st century as electronics did in the 20th century.

Mission

The International Year of Light is a global initiative that will highlight to the citizens of the world the importance of light and optical technologies in their lives, for their futures, and for the development of society.

The International Year of Light will consist of coordinated activities on national, regional and international levels.

Activities will be planned so that people of all ages and all backgrounds from all countries enjoy and appreciate the central role of light in science and culture, and as a cross-cutting scientific discipline that can advance sustainable development.

The International Year of Light is planned for the year 2015.

Background

The International Year of Light project includes over 100 partners from over 85 countries, including scientific societies, museums, universities and other organizations. The partnership has been working since 2010 to prepare the groundwork for a coordinated series of activities throughout the world during 2015.

Motivation

Light plays a central role in human activities. On the most fundamental level through photosynthesis, light is necessary to the existence of life itself, and the many applications of light have revolutionized society through medicine, communications, entertainment and culture. Industries based

on light are major economic drivers, and light-based technologies directly respond to the needs of humankind by providing access to information, promoting sustainable development, and increasing societal health and well-being. As light becomes the key cross-cutting discipline of science and engineering in the 21st century, it is essential that the brightest young minds continue to be attracted into careers in this field.

All fields of science are based on the theories of light and its interaction with matter and light is one of the main messengers in our understanding of the Universe and the subatomic world. The history of the study of light spans centuries, and has involved virtually all the major figures of science. And it was the 20th century that saw the birth of the modern theory of light, the invention and application of lasers, the widespread deployment of photonic devices to improve society, and the full appreciation of the fundamental place that light occupies in the fabric of space and time. The spectrum of light from X-rays to infrared lasers provides technologies that underpin our lives, optical technologies have revolutionized medical diagnostics and treatment, and light and photonics are poised to become the key enabling technologies of the future.

Goals

An International Year of Light will coordinate international and national activities in order to achieve the following goals.

- Improve the public understanding of how light and light-based technologies touch the daily lives of everybody, and are central to the future development of the global society.

- Build worldwide educational capacity through activities targeted on science for young people, addressing issues of gender balance, and focusing especially on developing countries and emerging economies.
- Enhance International cooperation by acting as a central information resource for activities coordinated by learned societies, educational establishments and industry.
- Focus on particular discoveries in the nineteenth and twentieth century's that have shown the fundamental centrality of light in science.
- Highlight the importance of research both into the fundamental science of light and its applications, and promote careers in science in these fields.
- Promote the importance of lighting technology in sustainable development, and for improving quality of life in the developing world.
- Highlight and explain the intimate link between light and art and culture, enhancing the role of optical technology to preserve cultural heritage.
- Maintain these goals and achievements in the future beyond the International Year of Light.

An International Year of Light will contribute significantly to fulfilling the missions of UNESCO to the building of peace, the alleviation of poverty, to sustainable development and intercultural dialogue through education, science, culture, and communication.

Themes & Activities

Light is a subject that cuts across science and culture.

- Through biology and photosynthesis, light is at the very origin of life. The science and technology of light are essential for the future development of humankind, and in the search of solutions to solve global problems in sustainability and healthcare through international cooperation.
- Through studies in fundamental science ranging from particle physics to cosmology, light provides a window on the universe, and our efforts to understand the properties of light have led to revolutions in many different areas of science and engineering.
- An International Year of Light is not only about science and technology. Light is the means by which humanity sees itself, and the many ways that light has impacted on society have inspired art, music, literature and philosophy across the centuries.
- Light is a subject that unifies humanity. All nations and all peoples see the same Sun rise and fall on the horizon, and all cultures throughout history have expressed the same wonder at the natural beauty of light seen in effects such as the rainbow.

Science of Light

Studying the fundamental scientific properties of light has impacted widely on all fields of science, technology and engineering. From early attempts to understand the motion of stars and planets to the appreciation of the importance of light in photosynthesis, efforts to understand the nature and the characteristics of light have revolutionized nearly every field of

science. Light from the Big Bang provides us with a vision of the origin of the Universe. The spectrum of light from X-rays to infrared lasers provides technologies that underpin our lives, and the interaction of light with the human body provides valuable techniques for diagnosis, imaging and treatment in medicine. Advanced research in areas such as nanophotonics, quantum optics and ultrafast science are inspiring new fundamental discoveries and opening new scientific frontiers.

Light Technology

The science of light is applied in the technological field known as photonics, and this theme addresses the important ways that photonic devices impact on areas such as medicine, communications and energy.

Light plays a crucial role in modern life and in shrinking the modern world that is often unknown and unappreciated. Light pulses and advanced optical fiber cables form the backbone of the global internet, and satellite telephones and wireless technologies allow even the most remote areas of the world to have access to communications, information and even advanced medical care. Light Technology is essential to improve society's energy independence through devices that efficiently convert sunlight to other energy forms, and new forms of low cost green lighting. In a similar way, understanding the Earth's environment increasingly relies on optical and photonic techniques for sensing and measurement.

These examples are of course state-of-the-art feats of engineering. But at the same time, optical technologies that are simple and that have existed for centuries are tremendously

important for our daily lives! Corrective eyeglasses for improved vision are familiar to us all, and simple optical instruments such as microscopes form a cornerstone of modern medical diagnostics. This theme will describe light technology and its many applications, and will focus on how optics is placed to be a key driver of innovation in the 21st century.

Light in Nature

The wonder of light and colour is revealed spectacularly in effects such as sunsets, rainbows, halos, and shadows to cite just a few examples of the rich variety of optical phenomena which can be found in nature. This theme will raise awareness of the beauty and accessibility of science through activities that will encourage and support observation of light and colour in the Natural world. No matter where one lives and no matter what one's age, it is easy and delightful to understand Nature through light: from ice crystals near the artic to mirages in the desert to shadows in the forest to shifting images on water, the wonder and beauty of natural optics is everywhere. And of course, this theme provides a natural place to consider how observing light in nature often means turning off the lights from modern society. Whilst modern lighting provides important and crucial opportunities and advantages in improving quality of life, raising awareness of the issue of light pollution will also be an important feature of this theme.

Overall, in these days where downloading images of nature from the internet has largely replaced direct observation, activities in this theme will encourage outdoor observation in all-weathers and at all-latitudes, aiming to inspire a new

generation of scientists to open their eyes.

Smart lighting can both highlight culture and reduce light pollution.

Light and Culture

Activities in this theme will highlight the myriad ways in which light has influenced and continues to influence human culture. From the early artists and scientists of Antiquity to the development of perspective and the understanding of light and shadow during the Renaissance, to impressionism and modern artistic techniques, this theme will describe how the study of light and art is central to understanding and appreciating our cultural heritage. Describing the continuous links between light and culture throughout history will provide valuable insights into the interactions between science and art and the humanities in general.

In a contemporary context, this theme will also describe ways in which light can be used to improve our appreciation of cultural heritage in ways such as applying optical techniques to image paintings, the use of modern technology in museums to experience culture in an interactive environment, and the use of natural light and low-pollution lighting to illuminate architecture, monuments and public spaces.

This theme will provide an important bridge between science and culture and will aid in breaking down the boundaries between these fields that are becoming increasingly separated in the modern world

Cross-Cutting Themes

Ensuring that science and technology are relevant to development and sustainability is essential, and modern optical technologies can play a vital role through low carbon emission solar lighting, and in areas such as agriculture, disease prevention, and water purification.

Light is an inspiring subject in both art and science, and promoting education for young people in these fields is a natural lever towards promoting higher education and encouraging careers in multidisciplinary fields in general. Addressing gender imbalance will be an essential part of this action as well.

A particular aspect of educational activities that can highlight the complex way in which science and society develops internationally is through the history of the science of light; this has involved virtually all the major figures of science over 2000 years and from all continents. Highlighting their often unknown human stories will be an inspiring educational and outreach activity for a new generation.

Examples of Activities

Each theme will include outreach and educational activities at all levels: international, national and local. A Steering Committee will provide oversight and ensure coordination. General planning began in 2010, and detailed activity planning has been underway since 2012. The broad scope of an International Year of Light can be seen below by providing some examples of planned activities.

A Year of Pioneers

A twelve month calendar will associate each month with a particular scientist, and his or her contribution to the science of light. Classroom kits for schools will provide biographical and scientific information.

Light in the Universe

Particular celebrations will focus on the advances of 1815, 1865, 1915 and 1965 that established light's place at the centre of modern science, 200 years of the wave theory of light, 150 years of the theory of electrodynamics, 100 years of general relativity and 50 years since the discovery of the Cosmic Microwave Background will provide key scientific focal points.

A Light Day for Earth

To illustrate the unifying nature of light around the world, one particular day of the year will focus internationally on the role of light in nature, light conservation, and means of reducing light pollution. We will coordinate with existing annual events of this nature.

Bright Futures

This activity will be a yearlong program of educational activities linking specifically to careers in science. Addressing gender issues and promoting science careers for women in developing countries will be a priority.

Light for Change

The availability of inexpensive and energy-efficient

lighting can revolutionize the quality of life in the developing world. Partners will support and develop initiatives promoting lighting of this sort worldwide.

The Daily Scientist

Volunteer scientists – from PhD students to Professors – will communicate their day-to-day experiences to the public at large using social media such as blogs, Facebook, YouTube. This will place a very human face on the scientific and engineering community.

2015

The year 2015 is a natural candidate for the International Year of Light, commemorating a number of important milestones in the history of the science of light dating back 50, 100, 150, 200 years and even further.

In 1815, Fresnel published his first work introducing the theory of light as a wave and in 1865; Maxwell rigorously described the dynamic electro-magnetic theory of light. In 1915, the theory of General Relativity developed by Einstein showed how light was at the centre of the very structure of space and time. In 1965, Penzias and Wilson discovered the Cosmic Microwave Background, an electromagnetic echo of the very creation of the universe.

These discoveries changed physics profoundly when they were made, and continue to have tremendous impact on science and technology. The wave theory of light and the laws of electrodynamics have led to developments ranging from lasers and DVDs to mobile phones to wireless internet to radio

astronomy. The laws of general relativity and the study of the Cosmic Microwave Background have impacted on areas from the design of the global GPS satellite system to fundamental questions concerning the origin of the Universe.
Even more generally, the year 2015 also celebrates 1000 years since the great works on optics by the pioneering scientist Ibn Al-Haytham, and represents 400 years since the invention of the first solar powered technology through the 1615 invention of a prototype solar-driven engine.

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Alternative Medicine and Its Validity

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The term "Alternative Medicine" encompasses a wide array of health care practices, products and therapies that are distinct from practices, products and therapies used in "Conventional" or "Allopathic" medicine. Some forms of alternative medicine, such as traditional Chinese medicine and Ayurvedic medicine, have been practised for centuries, whereas others, such as electrotherapy, are more recent in origin. Every year millions of people of countries like America, China try some form of alternative medicine – practices and products that are different from those normally prescribed by the doctor. But one many wonder: Do these treatments work? Am I wasting my money? Most important, are they safe? Health experts are still trying to answer these questions. More research will hopefully shed light on the real benefits and risks of these alternative treatments.

Alternative medicine and Complementary medicine:

The treatments used by most doctors are considered conventional medicine. Alternative medicine with

complementary medicine is known as CAM, i.e., Complementary and alternative medicine which consists of a group of health care practices and products that are considered out of the mainstream.

A treatment is considered alternative if it is used instead of conventional medicine. An example would be using acupuncture as your only treatment for headache. On the other hand, non-conventional treatment is considered complementary if we use it along with conventional medicine. An example would be using acupuncture along with painkilling drugs to reduce labour pains.

Categories of treatment of Alternative medicine:

The treatment by use of alternative medicine can be categorised as follows:

- treatment by use of alternative medicine found in nature
- energy medicine
- therapies that adjust the body
- mind-body medicine
- whole medical system

Alternative medicine treatments found in nature:-

The idea that natural substances might be used as medicine is not new. Practically since the beginning of time, people have used parts of plants and animals to treat diseases. Thus, some alternative medicine treatments use substances found in nature, such as herbs, vitamins and minerals. In fact, some conventional drugs come from nature. For instance, aspirin (an analgesic and antipyretic) is derived from a substance found

in the bark of the willow tree. Now-a-days some CAM products are sold as dietary supplements. These are products taken by mouth that are intended to supplement, or add to the diet. They come in many forms, including tablets, teas and powders.

Energy medicine:-

Some alternative medicine therapies involve using different types of energy to treat illness. Some of these therapies use energies that everyone agrees exist, such as the energy field surrounding magnets. Other therapies claim to use a 'life energy' which may or may not exist. The idea of life energy therapy is that a special type of 'life energy' flows through people's bodies is common among cultures around the world. For instance, the ancient Chinese called it 'qi' (chee), whereas ancient Hindus called it 'prana' (PRAH-nuh). Also common is the idea that certain "healers" can treat illness by passing their life energy into others. They do this by holding their hands on or near a person's body. In Japan, this is known as Reiki (RAY-Kee). In Western cultures, it's called therapeutic touch, laying on of hands, or polarity therapy.

Therapies that adjust the body:-

Some alternative medicine practices involve handling, pressing, or moving parts of the body. Instances are

- chiropractic
- osteopathy
- massage

Chiropractic:- It is believed by chiropractors that the body has a natural healing ability that is controlled by the nervous system.

They also believe that if the bones in the spine are not sitting on top of each other correctly, they put pressure on nerves along the spine. This can disrupt the flow of nerve signals to parts of the body. According to this theory, if a body part does not receive its normal supply of nerve signals, it becomes diseased.

Osteopathy:- Osteopaths believe that the bones and muscles of the body need to be positioned properly so that blood and other body fluids flow as they should. This is thought to help ensure health. An osteopath will first feel the patient's body to find tense muscles and joints that do not move well. They then manipulate or work with parts of the body to relieve muscle tension and help joints move more smoothly.

Massage:- Massage therapists press, rub or move muscles and other soft tissues of the body. Most people use massage to reduce muscle soreness and tense and relieve stress and anxiety.

Mind-body medicine:- Perhaps one may notice that his or her mood can affect whether or not he or she get sick. If we feel well, we are less likely to get sick. If we feel bad, we are more likely to get sick. In fact, research has shown that mood can affect our health.

Mind-body medicine is a branch of alternative and complementary medicine that seeks to understand how your mind and body affect each other. Hence this therapy attempts to use this information to improve our health. Two examples of mind-body therapies are biofeedback and hypnosis. Biofeedback allows people to control things about their body that they ordinarily would not be able to control. These include heart rate, skin temperature and muscle tension. On the other hand, Hypnotists try to produce a mental state in which one is

more open to suggestions. To hypnotize someone, a therapist will first get them to relax and concentrate on an object. Then the therapist will tell them something such as, 'you will not feel pain when you give birth.'

Research has shown that hypnosis can be useful for:

- reducing labour pain
- reducing anxiety before medical or dental procedures
- treating tension headaches.

Whole medical systems:-

Whole medical systems are health care methods that have evolved separately from conventional Western medicine. Each medical system involves several therapies that are often used in combination. This namely includes the following:

Traditional Chinese medicine:- Traditional Chinese medicine includes:

- Chinese herbal medicine
- Acupuncture, a treatment that involves inserting thin needles into specific points on the skin.

Research has shown that acupuncture may be useful for reducing pain after dental procedures, severe vomiting that can occur during pregnancy, labour pain, pain in osteoarthritis of the knee.

Ayurveda:- Ayurveda is one of the world's oldest systems of medicine. It started in India more than 5000 years ago. Ayurveda involves many different treatments, including:

- herbal medicines
- meditation
- yoga (a system of exercises designed to help one to gain control of one's body and mind)

Research on Ayurvedic treatments is still in the early stages. But a number of Ayurvedic herbs and spices are showing promise in treating various diseases. For instance, turmeric, a spice that is often used in Ayurvedic treatments, contains a substance that may help treat Alzheimer's disease.

Homeopathy:- Homeopathy is a medical system developed in Germany in the early 1800s. It was invented by Samuel Hahnemann in the late 1700s. It is based on the idea that drugs that produce symptoms similar to those of a disease can help cure that disease. Homeopathic products contain these drugs in very small doses dissolved in water or alcohol.

A few research studies have shown homeopathic products to work for some conditions. But many experts question these results because homeopathic products contain such small doses of the active drug. More research is needed before homeopathy can be considered useful for any medical condition.

People who use Alternative medicine and why:

From statistical data it is found that alternative medicine is used more by women, people with more education and people who live in or near cities.

Research shows that 40% of women in the United States use some form of alternative medicine.

People try for alternative medicine for a variety of reasons which includes:

1. conventional medicine has not helped solve their medical problem.

2. they like the holistic approach taken by alternative medicine therapists. A holistic approach involves paying attention to all of a patient's or client's needs to help his or her regain and maintain health. These include, not just physical but also emotional, social and spiritual needs.
3. people believe that products derived from nature are healthier and safer than prescription drugs, even though they may not be.

Downsides of using alternative medicine treatments:-

We should be aware of some of the downsides of using alternative medicine treatments, such as:

- no alternative medicine treatment has been proven to work beyond a shadow of a doubt.
- some alternative medicine products, although derived from plants, can cause health problems. For instance, ephedra, a Chinese herbal product was being sold in the United States to help people lose weight and to enhance athletic performance. Because ephedra increased the risk of heart problems and stroke, the U.S. Food and Drug Administration (FDA) banned the sale of ephedra.
- some herbal products, such as black cohosh, are unsafe to use during pregnancy. The safety of many other herbal products, either during pregnancy or breast feeding has not been studied.
- some alternative medicine products interfere with how prescription drugs work. For Instance, St. John's wort, which some people take to treat depression, can interfere with the actions of drugs for treating HIV, cancer and other

diseases. It may also reduce the effectiveness of birth control pills.

Presently alternative or complementary methods of care being used in hospitals and clinics are growing in numbers. Because their significant and important support to healing. But the possible benefits of using alternative medicines as self-directed care are largely unknown, even among its proponents, and require education about how to use it. Patients or clients need to understand the importance of taking responsibility for themselves on all levels; not just physically, but emotionally, mentally and spiritually. Whether alternative medicines are used through a practitioner/doctor or in self-directed care, for that awareness of their importance should be known.

In spite of having prospects, alternative medical diagnoses and treatments are not included as science-based treatments that are taught in medical institutions where treatments are based on what is established using the scientific methods. Alternative therapies lack such scientific validation and their effectiveness is not proved. Alternative medicines are usually based on tradition, religion, and belief in supernatural energies, pseudoscience, and errors in reasoning, propaganda, superstition or fraud. The scientific community has criticized alternative medicine as being based on misleading statements, pseudoscience, anti-science or poor scientific methodology. Promoting alternative medicine has been called dangerous and unethical. Testing alternative medicine has been called a waste of scarce medical research resources. Critics want to say "there is really no such thing as alternative medicine, just medicine that works and medicine that doesn't."

Conclusion:

If anybody chooses to try an alternative medicine treatment, be sure to discuss it first with the doctor. The doctor should know whether the therapy may be helpful and is safe to try along with the patient's current treatments. Also, when it comes to alternative medical therapies, it is probably best to steser a middle course. Keep an open mind but at the same time, be sceptical.

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বহুমূত্র ৰোগ এক নীৰৱ ঘাতক

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এইবিধ ৰোগৰ বিষয়ে 2000 বছৰ আগতে ইজিপ্তত উমান পোৱা যায়। আধুনিক বিজ্ঞানে ই.াক অগ্নাশয়ৰ পৰা ক্ষৰণ হোৱা ইনছুলিন হৰমন আৰু প্রস্রাৱৰ লগত জড়িত ৰোগ বুলি অভিহিত কৰে। ভাৰতীয় আয়ুর্বেদ শাস্ত্রই (খৃঃ পূঃ 500 চনত), কাপ্পাডচিয়াৰ এৰিটাচে (2য় খৃঃ) ডায়াবেটিচ, দীন আৰু জাপানৰ বিজ্ঞানীয়ে (3য় খৃঃ) মিঠা আঠা সদৃশ প্রস্রাৱ, থমাছ উইলছনে (খৃঃ পৃঃ 500] মেলিটাছ বা মধু, মেথিউ ডৰছন (1776 খৃঃ) চেনীৰ বাবে পোৱা ৰোগ বুলি অভিহিত কৰে।[1]

জার্মান বিজ্ঞানী পল লেংগাৰ হেনছ(1869 খৃঃ)ৰ ইনাছুলিন হৰমন অৱিষ্কাৰ আৰু জার্মান চিকিৎস অস্কাৰ মিনকোৱাস্কি (1889 খৃঃ) ইনছুলিনৰ অভাৱৰ বাবে বহুমূত্র হোৱা বুলি আৱিষ্কাৰ কৰাৰ পৰিপ্রেক্ষিতত বহুমূত্র ৰোগৰ ধাৰণা, কাৰক, লক্ষণ আৰু চিকিৎসা পদ্ধতিৰ বৈপ্লৱিক পৰিৱর্তন হয়। অগ্নাশয়ৰ লেংগাৰহেনচৰ দ্বীপুঞ্জৰ বি- কোষৰ পৰা ইনছুলিন ক্ষৰণ হয়।[2]

মধুমেহ ৰোগ বিশেষজ্ঞ সকলৰ গৱেষণালব্ধ আগজাননী মতে ভাৰতবর্ষত 1965 চনৰ 19 নিযুতৰ পৰা 2025 চনত মধুমেহ ৰোগীৰ সংখ্যা হ'বগৈ 57 নিযুত। উন্নয়নশীল ৰাষ্ট্র সমূহত এই সংখ্যা হ'বগৈ 51 নিযুত (1995] ৰ পৰা 72 নিযুত (2025]¼ সমগ্র বিশ্বত 135 নিযুতৰ পৰা বৃদ্ধি হৈ 300 নিযুত হ'বগৈ। অর্থাৎ মধুমেহ ৰোগীৰ বৃদ্ধিৰ হাৰ হ'ব 133í। সেয়েহে, এইৰোগক নীৰৱ ঘাতক বুলিও কোৱা হয়।[1]

এজন সুস্থ মানুহৰ মগজুক সুস্থ কৰি ৰাখিবলৈ প্রতি ঘণ্টাত 6 গ্রাম গ্ল'কজৰ প্রয়োজন হয়। সাধাৰণতে তেজত গ্ল'কজৰ পৰিমাণ 180 মিলিগ্রামতকৈ বেছি হ'লে অতিৰিক্ত গ্ল'কজ সমূহ প্রস্রাৱৰ লগত ওলাই যায়। এই অৱস্থাক ডায়াবেটিছ মেলিটাছ

(ডি. এম.) অথবা ডিচিপ্লিন মেইনটেইনিং ৰোগ বুলি কোৱা হয়। আন কথাত অনুশাসন আৰু নিয়ম মানি চলা ৰোগ। ৰোগী আৰু চিকিৎসক সকলোৰে বাবে প্ৰযোজ্য। প্ৰস্ৰাৱৰ লগত অতিমাত্ৰা পানী ওলাই গ'লে ডায়াবেটিছ ইনচিপিডাছ বুলি কোৱা হয়। ইয়াৰ মূল কাৰণ বৃক্কৰ চেকনিত অতিৰিক্ত পানী শোষণত সহায় কৰা এণ্টিডাইউৰেটিক হৰমনৰ প্ৰভাৱ।[1]

WHO (বিশ্ব স্বাস্থ্য সংস্থা, 1985] ৰ মতে মধুমেহ ৰোগ ডায়াবেটিছ মেলিটাছক দুই ভাগত ভাগ কৰিব পাৰোঁ।(1] ইনছুলিন নির্ভৰশীল (IDDM) আৰু (2] ইনছুলিন অনির্ভৰশীল (NIDDM)। দ্বিতীয় প্ৰকাৰ ক্ষীণ বা চর্বিমুক্ত বা মেদহীন আৰু শকত বা চর্বিযুক্ত বা মেহবহুল হ'ব পাৰে। এইবোৰৰ উপৰিও অপুষ্টি সম্পৰ্কীয় বহুমূত্ৰ ৰোগ (MRDM- Malnutrition Related Diabetes Malitus) আৰু গর্ভাৱস্থাত হোৱা বহুমূত্ৰ ৰোগ (Gastation DM) এই দুই ভাগতো বিভক্ত কৰিব পাৰি।[1]

প্ৰস্ৰাৱৰ লগত অতিৰিক্ত চেনী উলিয়াই দিয়া অৱস্থাক (Glycosuria) বুলি কোৱা হয়। সুস্থ আৰু স্বাস্থ্যবান ব্যক্তিৰ তেজত গ্লু'কুজৰ পৰিমাণ 80–120 মিলিগ্ৰামû100 মিলিগ্ৰাম হোৱাটো বাঞ্ছনীয়।[1] তেজত গ্লু'কজৰ পৰিমাণ নিয়ন্ত্ৰণ কৰাত হৰমনৰ ভূমিকা বিশেষভাবে মন কৰিবলগীয়া। তেজত গ্লু'কজৰ পৰিমাণ হ্ৰাসৰ কৰাত সহায় কৰা হৰমনবিধ হ'ল ইনছুলিন বা হাইপ'গ্লাইছেমিক হৰমন। আনহাতে পিটুইটাৰীৰ পৰা ক্ষৰণ হোৱা (Glucocorticoids) বা (Mineralocorticoids) নামৰ হৰমনবিধক হাইপাৰ গ্লাইছেমিক হৰমন বুলি কোৱা হয়। অগ্নাশয়ৰ পৰা ক্ষৰণ হোৱা গ্লু'কাগন নামৰ হৰমনবিধে যকৃৎ আৰু মাংসপেষীত জমা হৈ থকা গ্লাইক'জেন নামৰ অতিৰিক্ত খাদ্য ভাঙি গ্লু'কজলৈ ৰূপান্তৰ কৰি তেজত গ্লু'কজৰ পৰিমাণ বৃদ্ধি কৰাত সহায় কৰে। প্ৰ'টিন বা চর্বীত চর্বীৰ পৰাও গ্লু'কজ তৈয়াৰ কৰাত গ্লু'কাগনে সহায় কৰে। গ্লু'ক'কৰটিকয়ডিছে যকৃতৰ গ্লাইক'জেন জমা কৰা আৰু মিনাৰেল'কৰটিকয়ডিছে বৃক্কত NaCl আৰু পানী পুনঃশোষণত ব্যৱহাৰ কৰা হয়।[2] এণ্টিডাইইউৰেকটিল হৰমনবিধে বৃক্কৰ পানী পুনঃশোষণত সহায় কৰে আৰু আন সংক্ৰামক ৰোগ সঘনাই হোৱা, যৌন দূর্বলতা আৰু যৌন অক্ষমতা হোৱা, অজীর্নতা, মহিলাৰ প্ৰসাৱৰ ৰাস্তাৰ খজুৱতি, পুৰুষ লিংগ বগা হোৱা, বা ফাটি যোৱা বা কঠিন হোৱা, ভৰি আৰু হাতৰ আঙুলি সঘনাই জিন জিন কৰা, সঘনাই দৃষ্টি শক্তিৰ পৰিবর্তন, চকুত আগতিয়া ছানি পৰা, দাঁতৰ মাৰিত ঘা হোৱা, যিকোনো আঘাত বা ঘা পলমকৈ শুকোৱা, বিষ ফোঁহা সঘনাই হোৱা, ভৰিত আলচাৰ বা গেংৰিন হোৱা, ভৰিৰ আঙুলিত

সঘনাই ভেকুঁৰৰ দ্বাৰা আক্রান্তহৈ পুঁজ জমা বা ঘা হোৱা, উচ্চ ৰক্ত চাপ হোৱা, ভৰিৰ তলুৱাত ঘা হোৱা, ভৰি ফুলা, ভৰিৰ সন্ধিত বিষ হোৱা (নিউৰপেথি), ভৰি আৰু ভৰিৰ তলুৱা চেতনা হেৰুৱা, মুখনণ্ডল ঘামি যোৱা, নপুংশতা, হাতভৰি অত্যধিক ঠাণ্ডা হোৱা আদি বিশেষ ভাৰে মন কৰিব লগিয়া।

বহুমূত্র ৰোগীয়ে খাদ্য ধৰণ, খাদ্যৰ প্রকাৰ আৰু খাদ্যৰ নিয়মিতভাৰে নিয়ন্ত্রন কৰাটো ্তিপ্রয়েজন। সধূমেহৰ তীব্রতা আৰু প্রকাৰৰ ওপৰত নির্ভৰ কৰি এই মাত্রা নিদ্ধাৰণ কৰা হয়। অভিজ্ঞ চিকিৎসকৰ বা বিশেষজ্ঞৰ পৰামর্শনুযায়ী খাদ্য তালিকা নির্দ্ধাৰণ কৰিব লাগে। সাধাৰণতে সেউজীয়া শাক-পাচলি, গমজাত খাদ্য, দাইল, ফলমূল আদি খাব দিয়া হয়। নির্দ্ধাৰিত পৰিমাষৰ মৌছমী, কমলা টেঙা, বৰাৰ টেঙা, কলাজামু আৰু কলাজামুৰ গুটিৰ গুড়ি, মধুৰি আম, আপেল, নাচপতি, তৰমূজ আদি ডাক্তৰৰ পৰামর্শমতে খাব দিয়া হয়। আঙুৰ, কল, আম, পকা অমিতা, কঠাল আদি নোখোৱা টোৰে মধুমেহ নির্মাণৰ শ্রেয় উপায় তদুপৰি যিকোনো ফলৰ ৰসৰ সলনি গেটা কৈয়ে খাব লাগে। মিঠাই জাতীয় খাদ্য যেনে, ৰসগোল্লা, সন্দেচ, বৰফি, খীৰ, লাৰু আদিৰ পৰা আতৰত থকাটোয়ে মংগসজনক। একেদৰে অতি ঠাণ্ডা বা আতি গৰম খাদ্য, উকা আৰু তৈলাক্ত খাদ্য পাপৰ, ভূজিয়া বা নেমুটেঙাৰ ৰসস থাণ্ডাপানী, কেচা শাক-পাচলিৰ চালাড, চেনী বিহীন ৰঙা চাহ, শর্কৰা বিহীন খালী কফি, পিয়াজ, নহৰু আদি খোৱা অতি দৰকাৰ । নিচাজাতীয় দ্রব্য সেৱন আৰু ধূমপানো সম্পূর্ণৰূপে বর্জন কৰিব লাগে।

বহুমূত্র ৰোগীয়ে হাইপগ্রাই ছিমিয়া (তেজত চেনীৰ পৰিমাণ কমি যোৱা)ত ভুগি আকস্মিক মৃদ্যুমুখত পৰে নাইবা অজ্ঞানহৈ পৰে। এনে অৱস্থাত চেনী বা গ্লুকজ সেৱন কৰা অতিপ্রয়োজন। ভ্রমণৰ সময়ত বহুমূত্র ৰোগীয়ে ডাক্তৰৰ পৰামর্শমতে প্রয়োজনীয় ঔষথ আৰু আনু সঙ্গিঁক আদি লগত ৰাখিব লাগে। আকাশী জাহাজত ভ্রমণ কৰা মধূমেহ হোগী বিশেষভাৰে সজাগ হোৱা দৰকাৰ। মধূমেহ ৰোগী অতিক্রম যুক্ত চাকৰিত মকৰল হোৱাৰ পৰা বিৰত থাকিব লাগে। গাড়ী চলোৱা বহুমূত্র ৰোগীৰ বাবে আটাইতকৈ বিপদজনক। কাৰণ হাইপগ্লাইছিমিয়াত আক্রান্তহৈ হঠাতে অচেতন হোৱা নাইবা হৃদৰোগত আক্রান্ত হোৱা বা দৃষ্টিত বেমেজালিহৈ দূর্ঘটনাত পতিত হোৱা প্রায় দেখা পোৱা যায়। সেয়েহে গাড়ী চলোৱাৰ সময়ত গ্লুকজ লগত ৰখা আৰু দুশ্চিন্তাৰ পৰা মুক্ত থকাও বাঞ্ছনীয়।

বহুমূত্র ৰোগীয়ে প্রায়ে হাইপাৰ টেনচনত আক্রান্ত হোৱা দেখা যায়। এনে ৰোগীৰ ৰক্তচাপ 140ûþ90 মিমি. Hg(ছিষ্টলûþজয়াচটল)ৰ ওপৰত থাকে। অর্থাৎ

উচ্চ ৰক্তচাপত ভূগে। যাঠি বছৰ বয়সৰ উৰ্দ্ধত বৃদ্ধ ব্যক্তি, চৰ্বীযুক্ত আহাৰ বেছিকৈ খোৱা ব্যক্তি, মেদবহুল ব্যক্তি, অতিমাত্রা মদ্যপান কৰা ব্যক্তি, নিদ্রাহীনতাত ভোগা ব্যক্তি অতিমাত্রা নিমখ খোৱা কমকৈ শ্রম কৰা ব্যক্তি, অত্যন্ত ৰাম প্রীয় (বিলাসী) ব্যক্তি আদিৰ উচ্চ ৰক্তচাপ বেছিকৈ হোৱা দেখা যায়। হাইপাৰটেনচন ৰোগীৰ প্রধান সক্ষণ সমূহ হল - বৃক্কৰ সমস্যা, ধমনী বা উপধমনী সমূহ টান হোৱা বা স্থিতিস্থাপকতা হেৰুৱা, বুকুৰ বিষয ঘনকৈ উশাহ লো ৰা, মূৰৰবিষ, মূৰ ঘূৰণি, পিঠি বা পেটৰ বিষ, বমিভাৰ, চকুৰে ধোৱা দেখা আদি। বংশগত কাৰণতেও উচ্চ ৰক্তচাপ হব পাৰে। নিয়মিত যোগ অভ্যাস, সহজ সৰল জীৱন যাপন, আৰু নিয়মিত স্বাস্থ্য পৰীক্ষাৰ দ্বাৰা হাইপাৰ টেনচনৰ পৰা হাতসাৰি থাকিব পাৰি।

ঘৰুৱা পদ্ধতি বা প্রচলিত চিকিৎসাৰেও বহুমূত্র ৰোগৰ পৰা আৰোগ্য লাভ কৰিব পাৰি। এইবোৰৰ ঙিতৰত কলা জামুৰ ফল আৰু গুটিৰ গুড়ি, নিমপাতৰ ৰস আৰু গুঠিৰ গুড়ি, মেথি গুটি, মৰাপাটৰ পাত, অর্জুন গছৰ পাত, কেশৰ আলু, শিমলূ আলু, শিমলূ গছৰ পাত, কেশৰ আলু, শিমলূ আলু, শিমলূ গছৰ শিপা, খেজুৰ গছৰ শিপা, বৰগছৰ ফল, তিতা কেৰেলা, ঢ়েকীয়া শাক, শান্ত আৰু ইছব গোল আদি ব্যৱহাৰ কৰিলে যথেষ্ট সুফল পোৱা যায়।

হাইপাৰটেনচন বা উচ্চ ৰক্তচাপ, মধুমেহ আৰু Strokeৰ নিবিড় সম্পর্ক আছে। ভাৰতবর্ষত ICMRৰ তথ্যানুযায়ী 2004 চনত 9.3 লাখ Stroke ৰোগীৰ ভিতৰত 6.4 লাখ ৰোগীয়ে মৃত্যুবৰণ কৰে। মৃত্যুবৰণ কৰা নাইবা আক্রান্ত বেছিভাগ ৰোগীয়ে 45 বছৰৰ অনুর্দ্ধৰ। সমীক্ষানুযায়ী 2015 চনৰ ভিতৰত ভাৰতবর্ষত Stroke ৰোগীৰ সংখ্যা হ'বগৈ 1.6 নিযুত। একেদৰে WHOৰ প্রতিবেদন মতে 2050 চনৰ ভিতৰত বিশ্বৰ 80i Stroke ৰোগীৰ কেবল উন্নয়নশীল ৰাষ্ট্র বিশেষকৈ ভাৰতবর্ষ আৰু চীনতেই হ'ব। স্মর্তব্য যে উচ্চ ৰক্তচাপ Stroke ৰোগীৰ এটা অন্যতম কাৰণ[5]। মস্তিস্কত ৰক্তক্ষৰণ হৈ নাইবা মস্তিস্কৰ ৰক্তবাহী নলীকাত বন্ধ হৈ Stroke হয়। এই দুই বিধক যথাক্রমে হিমৰহেজ ষ্ট্রক আৰু ইচখিমিক ষ্ট্রক বুলি কোৱা হয়। অসমত 2000 চনত প্রতি 1 লাখত 108 জন আৰু 2015 চনত প্রতি 1 লাখত 248 জন ৰোগী ষ্ট্রকত আক্রান্ত হয়। ভাৰতবর্ষত 2015 চনত ষ্ট্রক ৰোগীৰ সংখ্যা হ'বগৈ 1,667,372জন[6]।

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জৈৱবৈচিত্র্য সংৰক্ষণৰ তাৎপর্য

হানিফ মোস্তাক আহমেদ
নৱজ্যোতি কলেজ, কলগাছিয়া

জৈৱবৈচিত্র্য হ'ল জীৱ সম্প্রদায়ৰ ভিন্নতা বা পৰিবর্ত্তনশীলতা, যি প্রাকৃতিক বাসস্থানৰ লগত ওতঃপ্রতভাবে জড়িত। বায়'ডাইভাৰছিটি বা জৈৱবৈচিত্র্য কথাষাৰ অক্ষৰিক অর্থত বিবেচনা কৰিলে ইয়াৰ অর্থ হয় কোনো ঠাইৰ জীৱৰ বিচিত্রতা। অর্থাৎ কোনো ঠাইৰ জৈৱবৈচিত্র্য বুলিলে সেই ঠাইৰ প্রাণৰ প্রাচুর্য্যৰ সলনি সেই ঠাইত কিমান ধৰণৰ প্রাণী আছে সেই সংখ্যাটোকহে বুজায়। প্রকৃতিত জীৱকুলৰ তিনি প্রকাৰ বৈচিত্রতা দেখিবলৈ পোৱা যায়, জিনীয় বৈচিত্রতা, প্রজাতীয় বৈচিত্রতা আৰু বাস্তব্য তন্ত্র বৈচিত্রতা। জিনীয় বৈচিত্র্যতাই পৰিৱর্ত্তিত পৰিৱেশত জীৱক জীয়াই থকাৰ ক্ষমতা প্রদান কৰে। প্রজাতি বিচিত্রতাই প্রকৃতিত এককোষীয় বেক্টেৰীয়া, ভাইৰাছৰ পৰা আৰম্ভ কৰি বহুকোষী অতিকায় তিমি মাছলৈকে বুজায়। বাস্তব্য তন্ত্র বৈচিত্র্যতাই বিভিন্ন পৰিৱেশ আৰু জৈৱভৌগলিক পৰিৱেশত বসবাস কৰা জীৱৰ ভিন্নতাক বুজায়।

প্রকৃতিৰ জৈৱ বৈচিত্র্যই মানৰ জীৱনত তাপর্য্যপূর্ণ ভূমিকা পালন কৰে। মানুহৰ দৈনন্দিন জীৱনত প্রয়োজনীয় খাদ্য, ইন্ধন, খৰি, কাঠ, পশুখাদ্য, ঔষধ আদি প্রত্যক্ষ ভাবে জৈৱবৈচিত্র্যৰ পৰা আহে। সমীক্ষাৰ পৰা জনা গৈছে যে, বর্ত্তমান মানৰ সমাজে ব্যৱহাৰ কৰা মুঠ ঔষধৰ ২৫ শতাংশ জৈৱবৈচিত্রৰ পৰা অর্থাৎ ক্রান্তিয় অঞ্চলৰ উদ্ভিদকুলৰ পৰা আহৰণ কৰা

হয়। তৃণভোজী জীৱ উদ্ভিদকূলৰ ওপৰতে নির্ভৰশীল। পশুৰ মাংস মানৱ সমাজৰ বাবে প্রটিনৰ এক প্রধান উৎস। জৈৱবৈচিত্র্যই কৃষি উৎপাদন বৃদ্ধিত অৰিহণা যোগাই আহিছে। ৰোগ প্রতিৰোধী শস্যৰ জাত উদ্ভাৱনত সহায়ক হৈছে। ১৯৭০ ৰ দশকৰ আৰম্ভণীতে ভাইৰাছৰ দ্বাৰা আক্রান্ত হৈ গ্রাছী ষ্টাণ্ট নামৰ মহামাৰীত এছিয়াৰ ১৬০,০০০ হেক্টৰ ভূমিৰ ধান নষ্ট হৈছিল, তেতিয়া মধ্য এছিয়াত পোৱা অৰাইজা নিভাৰা নামৰ বনজ ধানৰ পৰা প্রতিৰোধী জিন আহৰণ কৰি সেই সমস্যাৰ সমাধা কৰা হৈছিল। অৰাইজা নিভাৰাই হ'ল গ্রাছী ষ্টাণ্ট ব্যাধি প্রতিৰোধী একমাত্র জিনীয় উৎস। জৈৱবৈচিত্র্যই জলজ সম্পদৰ প্রতিৰক্ষাত বিশেষ ভূমিকা পালন কৰে। জলাশয় আৰু তাৰ আশে-পাশে উৎপন্ন হোৱা উদ্ভিদ সমূহে জলচক্র নিয়মিয়া কৰি ৰাখে, ভূমিক্ষয় ৰোধ কৰে, প্রাকৃতিক দুর্যোগ প্রতিৰোধ কৰে, মৰুকৰণ আৰু বান পানী প্রতিৰোধ কৰি প্রকৃতিৰ পৰিৱেশৰ ভাৰসাম্য ৰক্ষা কৰে। উপকূলীয় অঞ্চলত হোৱা অৰণ্যই প্রাকৃতিক দুর্যোগ ঘূর্ণীবতাহ আৰু ছুনামী প্রতিৰোধ কৰে, ভূমি গঠনত সহায় কৰে, মাটিত পোষক দ্রব্য সমতা ৰক্ষা কৰে।

জৈৱবৈচিত্র্যই পৰিৱেশ প্রদূষণ নিয়ন্ত্রণত বিশেষ ভাবে সহায় কৰে। বহুবিধ প্রদূষকৰ শোষণ আৰু ধ্বংসকৰাত জৈৱবৈচিত্র্যই বিশেষ ভূমিকা পালন কৰে। ছদবাহাৰ নামৰ উদ্ভিদে বিস্ফোৰক দ্রব্য টি,এন, টি, কো ধ্বংস কৰিব পাৰে। বিষাক্ত আৱর্জনা দুৰীকৰণৰ বাবে বহু কেইটা প্রজাতিৰ ভেঁকুৰ কার্য্যকৰী বুলি প্রমাণিত হৈছে। গধূৰ ধাতুযুক্ত মাটিত কিছুমান উদ্ভিদ বিশেষ ভাবে বাঢ়ি আহে বুলি জনা গৈছে। কিছুমান উদ্ভিদে বিষাক্ত ধাতু কপাৰ, নিকেল, কেড্‌মিয়াম, ক্রমিয়াম, কোবাল্ট আৰু মার্কাৰী শোষণ কৰিব পাৰে। সেয়ে সেইবোৰক প্রদূষিত ভূমিত ৰোপণ কৰিলে বিষাক্ত পদার্থ নাইকিয়া কৰিব পাৰে। ভাৰতীয় সৰিয়ই মাটিৰ পৰা কেড্‌মিয়াম আৰু ক্র'মিয়াম শোষণ কৰিব পাৰে। লেম্‌না মাইন'ৰ, এজলা পিনাটা আদিয়ে দুষিত পানীৰ পৰা কপাৰ, কেড্‌মিয়াম, আয়ৰণ আৰু মার্কাৰী আঁতৰাব পাৰে।

অৰণ্যৰ বিভিন্ন প্রজাতিৰ উদ্ভিদকূলে বায়ুমণ্ডলৰ পৰা কার্বন ডাই

অক্সাইড শোষণ কৰে। কার্বন ডাই অক্সাইডে সেউজ গৃহ গেছ হিচাপে গোলকীয় উষ্ণতা বঢ়ায়, গতিকে অৰণ্যই কার্বন ডাই অক্সাইড শোষণ কৰি গোলকীয় উষ্ণতাৰ বৃদ্ধিত বাধা প্রদান কৰে।

জৈৱবৈচিত্র্যৰ উদ্ভিদ আৰু প্রাণীকূলে খাদ্য শৃংখল আৰু খাদ্যজালৰ দ্বাৰা বাস্তব্যতন্ত্রৰ ভাৰসাম্য ৰক্ষা কৰে। বাস্তব্য তন্ত্রত এটা প্রজাতিৰ বিলুপ্তিয়ে আনটো প্রজাতিৰ ক্ষতি সাধন কৰে, তাৰ ফলত বাস্তব্য তন্ত্র ভংগুৰহৈ পৰে।

জৈৱ বৈচিত্র্যৰ দিশৰ পৰা বিবেচনা কৰিলে বিশ্বৰ মুঠ মাটি কালি ২.৪ শতাংশৰে গঠিত ভাৰতবর্ষই বিশ্বৰ জৈৱবৈচিত্র্যৰ ৮ শতাংশ অৱদান যোগাইছে। সেয়ে ভাৰতবর্ষ বিশ্বৰ ১২ টা বৃহৎ জৈৱবৈচিত্রপূর্ণ অঞ্চলৰ ভিতৰত এটা। বৈচিত্র্যময় ভৌগলিক আৰু জলবায়ু বিশিষ্ট ভাৰতবর্ষই ৪৫,০০০ উদ্ভিদ প্রজাতিৰে বিশ্বৰ জৈৱবৈচিত্র ৮ শতাংশ আৰু ৮০,০০০ প্রাণী প্রজাতিৰে বিশ্বৰ মুঠ প্রজাতিৰ ৭ শতাংশ অৱদান যোগাইছে, তাৰে ভিতৰত ৩৩ শতাংশ উদ্ভিদ আৰু ৬২ শতাংশ প্রাণী প্রজাতি ভাৰতবর্ষৰ বাহিৰে বিশ্বৰ আন কোনো ঠাইত পোৱা নেযায়। সপুষ্পক উদ্ভিদৰ এক তৃতীয়াংশ মাত্র ভাৰতবর্ষতেই পোৱা যায়। ৪৫,০০০ হাজাৰ উদ্ভিদ প্রজাতিৰ ২০,০০০ ভেঁকুৰ, ৫০০০ প্রজাতি শেলুৰে, ১৬০০ প্রজাতিৰ আৰোহী, ২৭০০ প্রজাতিৰ সমাংগদেহী, ৬০০ প্রজাতিৰ ঢেকীয়া আৰু ১৫০০ প্রজাতিৰ সপুষ্পক উদ্ভিদ চিনাক্তকৰণ কৰা হৈছে। বিশ্বত পোৱা মুঠ সপুষ্পক উদ্ভিদৰ ১৫ শতাংশ ভাৰতবর্ষত পোৱা যায়। আমাৰ দেশত প্রথাগত ভাবে কর্ষন কৰা ধানৰ আৰু অন্যান্য শস্যৰ প্রজাতি প্রায় ৩০,০০০ - ৫০,০০০ আছে বুলি ঠাৱৰ কৰা হৈছে। কৃষি শস্যৰ বিভিন্নতা পশ্চিম ঘাট পূর্ব ঘাট, হিমালয়ৰ পাদদেশ আৰু উত্তৰ পূর্বাঞ্চলৰ পাহাৰীয়া অঞ্চল বিলাকত আটাইতকৈ বেছি।

ভাৰতবর্ষ হ'ল ৬৭,০০০ প্রজাতিৰ কীট-পতঙ্গৰ আবাস ভূমি। এই কীট প্রজাতি বিলাকৰ ভিতৰত ১৩,০০০ পখিলা, ৪,০০০ খোলাধাৰী, ৬,৫০০ অমেৰুদণ্ডী, ২,০০০ প্রজাতিৰ মাছ, ১,২০০ প্রজাতিৰ চৰাই, ৫৪০ প্রজাতিৰ সৰীসৃপ, ২০০ প্রজাতিৰ উভচৰ প্রাণী, ৫০০ প্রজাতিৰ স্তন্যপায়ী

প্রাণী পোৱা যায়। তাৰে ৬২ শতাংশ উভচৰ আৰু ৩২ শতাংশ সৰীসৃপ মাত্ৰ ভাৰতবৰ্ষতেই পোৱা যায়। জেঠি জাতীয় প্রাণীৰ ১৫৩ টা প্রজাতিৰ ৫০ টা মাত্ৰ ভাৰতবৰ্ষতে পোৱা যায়। বৃহৎ আকাৰ প্রাণীৰ ভিতৰত ৭৯ টা প্রজাতিৰ স্তন্যপায়ী , ৪৪ টা চৰাই প্রজাতি, ১৫ টা সৰীসৃপ, ৩ টা উভচৰ প্রাণীৰ প্রজাতি বৰ্ত্তমান সংকটাপূৰ্ণ অৱস্থাত উপনিত হৈছে আৰু উদ্ভিদ কুলৰ ভিতৰত ১,৫০০ প্রজাতিৰ বিলুপ্তি আসন্ন বুলি কোৱা হৈছে।

ভাৰতীয় উপমহাদেশে বিশ্বৰ জৈৱবৈচিত্রলৈ ৩২০ টা প্রাণী প্রজাতিৰ অৱদান যোগাইছে, যিবিলাকৰ উৎপত্তি স্থল ভাৰতীয় উপমহাদেশ। ঘৰচীয়া জন্তুৰ ভিতৰত ২৭ জাতৰ গৰু, ৪০ জাতৰ ভেঁৰা, ২২ প্রকাৰ ছাগলি আৰু মহৰ ৪ টা জাত আমাৰ দেশত পোৱা যায়। কিন্তু উন্নত জাতৰ আমদানিকৃত পশু ধনৰ আগমনত থলুৱা জাত সমূহ বৰ্ত্তমান সংকটৰ সন্মুখীন হৈছে। জার্ছী আৰু হ'লষ্টেইন জাতৰ গৰুৰ আগমনত থলুৱা গৰুৰ চাহিদা বহু পৰিমাণে পৰি আহিছে আৰু জাত সমূহ নোহোৱা হোৱাৰ পথত আগবাঢ়িছে। ভাৰতবৰ্ষই বিশ্ব জৈৱবৈচিত্রলৈ ১৬৭ প্রজাতিৰ কৃষিজাত উদ্ভিদ আৰু সিঁহতৰ ওচৰ সম্পৰ্কীয় ৩২০ প্রজাতিৰ বনৰীয়া উদ্ভিদৰ অৱদান যোগাইছে। ধান, কুঁহিয়াৰ, মৰাপাট, কঠাল, আদা, হালধি, জালুক, বাঁহ, উট, মিথুন আৰু মহৰ উৎপত্তিস্থল হ'ল ভাৰতবৰ্ষ।

বাস্তৱ্যতন্ত্রৰ দিশৰ পৰা ভাৰতবৰ্ষ অতি চহকী, ভাৰতবৰ্ষৰ ওৱাইল্ড লাইফ ইন্ছটিটিউটৰ মতে দেশত জৈৰ ভৌগলিক অঞ্চল ট্রেন্স হিমালয়, হিমালয়, মৰুভূমি অঞ্চল, অৰ্দ্ধশুষ্ক অঞ্চল, পশ্চিমঘাট, দাক্ষিণাত্য, গংগা অৱবাহিকা, উত্তৰ পূব ভাৰত, দ্বীপ সমূহ আৰু উপকূলীয় অঞ্চল আদি দহটা জৈৰ ভৌগলিক অঞ্চল আছে। উত্তৰ পূৰ্বাঞ্চল, পশ্চিমঘাট- পশ্চিম আৰু উত্তৰ পশ্চিম হিমালয় অঞ্চল থলুৱা প্রজাতিৰে চহকী। আন্দামান আৰু নিকোবৰ দ্বীপপুঞ্জত ২০০ বিধ এনে প্রজাতি পোৱা যায় যিবিলাক পৃথিৱীৰ অইন কোনো ঠাইত পাবলৈ নাই। বিশ্বৰ ১৮ টা জৈৰ বৈচিত্র চহকী অঞ্চল যাক- হট স্পট বোলা হয়, তাৰে দুটা পশ্চিম ঘাট আৰু পূৰ্ব হিমালয় অঞ্চল

আমাৰ দেশত আছে। আন্দামান নিকোবৰ দ্বীপপুঞ্জত ২,২০০ টা সপুষ্পক উদ্ভিদ আৰু ১২০ টা লতা জাতীয় উদ্ভিদ পোৱা যায়। ভাৰতবর্ষত পোৱা ১৩৫ টা স্তলচৰ স্তন্যপায়ী পানীৰ ৮৫ টা উত্তৰ পূর্বাঞ্চলত পোৱা যায় আৰু এই অঞ্চলত ১,৫০০ টা থলুৱা উদ্ভিদ প্রজাতি আছে। সৰীসৃপ জাতীয় প্রাণীৰ ভিতৰত সাপৰ বেছিভাগ প্রজাতিৰ লগতে ১,৫০০ বিধ থলুৱা উদ্ভিদ পশ্চিম ঘাটত পোৱা যায়। আন্দামান নিকোবৰ, লক্ষাদ্বীপ, গুজৰাট আৰু তালিমনাড়ুৰ উপকুলীয় অঞ্চল পোৱাল পোকৰ বাবে চহকী।

কিন্তু আমাৰ দেশৰ এই বিশাল জৈৱবৈচিত্র্য দ্রুত জনসংখ্যা বৃদ্ধি, প্রাকৃতিক সম্পদৰ অবাধ আহৰণ, বননী, কৃষি আৰু মীন পালনত বাহিৰা প্রজাতিৰ অর্ন্তভুক্তি, পৰিৱেশ আৰু বাস্তব্য তন্ত্রৰ সমতা ৰক্ষা কৰিব নোৱাৰ চৰকাৰী নীতি, প্রাকৃতিক সম্পদৰ অসম মালিকানা, সংৰক্ষণ- ব্যৱহাৰৰ পৰা হোৱা লাভালাভৰ মোল বুজাত ব্যর্থতা, তাকৰীয়া তথ্য সংগ্রহ আৰু জ্ঞানৰ অভাৱ, জৈৱবৈচিত্র্য সংৰক্ষণত সহায়ক নোহোৱা প্রতিষ্ঠানিক আৰু বিধি ব্যৱস্থাৰ বাবে দেশৰ জৈৱবৈচিত্র ক্রমান্বয়ে ধ্বংস গৰাহলৈ আগবাঢ়িছে।

ভাৰতবর্ষৰ নিচিনা জৈৱবৈচিত্র্য সমৃদ্ধ উন্নয়নশীল দেশত দ্রুতহাৰত বাঢ়ি অহা জনসংখ্যাই জৈৱিক সম্পদৰাজিৰ ওপৰত প্রবল চাপ পেলাইছে। জৈৱিক সম্পদৰ অৱহমান আহৰণ আৰু ব্যৱহাৰে জৈৱবৈচিত্রৰ ওপৰত বিৰূপ প্রভাব পেলাইছে আৰু দেশৰ জৈৱ সম্পদক অৱক্ষয়ৰ গৰাহলৈ ঠেলি দিছে। তাৰোপৰি বাহিৰৰ পৰা আমদানীকৃত প্রজাতিৰ প্রভাৱতো থলুৱা জৈৱবৈচিত্র বিশেষ ভাবে ক্ষতিগ্রস্থ হৈছে।

গতিকে বর্ত্তমান আমাৰ দেশৰ জৈৱবৈচিত্র্যৰ সংৰক্ষণ মাত্র, খাদ্য, ইন্ধন, কাঠ, ঔষধ আৰু পশুখাদ্যৰ চাহিদা পূৰণৰ বাবেই নহয়, কৃষি উৎপাদন বৃদ্ধি, বাস্তব্য তন্ত্রৰ সমতা ৰক্ষা, পৰিৱেশ প্রদূষণ নিয়ন্ত্রণ আৰু প্রাকৃতিক দুর্যোগ প্রতিৰোধৰ বাবে ও প্রয়োজন। আহক আমি জৈৱ বৈচিত্র্য সংৰক্ষণ কৰি দেশবাসীৰ ভৱিষ্যৎ সুৰক্ষিত কৰো।

হৃদৰোগ, কাৰণ আৰু প্ৰতিকাৰ

শামচুল আলম
সহকাৰী অধ্যাপক, প্ৰাণীবিদ্যা বিভাগ,
নৱজ্যোতি মহাবিদ্যালয়, কলগাছিয়া

হৃৎপিণ্ড আৰু ৰক্তবাহী ধমনি, সিৰা আৰু কৈশিক জালিকা সম্পৰ্কিত ৰোগ হ'ল হৃদৰোগ। প্ৰধানত হৃদসংবহন তন্ত্ৰ, মস্তিষ্ক, বৃক্ক আৰু প্ৰান্তীয় ধমনি সম্পৰ্কিত ৰোগক হৃদৰোগ বোলে। এই ৰোগৰ কাৰণ অনেক থাকিব পাৰে যদিও উচ্চ ৰক্তচাপ আৰু এথেৰ'স্ক্লেৰোছিছ প্ৰধান। ইয়াৰ লগতে, বয়সৰ লগত হৃদৰোগৰ বাবে যথেষ্ট দায়ী, যিটো স্বাস্থ্যবান ব্যক্তিৰো হ'ব পাৰে।

1970 চনৰ পৰৱৰ্তী কালত বিশ্ব ব্যাপি উন্নত দেশ সমূহত এই ৰোগত মৃত্যুৰ হাৰ কমিলেও মধ্যবিত্ত আৰু দৰিদ্ৰ দেশবোৰত হৃদৰোগীৰ সংখ্যা আৰু এই কাৰণত মৃত্যুৰ হাৰ বৃদ্ধি হৈছে। যদিও হৃদৰোগ প্ৰাপ্ত বয়স্ক সকলৰ হয় কিন্তু ইয়াৰ পূৰ্বাৱস্থা এথেৰোচ্ক্লেৰোছিছ বহু আগৰ পৰাই আৰম্ভ হয়। সেই বাবে পুষ্টিকৰ আহাৰ, শাৰীৰিক শ্ৰম, ধপাত জাত উপকৰণ পৰিহাৰ কৰি হৃদৰেগ প্ৰতিৰোধৰ ওপৰত জোৰ দিয়া হয়।

হৃদৰোগৰ সচৰাচৰ উপসৰ্গবোৰ হ'ল বুকুত বেদনা বা অস্বস্তি। অৱশ্যে সকলো সময়তে ই একমাত্ৰ উপসৰ্গ নহয়। অইন উপসৰ্গবোৰ হ'ল— শ্বাস কষ্ট, পাকস্থলীৰ ওপৰ ফালে অসহনীয় বিষ, মূৰটো পাতল লগা, দেহৰ উৰ্দ্ধাংশ যেনে- পিঠি, পেট, গল, বাওঁ বাহুত বিষ, ডিঙিৰ পিছফালে বিষ বা অস্বস্তি লগা অৱস্থা হ'ব পাৰে।

হৃদৰোগ বিভিন্ন ধৰণৰ হ'ব পাৰে—

ঃ কৰোনাৰি হৃদৰোগ

ঃ কার্ডিও মায়োপেথি

ঃ উচ্চৰক্ত চাপজনিত হৃদৰোগ

ঃ হার্ট ফেইলৰ

ঃ কোৰ পালম'নেল হৃৎপিণ্ডৰ সোঁ অংশ অচল হৈ যোৱা, শ্বাস-প্রশ্বাস ব্যহত হোৱা।

ঃ কার্ডিয়াক ডিছৰিদ্‌মিয়াচ

ঃ ভাল্‌ভুলাৰ হৃদৰোগ

ঃ চেৰিব্রোভাস্কুলাৰ ৰোগ- মস্তিষ্কলৈ ৰক্ত সৰবৰাহকাৰী ৰক্তবাহিনীৰ ৰোগ, যেনে- ষ্ট্রোক।

ঃ প্রান্তীয় ধমনি ৰোগ

ঃ জন্মগত হৃদৰোগ

ঃ ৰিউমেটিক হৃদৰোগ- বাত জ্বৰৰ ফলত হৃদপেশী আৰু কপাট ক্ষতিগ্রস্থ হোৱা।

হৃদৰোগৰ কাৰক সমূহ- বয়স, লিঙ্গ, উচ্চৰক্তচাপ, মেদ বহুলতা, ডায়েবেটিছ মেলিটাছ, ধূমপান, অতিপাত মদ্যপান, পাৰিবাৰিক ইতিহাস, স্থুলতা, শাৰীৰিক পৰিশ্রমৰ অভাৱ আৰু বায়ু প্রদূষণ। বিভিন্ন অঞ্চলত বেলেগ বেলেগ কাৰণ থাকিলেও সমূহীয়া ভাৱে এই আটাইবোৰেই হৃদৰোগৰ কাৰণ। অৱশ্যে জীৱন-যাপনৰ ধৰণ পৰিৱর্তন, ঔষধ সেৱন আৰু উচ্চ ৰক্ত চাপ, মেদ বহুলতা আৰু বহুমূত্র প্রতিৰোধৰ মাধ্যমত হৃদৰোগৰ আশংকা অধিকাংশ হ্রাস কৰা সম্ভৱ।

বয়সঃ— হৃদৰোগৰ অন্তৰালত বয়স হ'ল সর্বাধিক আশংকাৰ বিষয়। দেখা গৈছে 65 বছৰৰ অধিক বয়সৰ লোকৰ 82% ই হৃদৰোগত মৃত্যুবৰণ কৰে। সেইদৰে 55 বছৰ বয়সৰ পিছত ষ্ট্রোক কৰাৰ সম্ভাৱনা দ্বিগুণে বাঢ়ি যায়।

বয়স বৃদ্ধিৰ লগত হৃদৰোগ কিয় বাঢ়ি যায় তাৰ অন্যতম কাৰণ ছিৰাম ক'লেষ্টেৰ'লৰ লগত জড়িত। বেছি ভাগ জনগোষ্ঠিতে বয়স বৃদ্ধিৰ লগত ছিৰাম ক'লেষ্টেৰ'লৰ মাত্রা বাঢ়ে। পুৰুষসকলৰ 45ৰ পৰা 50 বছৰ আৰু স্ত্রীলোকৰ 60 ৰ পৰা 65 বছৰৰ আগত নহয়। বয়সে ৰক্তবাহিকাৰ গাত গঠনাত্মক পৰিৱর্তন আনে, ফলত ধমনিৰ স্থিতিস্থাপকতা বিনষ্ট হয়, যাৰ পৰিনাম ক'ৰোনাৰি ধমনি ৰোগ।

লিঙ্গঃ— প্রজননক্ষম স্ত্রীলোকৰ তুলনাত পুৰুষৰ হৃদৰোগ হোৱাৰ আশংকা অধিক। জনন বয়স পাৰ হোৱাৰ পিছত স্ত্রীলোকৰো হৃদৰোগ হোৱাৰ সম্ভাৱনা পুৰুষৰ সমানেই। যদি কোনো মহিলাৰ বহুমূত্র ৰোগ থাকে তেন্তে পুৰুষ বহুমূত্র ৰোগীৰ তুলনাত মহিলা গৰাকী হৃদৰোগৰ দ্বাৰা আক্রান্ত হোৱাৰ সম্ভাৱনা অধিক।

মধ্যমীয়া বয়সৰ লোকৰ মাজত ক'ৰোনাৰি হৃদৰোগ মহিলাৰ তুলনাত পুৰুষৰ 2ৰ পৰা5 গুণ অধিক হয়। বিশ্ব স্বাস্থ্য সংস্থাৰ এটা সমীক্ষা মতে হৃদৰোগত মৃত্যুৰ হাৰত লিঙ্গ বৈষম্য প্রায় 40%। হৃদৰোগত লিঙ্গ বৈষম্যগত কাৰণ হ'ল হৰমনৰ পার্থক্য। মহিলাৰ দেহত ইস্ট্রোজেন হ'ল প্রধান যৌন হৰমন। এই হৰমনে গ্লুক'জৰ বিপাক ঘটাই প্রতিৰক্ষাকাৰী প্রভাৱ বিস্তাৰ কৰে।

বর্তমান বিশ্বত হৃদৰোগ মৃত্যুৰ প্রধান কাৰণ। 2008 চনত বিশ্বত মানু হৰ 30% মৃত্যুৰ কাৰণ আছিল হৃদৰোগ। এক সমীক্ষাত কোৱা হৈছে যে, 2030 চনৰ ভিতৰত বছৰি প্রায় 23 নিযুত মানুহ হৃদৰোগত মৃত্যুমুখত পৰ্ব্বি।

সেয়ে, এই প্রাণঘাতী ৰোগৰ পৰা পৰিত্রাণ পাবলৈ স্বাস্থ্য বিশেষজ্ঞ সকলে পৰামর্শ আগবঢ়াইছে যে—

ঃ সকলো প্রকাৰৰ ধপাত আৰু ধপাতজাত সামগ্রী সেৱনৰ পৰা বিৰত থাকিব লাগে।

ঃ অতিৰিক্ত তেল বা চর্বিযুক্ত আহাৰ গ্রহণৰ পৰা বিৰত থাকিব

লাগে, পুষ্টিকৰ আহাৰ গ্ৰহণ কৰিব লাগে।

ঃ খাদ্য তালিকাৰ সতে সতেজ শাক-পাচলি আৰু ফলমূল অন্তৰ্ভূক্ত কৰিব লাগে।

ঃ আঞ্জাত লোন খোৱাটো সীমিত কৰি, অতিৰিক্ত লোন মিহলাই আহাৰ গ্ৰহণ বন্ধ কৰিব লাগে।

ঃ চেনি বা মিঠা জাতীয় খাদ্য যিমান সম্ভৱ এৰাই চলিব লাগে।

ঃ ঘাম ওলোৱা শাৰীৰিক পৰিশ্ৰম কৰিব লাগে, খোজ কাঢ়োতে খৰগতিত খোজ কাঢ়িব লাগে।