



ZOI (ZOI-LIFE)

Dept. of Zoology

Auxilium College (Autonomous)

Vellore-6.



2017-2018



The Editorial

This Department Magazine ΖΩΙ – ΖΟΙ which means Life in Greek, is just a drop from the ocean of Auxilium which is full of life. This is the testimony which stands to speak about the activities, achievements and fulfillment in their own way, which is lit by the lamp, guided by the book and refreshed by the lily in the college emblem.

With pride we dedicate it as a small token of our Love and Gratitude to our dear **Dr. Sr. Mary Josephine Rani, Principal & Head Department of Zoology** for her service to the Department and to the College. We assure you dear Sister that we will always keep the department as you wished and we will follow your ways to keep our department unique and best in the College.

We march with zeal towards a new dawn having Knowledge and Virtue as our motto, to make a mark that does wonders to Mother Earth and Every one.

On behalf of the Faculty of Zoology,

Dr. A. Mary Agnes

Associate Professor of Zoology
Auxilium College (Autonomous)
Vellore- 632006

PG & RESEARCH DEPARTMENT OF ZOOLOGY:

The Department of Zoology is celebrating its Diamond Jubilee this year (1957-2017). The Department has rendered its committed service to the young women of the District and the neighbouring villages for the past 60 years. The vision of the department is to educate young women of all categories and to empower them to be leaders. The department offers a Bachelor's degree in Zoology since its inception, Masters since 2007, M.Phil., since 2009 and Ph.D. since the year 2012.

OBJECTIVES OF THE DEPARTMENT:

- Helping the students to understand the formation and functioning of living organisms.
- Imparting knowledge about the various technologies in life sciences.
- Creating awareness to conserve the environment.
- Over all to co-exist without tampering nature.

HIGHLIGHTS OF THE DEPARTMENT:

- Four Research Guides
- 15 Research Scholars enrolled
- 85 National and International Publications
- Enhancement of Infrastructure
- Completion of UGC Major and Minor research Projects
- Participation and presentation of papers in international conferences
- Faculty are invited as resources person like the Indian Science Congress at Jammu and Mumbai
- Completed and submitted two Ph.D thesis
- 7 Endowment Lectures have been introduced
- UGC Certificate course- MLT
- Online certificate course
- Video conferencing
- 36 Guest Lectures on various Topics
- 19 M. Phil projects have been completed
- Summer research projects for the PG Students
- 3 National Conferences have been conducted by the department
- Road to Commonwealth summit was organized by the department along with the Commonwealth youth council Chairperson.
- Department had organized International Capacity Building Workshop in association with the Commonwealth youth council.

WITH GREATFUL HEARTS WE THANK AND LOVE YOU DEAR HODS



FELICITATION TO SR. ETHELVINA RODRIQUES

When someone we love becomes a memory that memory becomes a treasure...

Sr. Ethel was a beautiful person inside out, filled with love, passion, enthusiasm and meticulous planning, selfless and generous. Sister always appreciated everyone whom she encountered, her pleasing smile, her chuckles, and her sweet and soft voice lingering in our hearts. Sister loved music and song and thought her students to sing and her love was contagious.

Sr. Ethel had been the principal of our college, an able administrator, a good mentor and a model to be followed as teachers.

Sister headed the department from 1965 to 1974, still her last she was with the department. The department's pride, well maintained museum stands as a testimony of sister's love the subject. Sister took much effort interest, enthusiasm in collection, preservation and kept the specimens meticulously for the future generation.

We like to thank sister for her contribution and sure her presence will fill the campus for eternity.



FELICITATION TO Mrs. SUGUNA GOPICHAN

Mrs. Suguna was an incredible woman who was able to inspire and support while facing challenges. Her life was driven by determination and commitments to the students. She was an exceptional teacher and a strict disciplinarian. Ma'am has served the department from the year 1961 to 1995. Her hard work and tireless effort molded many students into priceless gems. We express heart felt gratitude to ma'am for her diligent and her creative guidelines to march ahead.

Ordinary teachers direct us along the right path, good teachers impart good education, great teachers groom the students to become leaders and inspire us to set one own path.

Ma'am, May you enjoy good health and happiness throughout your life seeing all your students fountain of success.



FELICITATION TO SR. ANNIE P.J

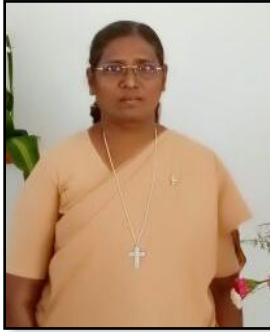
A women of great faith and immense hardworker and a potent leader is Sr. Annie Panakezham who entered the portals of Auxilium as a teenager .she contributed to the maintenance and development of zoology museum. As the head of the department she had the knack of getting the co operation of her colleagues and always produced 100% passes with high marks and university ranks.

It was as the superior of Auxilium that her tremendous potential for leadership , her fine aesthetic taste for construction of buildings and landscaping, for laying out gardens and her capacity for fund raising began to come to light. Her indomitable courage, tremendous faith in god and inborn talents and abilities enabled her to achieve all this and more.



FELICITATION TO Mrs. PADMASANI. V

Today is yet another landmark in the history of Zoology department as we celebrate our diamond jubilee, I am happy to felicitate my teacher, Ms. Padmasini who seems to be very strict, but she is very caring and a lovable person like a mother. She is a perfectionist. She can proudly say that Sr. Principal is her Student. Ms. Padmasini had spent 34 yrs in imparting the right skills and knowledge onto the student. Mam did her B.Sc., Zoology in our College, M.Sc., Zoology in Presidency College and M.Phil., Genetics in University of Madras, Tharamani. Mam started her career in the year 1977 and she was the Head of the Department from 2004-2011. She is a successful teacher, wife, mother and also a grandmother. The name Padmasani means a person who have power of speech and writing and our mam stands for her name. Technology has made it easier for students to learn with devices new but nothing can come close to the experience of being taught by an inspirational teacher like you. Mam you helped us to find our strengths, drive away tears, overpower and conquer fears.Thank you Mam.



FELICITATION TO Dr. SR. MARY JOSEPHINE RANI

The most dynamic person who believes in the formation of the youth, to greater achievements and who helped them to carry themselves in life's journey with spiritual guidance, psychological support and moral formation the most loving Sister ...Dr. Sr. Mary Josephine Rani our Principal and Head of Zoology, Loving known as Sister Anto. Sister is A role model living legend for all the Auxilians....She fulfills the college Motto, Vision and Mission through her life...Sister did her bachelor's degree in Auxilium and her masters, M.phil and Ph.d in Loyola college, Chennai. She started her carrier as a young innovative teacher and a cheerful, service oriented sister. Sr took initiative steps to the upliftment of the department to PG and Research. In order to empower the youth and increase job opportunity, she initiated job oriented UGC certificate course medical laboratory techniques for the students. She became head of the department in the year 2011. . As a sister, she has dedicated herself to develop intellectually enlightened, spiritually inspired, emotionally balanced, morally upright & socially committed students. Sris always available for the students and she loves to be with the students.

Sr is the Nightingale of ACK...her soft voice echoes through the campus of Auxilium...She fills the heart and soul of every Auxilian with the music and love....

Sister with the principles of Don Bosco etched in the soul she proves herself as an able leader guiding and leading Auxilium towards success.

Dear srI can proudly say that you are the motivating factor behind our success. You encourage us to reach for the skies, fearlessly and passionately. We admire you for all the knowledge you share, and the love you show to touch our hearts.

With gratitude, Pride and love we present the LIFETIME ACHIEVEMENT AWARD to the Deserving person...You dear sister Anto, during the Diamond Jubilee celebrations of our department.....

Thank you from the bottom of our hearts.....

I will give thanks to you O Lord my God, with all my heart and will glorify your name forever.

Psalm 86:12

I consider it as an honour conferred on me, as I am vested with the responsibility to felicitate an *incredible woman, loving sister*, and an *inspiring teacher Dr. (Sr.) A. Mary Josephine Rani*, Principal and Head of the Department of Zoology, Auxilium College, Vellore.

Rev. Sister Anto, as we fondly call her, hails from a pious catholic family. She has made her *father Mr. Antony Raj and mother Mrs. Rose Mary* and her *Siblings* very proud through all her endeavours.

Sister Anto is a distinguished *Alumini of Auxilium College*. She completed her B.Sc., Degree in Zoology in the year 1981. While doing her Under Graduation she was inspired by *Salesian Sisters* and joined the congregation and professed as a young nun in the year 1985.

Sister did her PG, M.Phil., and Ph.D., at Loyola College, Chennai. She is a Gold medalist in M.Sc., Zoology.

Sister Anto, joined the Department of Zoology, Auxilium College as a young Lecturer in the year 1989, her duty bound career spans over three decades, shaping the destiny of many young students. Sister has always been keen in the progress of our esteemed Institution.

Sister has held many prestigious offices and has whole heartedly carried out the responsibilities entrusted to her, to mention a few; she had been the Vice-Principal of our institution, NSS Programme Officer, Ranger Leader, Dean of Residential Students, In-charge of College Choir, National Literacy Mission and AICUF. Sister was also responsible for initiating many programmes like ALIVE and College Brass Band.

Her fervent efforts were instrumental in the commencement of BBA- Hospital Administration Programme in collaboration with the renowned Christian Medical College.

Sister's highly organized and intrepid nature, her presence of mind and quick decision making ability makes her an incredible leader. Sister Anto's sense of belonging to the institution and her hard work and diligence will ever be remembered in the days to come. Her piety and faith in God, designed the beauty of her life and made her more tenacious.

Sister Anto has a special place for the Department of Zoology in her heart. Sister motivated her department faculty and students towards excellence. Initiating PG and Research Programmes-

M.Phil. and Ph.D., UGC- Certificate Course in Medical Laboratory Techniques, is the *epitome of her devotion and dedication to the department.*

Department faculty look upto Sr.Anto as a mentor, with great sense of pride and respect. She was always ready with her *creative and brilliant* ideas. Her sweet *sense of humor and friendly approach* made working with her a joyful experience.

A good teacher knows how to bring out the best in students, Sister Anto knew, the ways to mould and uplift, both the slow learners and advanced learners by understanding and guiding them in the right direction. She always forethought about the future of the students. She has an amazing ability to read the minds of the students.

To be able to look back upon once life with satisfaction is to live twice, *sister has made the world better just by being the kind of person she is*. She has the gift of *Kindness, Courage, Loyalty and Integrity.*

Dear sister!!!!!!!!!!!!!!

We are fortunate to have you as our mother, sister and mentor.

Please remember because of you someone smiled, someone became more confident and felt loved every day. Let long live your impression in the hearts of every young mind you came across in your tenure as a committed teacher.

May I wish you on behalf of the Management, Faculty and Students, best of life, receiving the bounty of God's blessings and experiencing the greatness of Almighty's love as you have always been.

Promising our Prayers.....

Dr. J.S. Arockiamary
Associate Professor
Department of Zoology

Dear Sister,

In the field of teaching parlance you are the erudite beyond compare. You the epitome of simplicity, devotion, dedication and the pearl of starry luster in the family of Auxilium. By virtue of selfless service your work is an illuminating footnote for generation to come.

Good teachers like you are the reason why ordinary students dream to do extraordinary things.

We cannot forget your valuable presence in our Department .Our lives have been a great journey because you are always there to guide us through many storms. You inspired a lot through your knowledge and love.

You did everything to help your students shine. Despite the nasty challenges no one has even see you whine. We know how painful it is to say a good bye to a teacher who is more of a mother.

You have inspired our souls with a precious legacy. You have taught us the values that will never retire. I would like to say a big thanks for your love and support.

We always love you dear sister!

Thank you

M.Sc., Zoology

(2016 – 2018)

DEAR SISTER,

IT'S A TIME TO LOOK BACK WITH ADMIRATION

IT'S A TIME TO LOOK FORWARD WITH ANTICIPATION

Our beloved sister Anto

'it's difficult to say in words how much you are remembered and appreciated by us.

Dear sister all that we can say is a big thank you for all that you have done for our department and college.

Dear sister

Today we just want

To say thanks

The truth is that,

We respect you a lot

Everyday we've embraced

All that you've taught.

I thus conclude by saying

Like a rare gem

Found in depths of the earth

You are one of those jewels

Of whom there is a dearth

Like a prized possession

Always kept safe and secure

Your teachings and lessons

Will be in our hearts for sure.

R.BHUVANESHWARJ

வாழ்த்து மடல்

அக்சிலியம் கல்லூரியின் அன்னையே
அனைவரையும் அரவணைக்கும் அருளே
அன்பான சொல்லும் ஆதரவான கரங்களும்

தன் அகத்தே கொண்டவரே
கனிவான பார்வையும் கருத்தான பேச்சும்
ஆழமான அறிவும் அழகான குரலும்
ஆசிரியர் பணியில் ஈடுபாடும்

உங்களின் தனித்தன்மைகளாக கொண்டு
நீங்கள் கல்வி பணியிலும்

அருட்பணியிலும் பதித்த முத்திரைகள் - பல
முப்பத்தாறு ஆண்டுகளாக நம் கல்லூரியின்
முன்னேற்றத்திற்காக முழு மூச்சுடன்
உழைத்தவர் நீங்கள்

தந்தை தொன்போஸ்கோ

அன்னை மரிய மசரெல்லோவின்

அன்பு முறைக் கல்வி நெறியில்

வாழ்ந்து வளம் சேர்த்தவர் நீங்கள்

இக்கல்லூரி அறிவுக் கடலான போது

நீங்கள் கப்பலானீர்கள் - மாணவிகளுக்கு

ஆதரவளித்து அன்புடன் பேசி

நம்பிக்கையூட்டும் நன்மதிப்பாளர் நீங்கள்

இசையில் மூழ்கக் கூடியவர் - நீங்கள்

இனிமையாகவும் பேசக்கூடியவர்!

பதினோரு ஆண்டுகள் துணைமுதல்வராய் இருந்து

பல நற்காரியங்களை புரிந்தவர் - நீங்கள்

துறைத்தலைவராய் இருந்து - மாணவிகளையும்

பேராசிரியர்களையும் செப்பனிட்டவர் நீங்கள்!

எங்களை தாங்கள் ஆய்வுக்கூடம் மற்றும் அருட்காட்சியத்தில் பணிப்புரிய அமர்த்திய
இத்தனை ஆண்டுகளில் தாங்கள் எப்படி ஆய்வுக்கூடத்தின் மீதும் அருட்காட்சியத்தின் மீதும்
அன்பு செலுத்தி பாதுகாத்து வந்தீர்களோ அதே போன்று நாங்களும் என்றும் பாதுகாத்து
வருவோம் என உறுதி அளிக்கிறோம்.

உங்களிடமிருந்து நாங்கள் பல நற்பண்புகளையும், நற்குணங்களையும் கற்றுக்கொண்டோம்.

உங்களின் அன்பான வார்த்தைகள் மற்றும் அன்பான செயல்கள் அனைத்தும் எங்களின் மனதில் என்றும் நீங்கா இடம்பிடித்திருக்கும்.

இத்தனை ஆண்டுகளில் எங்களை தங்களின் சகோதரியாக நினைத்து கொண்டிருக்கும் தங்களுக்காக நாங்கள் என்றும் இறைவனின் ஆசியும், அருளும் பரிபூரணமாக கிடைக்க என்றும் இறைவனிடம் வேண்டிக்கொள்கிறோம்.

இப்படிக்கு
ஆய்வக உதவியாளர்

STAFF CORNER

CONSERVE AND CO-EXIST

Dr. JS. Arockiamary, Associate Professor, Department of Zoology, Auxilium College, Vellore-6

Charles Elton defines conservation as the wise principal of co-existence between man and nature.

The aim of conservation is to ensure the preservation of quality environment and bring back balance to the ecosystem. The harmony in the ecosystem can be established by co-existence. While human welfare is important, nature too has its intrinsic values and ought to be protected.

Needs of the few do not outweigh those of the rest, says Michael Eisenstein.

Our planet earth has evolved to its present state through millions of years and the flora and fauna has become a part of the environment through adaptations. Mother Earth has accumulated abundant natural resources over the years as a gift to the mankind. As the global population continues to grow, our demand for natural resources also grow, but instead of conserving the natural resources, mankind is ruthlessly depleting them.

Nature is the foundation of every economy on the planet. Inventing new technologies and revamping old techniques can protect the Earth's vital resources. Any conservational measure or rational plan for the management of the ecosystem must recognize that each habitat has certain character and each organism a certain range of physico chemical condition which it can tolerate. Therefore we can either modify the ecosystem to increase its capability or limit our requirements keeping the capability of the ecosystem in view.

Very little is left of the natural resources and the biodiversity within our ecosystem and anything we do to protect our planet can save the future. Human greed is primarily to be blamed for the current fiasco- not the seasonal fluctuations or climate change. Today conservation is not a choice, it's a necessity.

The word conservation is derived from the latin word "Guard Together", As a conscious generation let us resolve together to guard our planet.

A SCREENSHOT OF THE SENSE ORGANS IN SPIDERS

Dr. Mary Agnes, Associate Professor of Zoology, Auxilium College, Vellore-6

INTRODUCTION

Spiders are found throughout the surface of earth right from Arctic to dry desert region, particularly they are found abundant in areas rich in vegetation. It is right to say that they have conquered all possible ecological niches on land. The body of the spider is divided into an anterior prosoma (cephalothorax) consisting of a precheliceral unsegmented region (head or acron). The prosoma has a dorsal carapace formed from part of the head lobe. The cephalothorax contains the eyes, pedipalps, chelicerae, mouthparts and legs. The posterior region is the opisthosoma or abdomen comprised of primarily 12 segments but externally unsegmented.

Inside the prosoma lie the central nervous system, part of the intestinal tract, a pair of poison glands, musculature of extremities, pharynx and the sucking stomach. In the opisthosoma lie the lobed diverticula, hindgut, heart, the abdominal arteries, excretory organs, respiratory organs, reproductive organs and the various silk glands or spinning glands.

Spiders are divided into two groups : the wandering spiders and sedentary web spiders. The web spiders use their ability to produce silk for the construction of snares. The silk of spider is a fibro protein that is produced as a liquid in varied and voluminous abdominal glands. Many spinning glands seem to have two different cell types that contribute chemically different secretory products. While one type secrete only fibroin, the other apparently synthesizes mucopolysaccharides, which are responsible for the hygroscopic properties of the spider silky spiral of orb webs.

SENSE ORGANS AND THEIR FUNCTIONS

Among the reasons for the evolutionary success of the spiders, highly developed sensory systems take a prominent role. Since most of the spiders are predators in the agro ecosystem only their feeding mode is explained briefly. In order to locate a prey and for a successful capture the spider depends on its sensory system. They provide the spider with detailed information on what is going on around them. The behavior of the spiders like that of all animals is controlled by the central nervous system. Of the various types of sensory organs that collect information about the environment the major role is played by the mechanoreceptors, visual receptors and chemo receptors.

MECHANORECEPTORS

Mechanoreceptors respond to external stimuli such as touch, substrate vibration and air current and also keep the spider informed about the leg and joint positions. In most spiders, the mechanical senses are particularly important in guiding behaviour, prey capture and courtship. Mechanoreceptors found in spiders are (i) Trichobothrium (ii) Tactile hairs (iii) Slit sensilla. There are small sensory organs embedded in the exoskeleton at 'Strategic points'. In addition to these there are also internal Proprioceptors inside the legs; these measure the relative position of the joints.

TRICHOBOTHRIUM

The most common mechanoreceptors are the hair sensillum. It may appear as a simple tactile hair or as a more complex filiform hair a trichobothrium. The tactile hairs are distributed over the entire body surface, the trichobothrium occur only on the extremities. These are extremely fine hairs within special sockets. They are much less numerous than the common tactile hairs and are usually arranged in regular rows on certain leg segment (Fig-1).

The most striking feature of the trichobothrium is their extreme sensitivity. The long slender hair shaft is suspended in a very thin (0.5 μ m) cuticular membrane so that the slightest air current will make it quiver. Even totally blinded spiders can locate a buzzing fly as much as several centimeters away. These hairs have also been known as "touch-at-a distance" receptors.

SLIT SENSE ORGAN:

The exoskeletons not only serve as a protective shield and as the insertion site for the muscles, but also transmit mechanical stress that may be caused by substrate vibrations, by gravity, or by the spider's own movements. The slit sensilla are embedded in the exoskeleton.

Slit sense organs may occur either singly or in groups. Most conspicuous are those groups where the slits run strictly parallel to each other. They are called Lyriform organs, because of their shape (Fig- 2). The slit is only 1-2 μ m wide, yet may vary from 8-200 μ m long and bordered by a cuticular lip on either side, the gap is spanned by a thin cuticular membrane. Each sensillum has 2 dendrites, which detects the stress.

PROPRIORECEPTOR

Several groups of sensory cells (ganglia) lying inside the palps and legs of spiders provide animal with information about each joint. They register not only the position but also the beginning, direction and velocity of changes in position of the joint, which ultimately help the animal in movements towards either prey or mate

VISION

Visual stimuli seem to play an important role in prey capture and sexual behavior. Most spiders possess eight eyes arranged in two or three rows on the frontal carapace. They are arranged in four rows of two each (Fig-3). According to their position one can differentiate between anterior median eyes, anterior lateral eyes, posterior median eyes and posterior lateral eyes. In Lynx spiders they have direct retina and indirect retinae. Apart from prey capture, mate recognition, features of non-living environment, rivals, spider eyes help in astronomical orientation and even in detection of polarized light.

CHEMORECEPTORS

Although there can be little doubt about the spider's ability to smell, the location of the actual olfactory organs has been under debate for long time, SEM and TEM investigations reveal the presence of four different types of chemosensitive sensilla (Fig-4). The most important chemoreceptor of the spiders are the contact chemoreceptors or taste hairs which are found in the legs and palps. Each hair is usually innervated by 21 sensory nerve cells; 2 nerve endings are found near the base while 19 are found innervating the hair. The spiders can differentiate between dead and live prey by probing it with their tarsi, this ability is coined as "taste-by-touch". In addition to testing food, they use chemoreceptors to find mate and rivals.

CONCLUSION

Naturally occurring biological control has a potential role to play in management of pest in rice field and there is need to emphatic the impact of indigenous natural enemies as an essential, part of IPM programme, spider are one of the most abundant and potential arthropod predators in rice ecosystem and their importance in regulating the pest population had been emphasized by many workers. The study on the sense organs of the spiders helps us to understand them better and because of the polyphagous nature they could be used as biological control of pest in the Agro ecosystem.

DIFFERENT SENSE ORGANS OF SPIDERS

Fig-1 Trichobothrium



Fig-2 Slit Sense organ

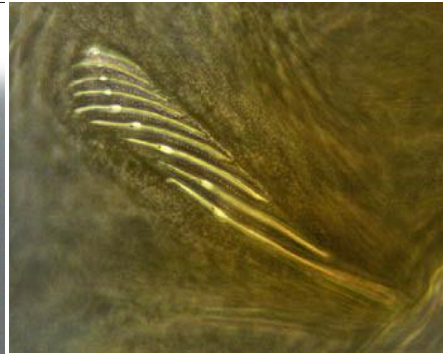
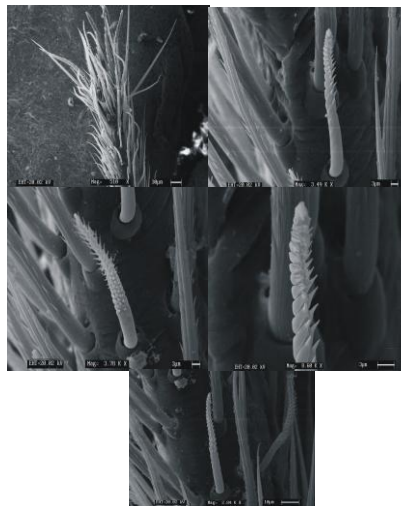


Fig-3 Arrangement of eyes on the head



Fig- 4 Chemosensory hairs



OSTRACODA (Gr. Ostrakon, a shell)

Dr. Uma Chandra Meeralakshmi, Asst. Pro Of Zoology, Auxilium College, Vellore- 6.

The name of this group is very apt, for on the first sight of an ostracod there seems to be little but a bean shaped shell. The entire body of the animal is enclosed in it with the exception of the antennae and a pair of slender legs at the rear end. When the creature is disturbed or alarmed, even these parts are quickly withdrawn and the shell closed tightly and thus deprived of any means of swimming the animal sinks to the bottom of the water. Although the shell is in one piece, it is functionally bivalve, rather like that of mussel. It serves, not merely as an armour - plating as in other crustacea but as one writer has put it, also as “a portable funk - hole of maximum efficiency”.

Ostracods are commonly known as “Seed Shrimps” and are found in a variety of aquatic or humid environments and are also tolerant of harsh environmental conditions. They occur in both marine and non-marine environments and are known from nearly all types of aquatic habitats like littoral, lake benthos, streams, and interstitial waters, fresh to highly saline waters (in salinities of up to three times seawater) and in temporary environments. Some species are also known from semi-terrestrial (mosses) and terrestrial (leaf- litter in forests) habitats .These are not exclusively planktonic forms.

Most of the ostracods are free living forms except one genus which is commensal on the gills of various species of freshwater crayfishes (Entocythere).

Bioluminescence

Many species of Ostracods in the subfamily Cypridininae are luminous. A new species *Vargula tsujii* seems to be fairly abundant in some areas along the coasts of lower and Southern California and prove useful as a nearby source of luciferin and luciferase, the glandular secretions known to produce luminescence in Ostracoda. *Cyprindina* is particularly important as this animal provided the material for studying the chemistry of bioluminescence. The Japanese armed forces are said to have used powdered *Cyprindina* for reading dispatches sent to forward areas. A small quantity of this powder, when rubbed along with some water, emitted enough light to read the dispatches. *Gigantocypris* a deepwater predatory species is remarkable for its large size and brilliant phosphorescence.

Palaeontological significance

Today ostracods are playing an important role in Quaternary climate change research. Ecological and biogeographical databases are being compiled from many researchers world wide. Using Geographical Information Systems (GIS) the data can be portrayed spatially. Examples of ongoing ostracod databases are the North American Non-Marine Ostracod Database (NANODE) and the Arctic Ostracod Database. The Ostracods are one of the few groups which have been easily fossilized because of their calcified valves. They have a long fossil record; there are more than 13,000 post-Paleozoic species, which includes about 5,000 recent species.

Ostracods are known since at least the Ordovician. Their small, calcified, bivalved carapaces are easily fossilised and exhibit many characters of taxonomical value. Their abundance, diversity and occurrence in nearly all marine and freshwater habitats as well as their persistence through all periods of earth history make them an excellent tool for palaeo-biological and palaeo-ecological studies. Fossil ostracod soft parts that are phosphatized, silicified or organically preserved are known from several sites, such as Spitzbergen (Triassic) Brazil (Cretaceous), Germany (Triassic) and Alaska (Quaternary). A compilation of literature on fossilized soft parts of ostracods is given by Smith (2000). A number of fossil records of ostracodes from India have been made and their occurrence where forameniferans are missing is considered as an index for the quest for oil and gas deposits.

Ecological Indicators

Ostracods serve as ecological indicators. Living ostracods are used as biomonitors in wetlands, streams and springs. These non-marine aquatic environments can be assessed by studying ostracod species living there. De Deckker (2002) notes that finding *Candona caudate* in lake settings can indicate that there is anoxia from eutrophication. Despite many limnological investigations in India, the freshwater ostracods have remained, to quote “neglected little crustaceans” (Kesling, 1956).

BIOREMEDIATION AND PHYTOREMEDIATION

Mrs. Hannah Elizabeth, Asst. Prof. OF Zoology, Auxilium College, Vellore-6

BIOREMEDIATION:

Pollution due to chemicals including heavy metals is a problem that may have negative consequences on the biosphere. The most abundant pollutants in the waste water and in sewage are heavy metals with explosives. Moreover, accumulation of heavy metals in vegetation due to irrigation with waste water could affect human health. Especially 2,4,6-trinitrotoluene (TNT), is a widespread problem at factories that produce explosive. The toxicity and mutagenicity of (TNT) can remain under ground for long periods as a solid or dissolved in ground water which poses threats to the human health and environment.

The intake and subsequent efflux of heavy metal ions by microbes normally includes a redox reaction involving the metal. As such, some bacteria even use them for energy and growth. Efforts have focused on developing methods to treat TNT biologically. A variety of ecosystems have been examined for microbes. Ecosystems have been examined for microbes that are able to transform TNT. One of the best methods to remove their toxicity from contaminated soil is known as biological remediation with soil bacteria. Therefore, there are considerable efforts to use microorganisms for the biodegradation of TNT is the safe approach.

PHYTOREMEDIATION

Phytoremediation is a newly evolving field of science and technology that uses plants to clean up polluted soil, water or air. Phytoremediation is a technology for real clean up of contaminated soils and the contaminants which are potentially toxic. It gets rid of the risks presented by a contaminated soil by decreasing contaminants bio availability using plants as a source. The two greatest advantages of phytoremediation compared with traditional abatement methods are cost effectiveness and less ecosystem disruption. Plants may also help to stabilize contaminants by accumulating and precipitating toxic trace elements in the roots. Organic pollutants can potentially be chemically degraded and ultimately mineralized into harmless biological compounds. 2,4,6-trinitrotoluene (TNT) are widely used in military fields. They and their breakdown products are major human produced contaminants in the environment, manufacturing, development and improper disposal contribute to contamination where they constitute a source of toxic, mutagenic and carcinogenic effects on human and other biota. In human, high and prolonged exposures to TNT cause hyperplasia of the bone marrow leading to aplastic anemia and a drastic loss of blood platelets. The introduction of harmful substances into the environment has been shown to have many adverse

effects on human health, agricultural productivity and natural ecosystems . Because the costs of growing a crop are minimal compared to those of soil removal and replacement ,the use of plants to remediate hazardous soils is seen as having great promise.

ENVIRONMENTAL SUSTAINABILITY AND AQUACULTURE MANAGEMENT

Mrs. Vidhya, Asst. Prof Of Zoology, Auxilium College, Vellore-6.

Fish cultivation has assumed a commercial dimension world-wide. Most individual, have also engaged themselves as full-time Fish farmers in different level of this aquaculture business. Thus, some are into Fish feed production, breeding (reproduction) as well as total development and marketing of this agricultural product. Apart from the fact that there are various feeds available in the market for cultivation of Fish, various feed supplements from poultry waste to domestic food remnants as well as vegetables, nuts, fruit peels, and so forth are also integrated in the production of this fast growing aquaculture practice. In line with this encouraging agricultural venture is the attendant problem of effluent generation which can adversely affect the aesthetic environments.

Fish pond effluent quality varies from pond to pond and from season to season. Effluent quality is usually poorest (highest concentrations of solids, organic matter, total phosphorus, and total nitrogen) in the summer when fish feeding rates and water temperatures are highest. Catfish pond effluents generally have higher concentrations of nutrients and organic matter than natural stream waters but much lower concentrations than municipal and industrial waste water. There are various biological techniques adopted, which are cost efficient and eco-friendly in the treatment of aquaculture effluents. Some of such aquaculture bio techniques include the following.

Construction of Wetlands Adjacent to Ponds

Wetlands are inexpensive to build and operate, and it also eliminates the need for chemical treatment of wastewater. They also contribute stability to local hydrologic processes and are excellent wild-life habitats. Wetlands act as biological filters to remove pollutants from water, and natural or constructed wetland exposes the solid, semisolid waste particles for fast degradation by microorganism. The water if properly channelled can be reused, and the dried solid component of the effluent when properly treated can be used as organic fertilizer in crop production.

Treating Pond Effluents Using Grass Filter Strips Draining effluents over grass strips filters solids from animal waste. This system may be useful for filtering catfish pond effluent. Grass filter strips are highly effective in reducing the concentrations of suspended solids, biochemical oxygen demand, and ammonia, but not efficient in removing algae.

Conservative Water Management Practices

1. Reusing Water for Multiple Fish Crops: The concentration of the substance in the effluent is dependent on the volume of water discharged as well as the mass of nutrients (organic matter) present in the pond. Thus, reducing the concentration of potential pollutants in pond effluents is difficult, but it is relatively easy to control discharge volume. Natural processes, such as nutrient uptake by bottom soils, microbial decomposition of organic matter, denitrification and sedimentation, continually remove potential pollutants from pond water.

2. Reducing Overflow after Rains by Keeping Pond Water Level below the Pond Drain: Seasonal changes in overflow volume affected the amount of waste discharged more than seasonal changes in effluent quality. So, reducing overflow volume can have a dramatic impact on mass discharge of nutrients and organic matter from the ponds. By keeping the pond water level below the level of the drain, rainfall is captured rather than allowed to overflow.

Using Effluents for Irrigation

If ponds are located near terrestrial crops that require irrigation, pond discharge can be used for irrigation water. That use will reduce waste discharge and benefit the crop. Although the nutrient content of pond effluents may be too low to affect crop production, effluent water not useful for Fish cultivation can find application for irrigation of crops and thus reduce discharge volume. Rice irrigation, soybeans irrigation with effluents of aquaculture is highly beneficiary.

Other Aquaculture management practices:

- (i) Use high-quality feeds and efficient feeding practices. Feeds are the origin of all pollutants in Fish pond effluents.
- (ii) Provide adequate aeration and circulation of pond water. Oxygen availability at bottom of ponds improves degradation of organic matter and reduces their amount in effluent.
- (iii) Minimize water exchange. Routine water exchange is of questionable value as a water quality management procedure and greatly increases effluent volume.
- (iv) Operate ponds for several years without draining. Reusing water for multiple fish crops is one of the best methods of reducing waste discharge from ponds.
- (v) Allow solids to settle before discharging water. After sieving ponds partially drained for fish harvest, hold remaining water for 2 to 3 days to allow solids settle.

THE INVISIBLE HEALTH HAZARD IMPACTING THE BIOSPHERE

Ms. Rebecca Vinoliya, Asst. Prof of Zoology, Auxilium College, Vellore-6.

Electromagnetic radiation, in the form of waves of electric and magnetic energy, has been circulating together through space. The electromagnetic radiations are of two types, one being ionizing radiations such as X-rays and gamma rays, and the other being non-ionizing radiations such as electric and magnetic fields, radio waves, radio- frequency band which includes microwaves, infrared, ultraviolet, and The biological effects of RF-EMF at molecular level induce thermal and non-thermal damage, which may be due to dielectric heating leading to protein denaturation, polar molecular agitation, cellular response through molecular cascades and heat shock protein. The three major physical parameters of RF-EMF radiations is frequency, intensity, and exposure duration. Although the non-ionizing radiations are considered less dangerous than ionizing radiation, over-exposure can cause health hazards. The electromagnetic radiations, also known as electrosmog cannot be seen, smelt or felt, one would not realize their potential harm over long periods of exposure until they manifest in the form of biological disorders. RF-EMF from cell phones is considered as a “possible human carcinogen” Class 2B.

Studies on Plants: Tops of trees tend to dry up when they directly face the cell tower antennas and they seem to be most vulnerable if they have their roots close to the water and have a gloomy and unhealthy appearance, possible growth delays, and a higher tendency to contract plagues and illnesses. The browning of tree tops is often observed near cell towers, especially when water is near their root base.

Studies on Insects: Monarch butterflies and locusts migrate great distances using their antennae to sense air currents and earth's electromagnetic fields. Moths are drawn to light frequencies. Ants, with the help of their antennas are adept at electrical transmission and found to respond to frequencies as low as 9 MHz. Flying ants are very sensitive to electromagnetic fields. Bees have clusters of magnetite in the abdominal areas. Colony collapse disorder (CCD) was observed in beehives exposed to 900 MHz for 10 minutes, with sudden disappearance of a hive's inhabitants, leaving only queen, eggs, and a few immature workers behind. With navigational skills affected, worker bees stopped coming to the hives after 10 days and egg production in queen bees dropped drastically to 100 eggs/day compared to 350 eggs. Radiation affects the pollinators, honeybees, whose numbers have recently been declining due to CCD by 60%. EMFs from telecommunication infrastructure interfere with bees' biological clocks that enable them to compensate properly for the sun's

movements, as a result of which, may fly in the wrong direction when attempting to return to the hive . Bee colonies irradiated with digital enhanced cordless communications (DECT) phones and mobile handsets had a dramatic impact on the behavior of the bees, namely by inducing the worker piping signal. In natural conditions, worker piping either announces the swarming process of the bee colony or is a signal of a disturbed bee colony .

Studies on Amphibians and Reptiles : Salamanders and turtles have navigational abilities based on magnetic sensing as well as smell. Many species of frogs have disappeared all over the world in the last 3–5 years. Amphibians can be especially sensitive because their skin is always moist, and they live close to, or in water, which conducts electricity easily. Toads when they get exposed developed arrhythmia increased mortality and induced deformities were noted in frog tadpoles (*Rana temporaria*) and tadpoles developed more slowly, less synchronously than control tadpoles, remain at the early stages for a longer time, developed allergies and that EMF causes changes in the blood counts.

Studies on Aves : House sparrows, white storks, rock doves, magpies, collared doves exhibited nest and site abandonment, plumage deterioration (lack of shine, beardless rachis, etc.), locomotion problems, and even death among some birds. No symptoms were observed prior to construction of the cell phone towers. The plumage deterioration and damaged feather are the first signs of weakening, illnesses, or stress in birds. The disappearance of insects, leading to lack of food, could have an influence on bird's weakening, especially at the first stages in young bird's life. In chick embryos exposed to ELF pulsed EMR, a potent teratogenic effect was observed, leading to microphthalmia, abnormal trunkal torsion, and malformations on the neural tube .white stork (*Ciconia ciconia*), reporting problems with reproduction, circulatory, and central nervous system, general health and well-being (microwave syndrome) . Deformities and deaths were noted in the domestic chicken embryos subjected to low-level, non-thermal radiation from the standard 915 MHz cell phone frequency.

Studies on Mammals : There were abundant signs of wildlife, migrating and resident birds, bats, small and large mammals, and insects including bees in the absence of cell phone tower whereas no signs of wildlife, tracks, scat, or feathers were noted. When Whole body gets irradiated significant changes in cardiac activity,Bradycardia developed in and Separate ventricular extra systoles also developed. Oxidative stress was increased in the eyes with cataracts, and there was an association between oxidative stress and the distance to the nearest mast in cows .

When rats were exposed a significant decrease in melatonin and increase in both creatine kinase and caspase 3 was found which indicates chronic exposure to these radiations may be an indication of possible tumor promotion. A study on pregnant rats and brains of fetal rats was carried out after irradiating them with different intensities of microwave radiation from cellular phones for 20 days three times a day. Superoxide dismutase (SOD), glutathione peroxidase (GSH-Px), malondialdehyde (MDA), noradrenaline (NE), dopamine (DA), and 5-hydroxyindoleacetic acid (5-HIAA) in the brain were assayed. The significant content differences of noradrenaline and dopamine were found in fetal rat brains . when rabbits were exposed to continuous wave and it developed acute effects in the eyes, where lens opacities developed within 4 days.Exposed animals in most of the cases revealed defects in their working memory possibly due to cholinergic pathway distraction. Mobile phone RF-EMF exposure significantly altered the passive avoidance behavior and hippocampal morphology in rats .

Studies on Humans: The exposure to continuous RF-EMF radiation poses a greater risk to children, particularly due to their thinner skulls and rapid rate of growth. Also at risk are the elderly, the frail, and pregnant women, .DNA damage via free radical formation inside cells has also been recorded . Free radicals kill cells by damaging macromolecules such as DNA, protein, and membrane are carcinogenic. In fact, EMR enhances free radical activity. Single- and double-strand DNA breaks are seen in rat brain cells after acute exposure to radiofrequency electromagnetic radiation.

RF-EMF radiations lead to tissue damage, DNA damage, or chromosome mutations. There is a higher risk of cancer among people living within 200 m of a mobile phone base station and that cancer risk rose with increasing exposure, reaching 8.5 times the norm for people most exposed.,it is likely that different types of cells and from different species might respond differently to mobile phone radiation or might have different sensitivity to this weak stimulus .

Comparisons relation with distance from base station show significant increase as compared to people living greater than 300 m or not exposed to base station, till 300 m for tiredness, 200 m for headache, sleep disturbance, and discomfort, and 100 m for irritability, depression, loss of memory, dizziness, and libido decrease. Women significantly more often than men complained of headache, nausea, loss of appetite, sleep disturbance, depression, discomfort, and visual perturbations were observed . A follow-up study which was performed found that the most exposed people had a higher incidence of fatigue, irritability, headaches, nausea, loss of appetite, sleeping disorders, depression, discomfort, difficulties concentrating, memory loss, visual disorders, dizziness, and cardiovascular problems. Women are more at risk as they tend to spend more time at home and are

exposed to radiation continuously. There was prevalence of neuropsychiatric complaints among people living near base stations. Growing amounts of published research show adverse effects on both humans and wildlife far below a thermal threshold, usually referred to as “non-thermal effects”, especially under conditions of longterm, low-level exposure .

RF-EMF produces DNA damage via free radical formation inside cells. Free radicals kill cells by damaging macromolecules such as DNA, protein, and membrane, also shown to be carcinogenic. EMR enhances free radical activity. EMR interferes with navigational equipments, lifeline electronic gadgets in hospitals, and affects patients with pacemakers. A short-term exposure (15 and 30 minutes) to RFR (900 MHz) from a mobile phone caused a significant increase in DNA single strand breaks in human hair root cells located around the ear which is used for the phone calls . Various in vitro studies have shown that 1800 MHz RF-EMF radiation could cause oxidative damage to mtDNA in primary cultured neurons. Oxidative damage to mtDNA may account for the neurotoxicity of RF radiation in the brain .

CONCLUSION

New, biologically-based public exposure standards are urgently needed to protect public health world-wide. EMR exposures should be reduced now rather than waiting for proof of harm before acting .But effects, if any, from RF-EMF radiations released into the environment over a long period of time in densely populated areas where people are continuously exposed to them will show in years to come. In animal studies, non-ionizing radiation was also found to be teratogenic and oncogenic, and likely mutagenic, but it is unclear if these observations were due to heating affect, non-thermal affects or both. Trees, plants, soil, grass, and shrubs have the ability to absorb electromagnetic wave energy over a very broad range of wavelengths .The epidemic of civilization, including cardiovascular disease, cancer, diabetes, and also suicides, was caused by electrification and the unique biological responses we have to it and that our evolutionary balance, developed over the millennia has been severely disturbed and disrupted by man-made EMFs.

FUTURE PROSPECTS OF HERBAL MEDICINE

Dr. A. Rajalakshmi, Asst. Prof. Of Zoology, Auxilium College, Vellore-6

Herbal medications have been used for the treatment of variety of ailments, a huge number of population in the world is entirely dependent on traditional medicines. In the last few years there has been an exponential growth in the field of herbal medicine and these drugs are gaining popularity both in developing and developed countries because of their natural origin and less side effects. Many traditional medicines in use are derived from medicinal plants, minerals and organic matter. A number of medicinal plants, traditionally used for over 1000 years named rasayana are present in herbal preparations of Indian traditional health care systems. The World Health Organization (WHO) has listed 21,000 plants, which are used for medicinal purposes around the world. Among these 2500 species are in India, out of which 150 species are used commercially on a fairly large scale. India is the largest producer of medicinal herbs and is called as botanical garden of the world.

There are about 400 traditional plant treatments for diabetes have been reported, although only a small number of these have received scientific and medical evaluation to assess their efficacy. Major hindrance in amalgamation of herbal medicine in modern medical practices is lack of scientific and clinical data proving their efficacy and safety. There is a need for conducting clinical research in herbal drugs, developing simple bioassays for biological standardization, pharmacological, toxicological evaluation, and developing various animal models for toxicity and safety evaluation. It is also important to establish the active components from the plant extracts.

AMAZING FACTS OF THE HUMAN BODY

Ms. Dhivya, Asst. Prof. of Zoology, Auxilium College, Vellore-6

Amazing facts of human brain:

1. Brain is 73% water. It takes only 2 % dehydration to affect your attention, memory and other cognitive skills.
2. Ninety minutes of sweating can temporarily shrink the brain as much as one year of aging does.
3. Each neuron can transmit 1000 nerve impulses per second and make as many as tens of thousands of synaptic contacts with other neurons.
4. A piece of brain tissue the size of a grain of sand contains 100, 000 neurons and 1 billion synapses all communicate with each other.
5. Brain generates about 12 -25 watts of electricity. This is enough to power a low voltage LED light.
6. Brain has a pattern of connectivity as unique as fingerprint.
7. Brain storage capacity is considered virtually unlimited.
8. Brain surgery can be performed while the patient is awake with no pain or discomfort. The brain has no pain receptors and feels no pain.
9. All of the blood vessels in brain end to end, they would stretch halfway to the moon (About 120, 000miles).
10. Human brain consumes more energy than any other part of the body.
11. The neo cortex makes up 75% of the human brain.
12. Human use more than 10% of their brains.

Amazing facts on heart:

1. Adult heart beats about 100, 000 times each day.
2. Heart rate drops while you sleep.
3. Heart has its own electrical impulse it can continue to beat even when separated from the body, as long as it has an adequate supply of oxygen.
4. The heart pumps blood to almost all of the body 75 trillion cells. Only cornea receive no blood supply.
5. The biggest heart on earth belongs to the blue whale, with a heart that weighs 1, 500 pounds.
6. The size of a heart valve is roughly the size of a 50 cent coin.
7. Woman's heart will beat faster than a mans.
8. Heart disease has been found in 3000 year old mummies.

9. Heart is about the size of two hands clasped together.
10. Heart beats 100, 000 times a day.
11. Each minute heart pump 1.5 gallons of blood.
12. Heart cancer is very rare because heart cells stop dividing early in life.

Amazing facts on eye:

1. An eye is composed of more than 2 million working parts.
2. Only 1/6 of the human eye ball is exposed.
3. 80% of our memories are determined by what we see.
4. There are about 39 million people that are blind around the world.
5. 80% of vision problems worldwide are avoidable or even curable.
6. A fingerprint has 40 unique characteristics but an iris has 256 l. A reason retina scans are increasingly being used for security purpose.
7. Eyes are the 2nd most complex organ after the brain.
8. You see with your brain not your eyes. Our eyes function like a camera capturing light and sending data back to the brain.
9. Eye colour is determined by the amount of melanin in iris.
10. Blink is more when we talk.
11. One of the most common cosmetic injuries is poking the eyeball with a mascara wand.
12. Eyes contain 107 million light sensitive cells.
13. A blink typically lasts 100 to 150 mille seconds.
14. Eyes are able to process 36, 000 pieces of information in a single hour.

Amazing facts on kidney:

1. The blood flow in kidney is higher than the blood flow in heart, liver and brain.
2. Kidney measure around 4.5 inches in length.
3. Kidney is no bigger than a standard computer mouse or a cell phone.
4. Each individual kidney weighs around 4-6 ounces.
5. In adult kidneys form only 0.5% of the entire body weight.
6. Each kidney consists of at least 1million to 2 million Nephrons. Nephron s are very tiny fitters that are capable of filtering blood and eliminating waste materials.
7. We can hold between 50 and 500 milliliters of urine in your bladder.
8. 50% of one single kidney is capable of doing the job that is performed by 2 kidneys together.

9. When dehydration sets in, kidney stop producing enough urine until hydration is restored and blood volume increases.

10. Kidney filters and return around 200 quarts of fluids into the blood stream each day. Nearly 2 quarts are lost in form of urine while remaining 198 quarts are recovered.

11. Excessive antacids and milk can cause kidney stones.

Amazing facts on Ear:

1. Ears have more than 20, 000 hair cells.

2. Ears work all night long.

3. Ears can influence taste.

4. You get a novel ear canal each year the ear canal skin continually increasing external at rate of 1.3 inches each year.

Amazing facts on Skin:

1. The average human will shed 40 pounds of skin in their life.

2. Each minute 41,000 dead skin cells leave your epidermis. This way our body loses up to 10 pounds (4.5 kg) annually!

3. Palms, soles of the feet and lips are the only areas of the skin without a hair follicle.

4. More than 30 million bacteria live on a square inch (6.5 cm²) of skin. Luckily, the great majority are harmless.

Amazing facts about Lungs:

1. The total length of the airways running through the two lungs is 1,500 miles or 2,400 kilometers.

2. Babies are born with pink lungs but they darken in colour as we breathe in polluted air.

3. It's impossible to breathe and swallow simultaneously.

4. If the inner surface of the lungs could be stretched out flat, they would occupy an area of around 80 to **100 square meters** — about the size of half of a tennis court!

5. Children laugh about 300 times a day. Adults laugh about 15 to 100 times a day. Laughter is the best medicine, may have some truth. It helps to boost the immune system.

6. The lung is the only organ that is capable of floating on water!

CROSSWORD

Ms. Dhivya, Asst. Prof of Zoology, Auxilium College, Vellore-6.

QUESTIONS:

1. It produces proteins in the cells
2. Organelle for biosynthesis of ribosome
3. Directs all cell action
4. The term that refers to a portion of DNA.
5. Kiwi is restricted to
6. A thick layer of fat found in whales
7. Sound box in birds is known as
8. Name of the 3rd cranial nerve
9. Bipolar neuron is found in
10. Organisms living on trees and branches
11. King crab
12. Second line of defense in the body
13. The sugar component present in RNA
14. Big toe is also called as
15. Galapagos island
16. Axolotl larva
17. Stage in development of organism
18. Deepest region of the ocean
19. Liquid part of the blood
20. Largest Mammal

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ANSWERS:

1. Ribosomes 2. Nucleus 3. Nucleolus 4. Gene 5. Newzeland 6. Blubber. 7. Syrinx 8. Occulomotor 9. Retina 10. Arboreal 11. Limulus 12. Blood 13. Ribose 14. Hallux 15. Darwin 16. Neoteny 17. Morula 18. Benthos 19. Plasma 20. Whale.

ENDOWMENT LECTURES

DNA FINGERPRINTING

Dr. Asha, Professor, School of Biosciences & Technology, Vellore Institute of Technology, Vellore, India.

DNA fingerprinting is a chemical test that shows the genetic makeup of a person or other living things. It's used as evidence in courts, to identify bodies, track down blood relatives, and to look for cures for disease.

Uses

Since it was invented in 1984, DNA fingerprinting most often has been used in court cases and legal matters. It can:

- Physically connect a piece of evidence to a person or rule out someone as a suspect.
- Show your parents, siblings, and other relatives may be.
- Identify a dead body that's too old or damaged to be recognizable.

DNA fingerprinting is extremely accurate. Most countries now keep DNA records on file in much the same way police keep copies of actual fingerprints.

It also has medical uses. It can:

- Match tissues of organ donors with those of people who need transplants.
- Identify diseases that are passed down through your family.
- Help find cures for those diseases, called hereditary conditions.

Fingerprint Test

To get your DNA fingerprint, you would give a sample of cells from your body. This can come from a swab inside your mouth, from your skin, the roots of your hair, or your saliva, sweat, or other body fluids. Blood is usually the easiest way.

The DNA is extracted from the sample and then augmented using a technique called PCR, or polymerase chain reaction, which replicates and amplifies the DNA sample in the lab. This amplified DNA is then cut at specific sequences with restriction endonucleases, and this is where the magic happens. Because each person's DNA is different, it will be cut by these enzymes at different sites, leaving us with pieces of different sizes. Specifically, these regions are called STRs, or short tandem repeats, which are regions of non-coding DNA that have specific and repeated nucleotide sequences. The number of times the sequence is repeated is unique to each individual, giving each of us fragments of different lengths. The fragments we end up with are called RFLPs, which stands for restriction fragment length polymorphisms, and the name reminds us that we are talking about fragments cut by restriction endonucleases.

The next step is to separate the fragments based on their size through gel electrophoresis. That sounds like a mouthful but it's actually pretty simple. The DNA fragments are put into agarose gel and then an electric current is applied to the gel. The shorter fragments move to the positive pole more quickly than the longer fragments, and the pattern of the fragment separation is compared to the reference sample for a match. We can see the different fragments because they've been stained with fluorescent dye, and this visualization in the gel is called electrophoresis visualization.

TIME TO WALK- MOLECULAR MOTORS OF LIFE

Dr. Kavitha Thirumurugan, Professor, School of Biosciences & Technology, Vellore Institute of Technology, Vellore, India.

Molecular motors are protein molecules that function as cargo transporter of the cell, carrying neuronal vesicles, skin pigment (melanophilin) and other vesicles. They are mechanoenzymes, utilize ATP to walk on the cytoskeletal protein, F-actin. ATP hydrolyzes into ADP and Pi and the release of the inorganic phosphate help the motors to move on actin. There are several molecular motors- myosin I in endocytosis, myosin II in muscle contraction, myosin V in organelle transport, kinesin in cell division, dynein in sperm motility, F_0-F_1 ATP synthases, RNA polymerases and ribosomes. Unlike myosins which walk towards the plus end of F-actin, dynein walks towards the minus end of microtubules. Myosins have globular motor domain (head) to bind and hydrolyze ATP and calmodulin binding lever arm with cargo-binding tail domain at the end. Myosin super family has 35 members whose head domain is conserved and the lever arm has variation in length. During ATPase cross-bridge cycle, myosin motor domain undergoes conformational changes, converting from pre-power stroke state to post-power stroke state, and release of Pi is the force generating step that propels the myosin V to walk on actin in a processive manner without detachment as 'high-duty' molecule. Sliding of thick (myosin) and thin (actin) filament in the presence of calcium, exposes the myosin binding site of actin to contract the muscles. In the absence of calcium and cargo, myosin V adopts inactive structure and folds back. This inhibited myosin is unable to bind F-actin and continue as cargo transporter.

High resolution technique, X-ray crystallography has been used to determine the atomic structures of these molecular motors. Where crystallography could not solve the structure of some of these motor proteins, Cryo-electron microscopy at a single molecule level deciphered their structures. In this technique, protein molecule has been frozen in water, closer to native state and analysed through high resolution transmission electron microscope (HRTEM). Collection of many single particles (at

least several thousands), aligning and classifying them with the help of several image processing tools finally solve the 3D structure of these molecules. Optical trap measures the step size of myosin on actin, kinesin and dynein on microtubule. *In vitro* motility assay determines the movement of these motors on their respective tracks.

How do the motors move in the crowded complex milieu of the cell is an interesting question. When motors oriented in opposite directions (plus end, minus end) walk past each other on unique cytoskeletal cables (actin, microtubule), they have to reach their destination with less collision and more precision, co-operatively. This is not an easy task to accomplish given the speed with which they operate and the number of motors involved in the interaction.

What is the relevance of these fundamental functional motors in medicine? Mutation in cardiac myosin results in familial hypertrophic cardiomyopathy, causing sudden death of athletes; mutation of myosin in deafness; mutation of dynein in sterility; mutation of kinesin in neurodegenerative diseases.

CANCER AND RAS: DRUGGING THE UNDRUGGABLE TARGET

Dr. Harrys K.C Jacob, Post Doctoral Scientist, Sylvester Comprehensive cancer center, Miami School of Medicine, Miami, USA.

What is cancer? Cells that are immortal and have a cellular machinery that is out of control and has been replicating without control and in the process recruiting factors and blood vessels to help it grow faster and reached to a point that it starts to obstruct essential functions of organs. Among one of these proteins that have been studied for nearly 40 decades is the Ras protein. There are several forms of the protein called isoforms and they have been extensively studied over all these years. However, the scientific community has been unable to drug this molecule to inhibit its activity and there are extensive efforts all over the world in order to drug this molecule without much success.

Scientists are hence resorting to other strategies to inhibit this molecule and they do so by looking at signaling proteins that this protein talks with downstream of the signaling pathway. There are good inhibitors available for some of these proteins such as the Rafs, Meks and Erks but clinically of not much avail as the cancer cell can compensate and form signaling partners with other proteins and thorough alternate signaling can still cause cancer cells to grow.

One of the molecules our lab has focused on is Kinase suppressor of Ras (Ksr). It has been described in literature as a scaffold protein that allows for different molecules to come and interact and transmit the signal from Ras to the final nuclear transcription factor that controls cell proliferation. Our lab has been able to show that other than a scaffolding function, the molecule can be an active

enzyme a kinase to be precise. We have tried to understand how the signaling is modulated when you stop the Ksr kinase. We have had success in understanding what Ksr interacts with downstream and how we can understand it's mechanism of action. Currently, there has been the development of a chemical inhibitor that seems to work in cells against Ksr kinase activity and we are looking to see how signaling in this pathway can be inhibited so that we can stop cancer cells from proliferation.

NCBI THE BIOINFORMATIC RESOURCE

The National Center for Biotechnology Information is one of the premier resource databases and repositories for all sorts of information on biological data from all experiments that have been done. It is also a database that can be used by researchers to access and analyze data to make sense of it and to also design experiments. The students were trained in order to understand the components of the database and how one can access relevant information that is needed for research. They students were taught on the use of search engines and bioinformatic tools to design PCRs and also to obtain information that could be further used in their research. Basics of accessing NCBI and understanding its layout and functionality was explained to the students.

Post training students were comfortable in accessing the database and had some trial runs workshop to see if they understood the concept. Bioinformatics is a major part of research and wet lab work is not the only thing. One must be able to understand the data that instruments spew forth and having databases will help recheck and not re-invent the wheel when it comes to showing new data. One must be capable enough to search literature on these databases and make sure that they are doing a novel work and provide substantially important information to the scientific research community. All biology students should have a working environment that encourages them to use bioinformatics to answer and investigate new angles in their research.

STUDENT CORNER

AN INTRODUCTION OF EXOTIC SPECIES

Sindhuja G., Varshini Prema Kumari ., Yasmin M .

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It is a non-indigenous species or non- native species living outside of its native distributional range, which has arrived there by human activity, either deliberately or accidentally. Introduced species that become established and spread beyond the place of introduction are called invasive species. The impact of introduced species is highly variable. Some have a negative effect on a local system, while other introduced species may have no negative effect or only minor impact. Some species have been introduced intentionally to combat pests. In case of genetics when a new species is introduced, the species could potentially breed with the members of native species, producing hybrids. The effect of the creating of hybrids can range from having little effect, a negative effect, to having devastating effects on native species. Potential negative effects include hybrids that are less fit for their environment resulting in population decreases. The result of this introduction included increased levels of heterozygosity and a large population size.

REVIEW PAPER ON SUSTAINABLE ECOLOGICAL SANITATION

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Abstract

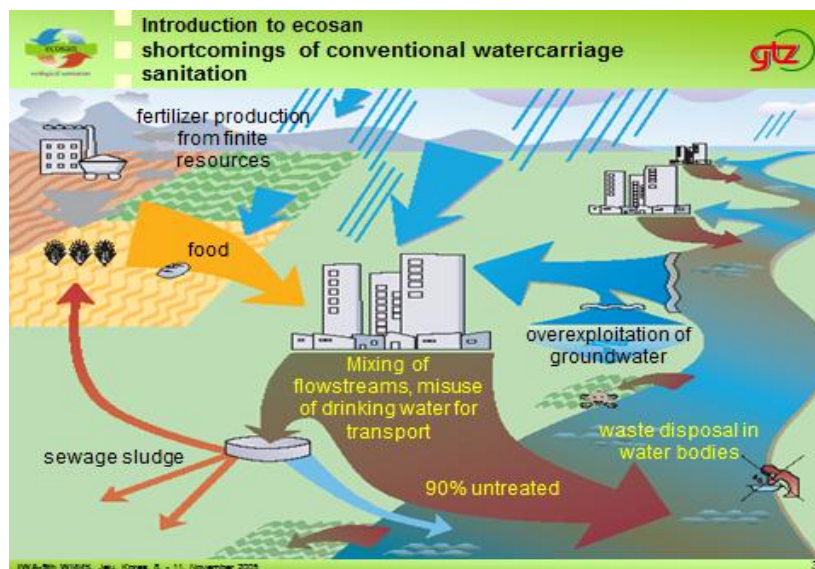
Today world is growing more competitively in all aspects but sanitation is lacking in our country even in our streets. As cities expand and population increases, the situation will grow worse and the need for safe, sustainable and affordable sanitation systems will be even more critical. Many parents want their children to be grown in a high standard of living and in a well sophisticated way but no one is interested to grow their children in a well sanitized environment. Now days maintaining sanitation is an important issue where the government and the people are not at all bothered, lack of sanitation will lead to so many diseases and infections. We have to take some initiatives to maintain sanitation even from our house level.

The famous saying is that "Today's waste will be a tomorrow's wealth". So never leaves them to be dumped or run off or mixed with other pollutants. Use proper methods to recycle the waste water and to reuse it in order to overcome water scarcity but also to reuse its nutrients (urine is a nitrogen rich

fertilizer).If it is done in our Municipalities we can get dual benefits like more natural fertilizer and the amount of waste getting useless can be prevented. By doing like this we can minimise the amount of waste.As a result of it we will become eco-friendly,pollution can be reduced.

Introduction

Ecological sanitation(Ecosan) strives to bring the elements contained in wastewater streams back into the natural cycle (agriculture).Sustainability is defined as a process of meeting human development goals while sustaining the ability of natural systems which continue to provide the natural resources and ecosystem services upon which our economy and society depends. Starting in 1970s, as wastewater treatment research received much attention and saw major developments; the topic of composting toilets has been neglected by the sanitation community including researchers and professionals. Yet, with the new sustainability paradigm of the 21st century, interest in composting toilets has been growing. With this growing interest and yet gaps in knowledge about the engineering of composting toilets, it is now timely to revisit the status of composting toilets and bring awareness to this technology so they can be better evaluated for possible adoption as an alternative sustainable sanitation system.This paper gives some project examples to show how the sustainable sanitation is maintained as the eco-friendly in the environment.



Literature Review

There are some sanitation techniques that should be followed as a practise in our environment. In water based systems, the flushed water source can be potable water, rainwater, or

grey water and the treatment can be achieved via various methods such as conventional wastewater treatment constructed wetlands or living machines (eco-machines) Though all these sanitation technologies provide the same function of treating human waste, potable water based systems with conventional wastewater treatment or with septic tanks are primarily the ones used in the developed world.

Composting based sanitation systems are known as composting toilets, dry toilets, biological toilets, bio toilets, or waterless toilets. They are typically made of plastic, ceramic, or fiberglass. A composting toilet has two primary components; the toilet and the composting tank. The other parts of a composting system often include a fan and vent pipe to remove any odour. [1]

Types of sanitation Techniques

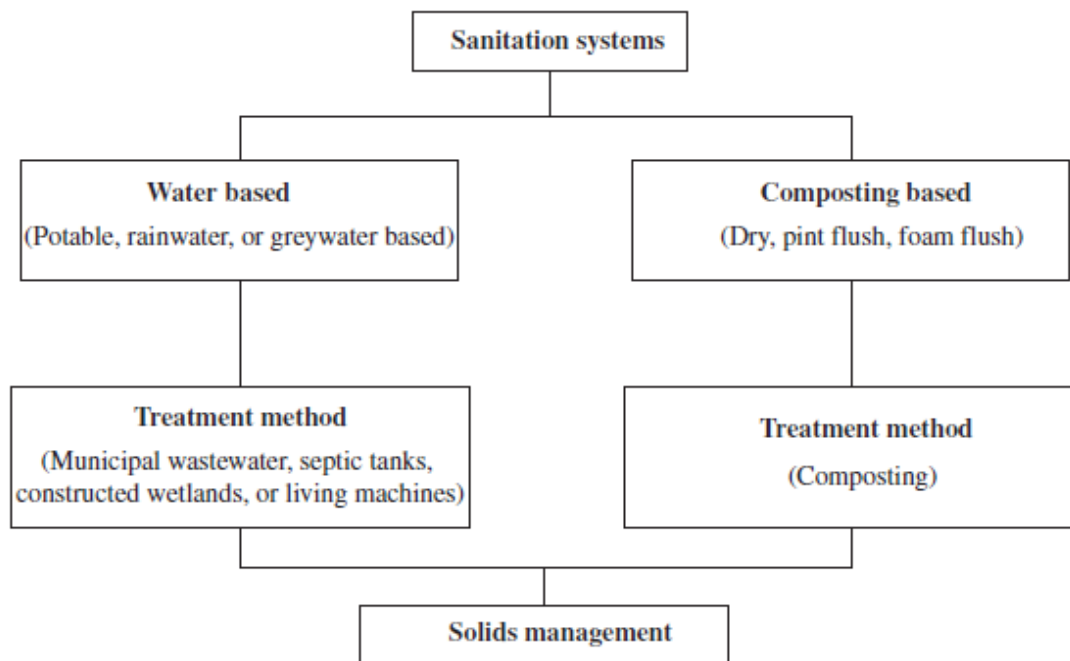


Fig. 1. Sanitation technologies.

Ecological sanitation introduces the concept of sustainability and integrated, ecosystem oriented water and natural resources management to sanitation. The basic principle of Ecosan is to close the nutrient loop between sanitation and agriculture with the objectives. The advantages are as follows:

- Improvement of health by minimising the introduction of pathogens from human excrement into the water cycle
- Promotion of recycling by safe, hygienic recovery and use of nutrients, organics, water and energy

- Conservation of resources (lower water consumption, chemical fertilizer substitution, minimal water pollution)
- Preference for modular, decentralised partial-flowsystems for more appropriate cost-efficient solutions
- Possibility to integrate on-plot systems into houses, increasing user comfort, and security for women and girls
- Contribution to the preservation of soil fertility

Based on the results of the studies some broad observations can be drawn: (i) conditioning the soil with human excreta enhances crop productivity when compared to the control (no treatment); (ii) ammonia losses from urine depend on the manner in which it is spread and introduced in the soil and can be minimized through practices such as harrowing (iii) nutrients present in excreta are either plant available or are become plant-available over time as compounds with low solubility such as inorganic P (> 95% of *tot*-P) (iv) yields of excreta-fertilized plants are similar to that obtained when mineral fertilizers are added in the same ratio; however, the yield is sensitive to N-loading from urine which is a fast-acting liquid fertilizer ; and (v) the attraction towards urine largely stems from aspects such as low capital investments, ease of infrastructural retrofitting, demonstrated increase in crop yields, the promise of an essentially 'free' and sustainable supply of nutrients and simultaneous improvement of sanitary hygiene through use of diverting toilets.

Human faecal sludge (HFS), in the context of onsite sanitation, generally encompasses the semi-solids mixture of fresh, unprocessed or partially digested excreta (a mixture of urine and faeces only), along with associated sanitary cleansing products typically found at and in sanitation facilities such as septic tanks, dry toilets and open-defecation sites. It may also contain black water, with or without grey water; and makes up the largest amount of bodily waste generated daily. HFS is highly heterogeneous and variable in content, consistency, quantity, composition and concentration. Fig. 2 shows the characteristic composition of HFS.

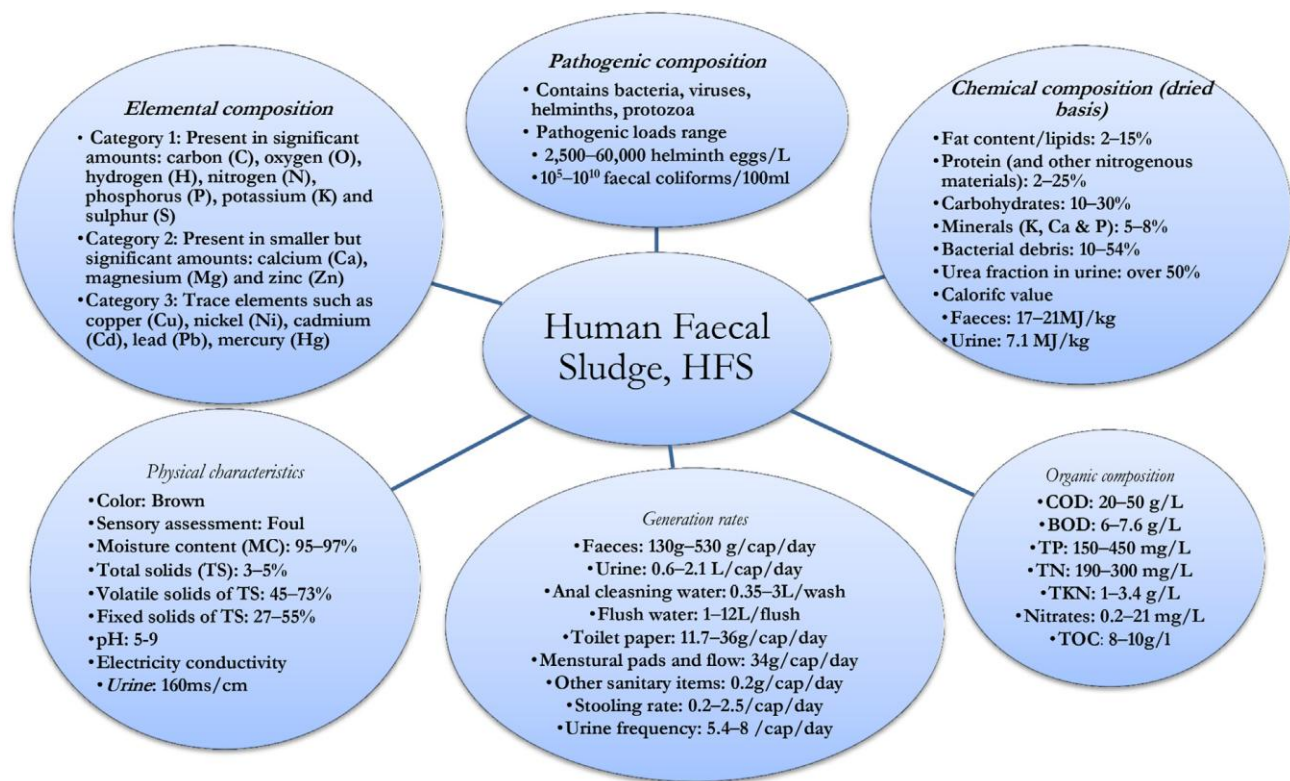


Fig 2 Characteristic composition of HFS

The Ecosan system is considered for large hospital complexes. The sanitation devices included are: gravity separation toilets using rainwater for flushing which allow the separate collection of 80% of undiluted urine apart from faeces, i.e. 20% of urine is misdirected with faeces flow, one waterless urinal, one sink and one small kitchen (sink and dish washer). Wastewater output from the building consists of 3 main flows: Brown water including flushing water, faeces and 20% of misdirected urine; Yellow water, corresponding to 80% of urine left; Grey water from the utilization of water for sinks, washing machines, and kitchen. Yellow water is collected and discharged by gravity into pump wells, from which it is pumped to the holding tanks for at least 6 months in order to meet the sufficient hygienic requirements before the application onto farmland as fertilizer. Brown water is assumed to be drained off by gravity to the pumping station from where the mix is pumped to the solid–liquid separator. The solid fraction is further thickened and transported to the anaerobic digester, where it is treated and converted into biogas assumed to be composed of only CH₄ and CO₂. Grey water is collected by gravity drainage and treated (Fig. 3). Biogas contains roughly 53–73% methane, 30–40% carbon dioxide and trace of other gases such as nitrogen and hydrogen sulphide [5].

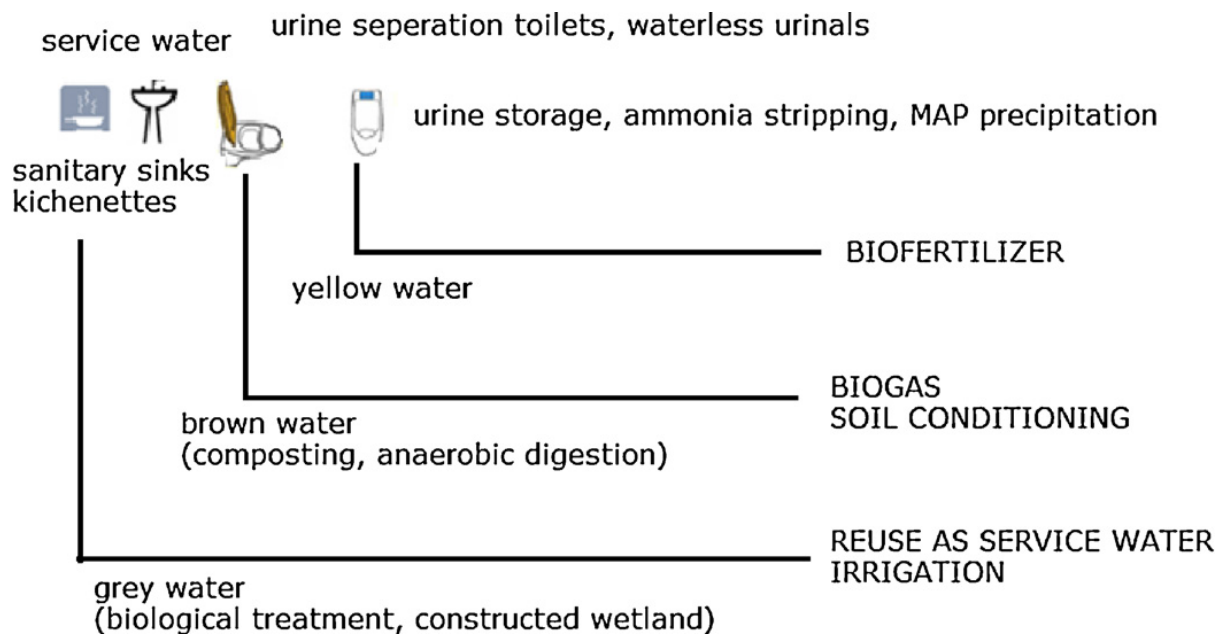


Fig 3 Ecosan services at hospitals

The major waste streams into the environment in urban slums are excreta, grey water and solid wastes. Excreta refer to urine and faeces. They form a major health risk due to the presence of pathogens in faeces and the mobility of nutrients and micro-pollutants in urine. Grey water is wastewater of domestic origin from bathroom, kitchen, and laundry use, excluding wastewater from the toilets. Solid waste management is one of the major problems to the environment and to public health faced by developing countries. The growth of cities in developing countries has resulted in growth of urban areas that generate large amounts of organic solid waste.[6]

Treatment of waste streams in urban slums using sustainable technologies preserves their reuse potential to recover resources. Technologies and institutional aspects complement each other in the collection, transport, treatment and disposal or reuse of the waste

Collection of sewage

1. Off-site arrangement

Sewage here refers to combined excreta and grey water. It is collected and transported under gravity by a pipe network to the stabilization ponds for treatment before discharge into the receiving environment

2. On-site arrangement

A flush toilet connected to a septic tank that also receives grey water is an onsite system for sewage collection and treatment. The system requires water to transport the waste in pipes to a septic tank where it undergoes anaerobic treatment.

Treatment

Pit latrines-The types of pit latrines in slums include traditional ones are made of wood poles and mud and ventilated improved pit latrines (VIP). Unlined pit latrines are usually elevated in slum areas with a high water table. In slums, pit latrines are shared by many households as a result of high population density and limited space.

Bio gas Toilets-Biogas toilets need to be implemented within biogas sanitation systems that address the transportation, storage, treatment, and reuse or disposal of the end products. The facility consists of a toilet connected to a digester and biogas is stored under the fixed dome by hydraulic displacement of the digesting slurry inside the digester. This technology has been implemented in slums in India at households for excreta disposal and for use in slums as public toilets linked to a biogas plant or effluent treatment systems for nutrient recycling.

Implementation of biogas toilets requires skilled personnel at local level for process control. The occurrence of pathogens in the digestate and the investments cost that are still not affordable by the majority in the targeted communities remain unexamined issues despite the good social acceptance of biogas toilets.



Fig 4 Bio gas toilet system in India

Conclusion

The Eco-San systems aim to recover resources from wastewater with the minimized demands on other resources, particularly for water and energy. Therefore, the separate collection and treatment of water flow is not a prerequisite in Eco-San systems, since the centralized and combined flow systems are also possible. The recovery and agricultural use of the organic matters and nutrients contained in sewage would improve soil structure and fertility as well as increase agricultural productivity. The recovery of energy through the anaerobic digestion of feces and organic waste represent a significant step towards energy efficiency.

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AMAZNG ANIMAL FACTS

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1. Jelly fish and lobsters are considered biologically immortal – they don’t age or will never die unless they are killed.
2. Elephants brain react to humans the same way that humans brains react to puppies – they think we’re cute.
3. The stomach acids found in a snakes stomach can digest bones and teeth but not fur or hair.
4. The type of diet a bird eats in the wild is directly related to the shape of a birds beak .
5. A snake can go a year without food if it digest its own heart and after a good meal the heart will grow again.

DID YOU KNOW!

Ms. Yasmin. M., Ms. Pavithra . V

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1. India is the only country which has both Lion and Tiger.
2. Rabbit is the only animal which eats their own faecal matter.
3. Shark have a immunity power to fight against cancer.
4. Rainwater contain Vitamin B12.
5. The smell after rain is because of the bacteria called Actinomycetes.
6. Colour chalk is made out of Planktons.
7. The spreading of pheromone of snake is inhibited by the smell of egg and milk.
8. The group of Crow is called Murder.
9. The group of Giraffe is called Tower.
10. The male kangaroo is called as jack, The female kangaroo is called as jill and the young one is called as joey.
11. The kangaroo meat contains only 2% of fat and remaining 98% of protein.
12. The crane is called as “one leg saint”.
13. India is the home for most endemic species.
14. Turtle exist from before the Jurassic period.
15. All babies are color blind when they born.
16. When the pregnant women affected by heart disease the fetus send stem cells from the uterus to repair it.
17. Hydra will not die, because it undergo regeneration.
18. Penguin has the ability to convert salt water into freshwater.
19. When the penguin is depressed it commit suicide.
20. Cockroach even survive when its head is removed , it dies only because of starvation.
21. Cats have 24 more bones than humans.
22. Mango can bear fruits even after reaching its peak age of 300 years.
23. Bees are able to detect bombs with their tongues.
24. Scorpion venom is the most expensive liquid on earth.
25. Fireflies are the most efficient producers of light in the world, even when compared to modern light bulbs.
26. A grapefruit is a biggest thing that a whale can swallow.
27. Two days after a death of an ant it give some odor so that other ant carry it to an ant graveyard.
28. Mosquitoes have killed humans than all the wars in the history.
29. The human brain is about 75% water.

30. Jellyfish and Lobster are considered biologically immortal. They don't have age and will never die unless they are killed.
31. Saturn's rings are not solid. They are made up of bits of ice, dust and rock.
32. A cat's brain is 90% similar to humans.
33. The Statue of Liberty was made with copper but due to oxidation, it changed to green.
34. Iceland is the most peaceful country in the world.
35. The stomach acid is enough to dissolve a razor blade.
36. 70% of oxygen we breathe is produced by the ocean.
37. The human heart is the only muscle that continuously works for a lifetime.
38. One puffer fish contains enough poison to kill 30 people.
39. Sharks never stop moving when they sleep or at rest.
40. Sulfhemoglobinemia is a condition where a person develops green color blood.
41. Male kangaroos flex their biceps to impress females.
42. The shell is 12% of an egg's weight.
43. A blue whale can go up to 6 months without eating.
44. The hardest bone in the human body is the jaw bone.
45. Snakes sleep with their eyes open.
46. Dolphins and whales don't drink water.
47. Penguins spend about half of their lives on land and half in the ocean.
48. Shrimps are born male, but slowly grow into females as they mature.
49. Earthquakes can turn water into gold.
50. Ants carry out wars and enslave other ants.

INDIA AS MEGA BIODIVERSITY

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Bio diversity was coined by Edward. Diversity of nature is the various plants and animals their genes and the ecosystem, regarding the diversity of the nature found in India, it is mega diversity.

Uniformity is not the nature's way

Diversity is the nature's way.

There are several billion of species found in the world out of which only 1.5 billion species has been named. Biodiversity are found much in the tropical areas 90% of the worlds diversities can be seen in tropical areas.

In India we see a mega diversity which consists of various species of plants and animals.

Biodiversity is celebrated in India has major reason on food producing crops like rice, wheat and corn are the major crops which feed the 90% of the total world's population. Since agriculture is the backbone of us and India has a major role of cultivating their crops and helping the world.

How is the crop production related to biodiversity?

The important and very essential process of crop production and cultivation is basically carried out by various kinds of insects, bees etc,

It is a fact that if bees became extinct the world would come to an end within few years.

India has variety of bees and insects which helps in bio diversity without these insects it is not possible to carry out agriculture by pollination so their insects and plants stay symbiotic in biodiversity.

How animals of India play a role in biodiversity:

Animals have a major role to be played in biodiversity. They helped man to live a beautiful life in India. The animals maintain the ecosystem and the food chain which is very important rule of living. Food chain which starts from the producers plants carried out by the consumers and ends in decomposers. so the union of all the living species of the India has to be celebrated for the biodiversity. India takes many steps to protect and take care of various species.

Example:

- Few years ago Bengal tigers population has been greatly reduced and immediate steps has been taken to prevent the animal from extinction
- A 25 paisa coin has been introduced to print with the picture of one horned Rhinoceros to prevent the animal from extinction
- Various rules are put forward by the blue cross in order to maintain our biodiversity.

Reasons for celebrating biodiversity:

Beauty of biodiversity – India looks beautiful with all the different species in plants and animals. We have various forest and zoological parks where the biodiversity can be clearly seen. Ottacamund (ooty) has a botanical garden where we can see a variety of flowers and herbal plants. Kerala is a state where it is given much importance for the cultivation of crops and growth of animals.

Many parks like Guindy national park, vandaloor zoo mudhumalai elephant resort, has a very important role in maintaining and celebrating biodiversity.

Biodiversity is the key of living and it is the duty of everyone to preserve it at any cost. – Thomas eisen.

According to the quotes it is the duty of every citizen of India to prevent and celebrate the diversity of nature.

Life would become impossible without biodiversity

since varieties of forms are seen in India, which adds duty to the country it is very important to protect them for our future generation.

Awareness:

It is essential to protect the biodiversity to celebrate it. We would have thought that a sparrow which is most commonly found in our streets which add beauty to the environment is becoming extinct due to the signals of various satellites.

Elephants are widely killed for their tusk. Various trees are destroyed for the use of furniture etc., it so necessary to build very big houses and apartments by destructing the place of living of our animals. It is not necessary to have unnecessary decorations for our house by destroying trees.

Biodiversity is the key

let us not astray.

Hence, care should be taken by every citizen that the extra decoration which comes out of the plants and animals add additional beauty but without them life itself become impossible.

Let us all have uniformity in maintaining the
diversity of nature.

The beauty of biodiversity can be celebrated well only if it is maintained well. All the species are interrelated to one another. When there is destruction in any one of the level of species (or) hierarchy, the entire biodiversity can be stopped.

Hence, India has “mega diversity” We all must celebrate the mega diversity by maintaining them properly.

These animals and plants are also distributed in various regions and also have appropriate climate conditions for the growth and hence it has all qualities for celebration.

Let us celebrate the diversity by maintaining them
with sincerity.

MY ROLE IN CONSERVING BIODIVERSITY

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Introduction:

Our mother land India is enriched with the heritage of diversities it is not only a country of many religion and culture but also a source for many different varieties of flora and fauna. The evolution theory of Lamarck and Darwin is sufficient for anyone who wants to know how life evolved on earth. But it ultimately ends with single concept that is the “Hand work of the creator, the almighty”.

Hence India is a country of biodiversity. The role of biodiversity is a significant and vital part in existence of life. Biodiversity is a part and a parcel of biotic environment for the sustainability of living organisms.

What is biodiversity? Bio – means life, living, Diversity- means different varieties, kinds. Biodiversity includes all forms of living organisms from unicellular organism (amoeba), to the largest developed and most efficient creature, the human. The flora and the fauna of the

biodiversity each play a vital role in their space thus creating a more vivid chance for the other organisms to grow. Based on the evolution theory of natural selection, or theory of Darwin, the different forms of life exist after surviving struggle for existence. The variation and hereditary and the struggle for the survival of the fittest has led to the decline of the feeble creatures and nourished and nurtured the growth of fit animals and plants. Thus, biodiversity is the inclusion of all forms of living organisms. The earth is huge bio diversity, where all living beings come under one roof, the atmosphere.

Conserved biodiversity! Why? Why conserve biodiversity? Conserving biodiversity is not an optional choice but it can be regarded as the fundamental duty of each living being. The reason, we have unusual climatic conditions, rear rainfall, hotter planets is because we have tampered the biodiversity. We have been unaware of what / of how serious, the effects of eradicating or extinction of animals could be? How many of us have seen dinosaurs? None of us, I could say because we have not been nice to them .We have seen them as some evil creature. Now, how we wish to see them. We buy the first class tickets to watch a Jurassic movie, but where have our sense's been when we have them live on the earth. "To err is human" – says a proverb, But that does not mean, that we keep erring of and be unaware of the critical conditions of the destruction of the biodiversity.

Top reasons – why you should conserve biodiversity:

(i) Destruction of any animal / plant – will lead to the fatality of the closely linked animal species or the growth of the other (prey) may grow in unexpected number. For instance: if we do not have snakes, our environment would be full of lizards, if there are more lizards, there would be no ants. "Every animal is important in a biodiversity"

(ii) The destruction of the biodiversity hampers the food web/ food chain of that community. The species that do not have sufficient energy flow would die of starvation. Grasshopper ----- lizards ----- snake ----- eagles/vulture

Hence you need a balanced existence of all species of animals and plants in the nature.

(iii) Destruction/depletion of the biodiversity has a heavy impact on the climatic conditions of that place. Today is a global warming is a vibrant topic of the discussion. What is the reason? It is because we have cut down trees, made spaces for luxurious apartments? How long will you survive???(iv) Man is a selfish creature. He wants to become rich, Richer and wants to be the richest. But it is right to become rich by destroying the basic needs of others. We have

destroyed the homers of thousand of plants and animals to become rich. Where are we leading too? What would be the state of our children???

(v) “The best gift that you give your child is the nature in its full glory” – Barak obama – Lets give, the best gift to our beloved generation. Stop – destroying, Start – Building.

(vi) The destruction of the forest in the bio-diversity has its own influence:

- Soil erosion
- No natural barriers and thus unusual and unpredictable weather conditions.
- No natural Medicine.

Thus, protecting/conserving our forests would contribute more than you think.

My role in conserving Biodiversity:

“Every little drop of water makes a Ocean”. Each individual’s part in conserving a party of the biodiversity can not only conserve it but enrich it with many more species.

Conserving a biodiversity does not mean, It put a fence around the forest and I protect it but it means that I take effort to ensure that diversity is as what I should be.

“A Thousand miles start with a single step”It does not matter, how for you go, but all that matters it the first step. The first step is always a crucial one. Hence the first step starts with you. The first step starts with me. What can I do to conserve my biodiversity?

1. Stop, encouraging animal being pestered in circuses.
2. Educate people the effects of biodiversity destruction; I will try to start with my family.
3. Stop ill treating animals
4. Encourage – Afforestation
5. go green
6. Avoid Plastics
7. I will try to lessen the pollution, beginning with my house

Sometimes taking resolution may seems harden or sometimes impossible but once followed, it will give us good results, pollution free environment rich biodiversity and diverse animals and plants.

Leave behind luxurious apartments, millions of bank balance rich ornaments!

Conclusion:

“Any distance can be walked” any form of environment can be conserved, if we are confident of ourselves that we can conserve our environment. It is our duty to ensure that we act as ambassadors to safeguard our heritage. We also pledge in our gatherings that we are proud of India’s rich heritage? But are you really proud? If proud, why destroy? Start conserving the biodiversity. We may die & perish the biodiversity will be a guardian to our children. Conserve, Biodiversity and you have no fears of your generation.

BIODIVERSITY OF INDIA

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The term” biodiversity” encompasses the variety of all life forms on earth. It is identified as the variability among living organisms and the ecological complexes of which they are part, including diversity within and between species and ecosystem. In simple words it can be defined as “variety, variability between genes, species and ecosystem. The term biodiversity was coined by “Walter and Rosen” in 1985.

Measurement of Biodiversity

Biodiversity is measured by two major components:

1. Species richness, and
2. Species evenness.

Species richness

It is the measure of number of species found in a community

Alpha diversity

It refers to the diversity within a particular area or ecosystem, and is usually expressed by the number of species (i.e., species richness) in that ecosystem.

Beta diversity

It is a comparison of diversity between ecosystems, usually measured as the change in amount of species between the ecosystems.

Gamma diversity

It is a measure of the overall diversity for the different ecosystems within a region.

Species evenness

It measures the proportion of species at a given site, e.g. low evenness indicates that a few species dominate the site.

Genetic diversity

Genetic diversity is the total number of genetic characteristics in the genetic makeup of a species. A single species might show high diversity at the genetic level [E.g. Man: Chinese, Indian, American, African etc.]. India has more than 50,000 genetically different strains of rice, and 1,000 varieties of mango.

Genetic diversity allows species to adapt to changing environments. This diversity aims to ensure that some species survive drastic changes and thus carry on desirable genes.

Species diversity

Species diversity is a measure of the diversity within an ecological community that incorporates both species richness (the number of species in a community) and the evenness of species.

For example, the Western Ghats have a greater amphibian species diversity than the Eastern Ghats. There are more than 200,000 species in India of which several are confined to India (endemic).

Ecological diversity

Ecological diversity refers to the different types of habitats. A habitat is the cumulative factor of the climate, vegetation and geography of a region.

It includes various biological zones, like lake, desert, coast, estuaries, wetlands, mangroves, coral reefs etc.

Biodiversity of India

India is recognized as one of the mega-diverse countries, rich in biodiversity and associated traditional knowledge. India has 23.39% of its geographical area under forest and tree cover. With just 2.4% of the land area, India accounts for nearly 7% of the recorded species even while supporting almost 18% of human population.

In terms of species richness, India ranks seventh in mammals, ninth in birds and fifth in reptiles.

In terms of endemism of vertebrate groups, India's position is tenth in birds with 69 species, fifth in reptiles with 156 species and seventh in amphibians with 110 species.

India's share of crops is 44% as compared to the world average of 11%.

India Represents

Two 'Realms'

Five Biomes

Ten Bio-geographic Zones

Twenty five Bio-geographic provinces

Realm is a continent or sub-continent sized area with unifying features of geography and fauna & flora.

The Indian region is composed of two realms. They are:

1. The Himalayan region represented by Palearctic Realm and
2. The rest of the sub-continent represented by Malayan Realm

In world Eight terrestrial biogeographic realms are typically recognized. They are

1. Nearctic Realm
2. Palearctic Realm
3. Africotropical Realm
4. Indomalayan Realm
5. Ocenaiia Realm
6. Australian Realm
7. Antarctic Realm
8. Neotropical Realm

Biomes of India

The term biome means the main groups of plants and animals living in areas of certain climate patterns.

It includes the way in which animals, vegetation and soil interact together. The plants and animals of that area have adapted to that environment.

The five biomes of India are:

1. Tropical Humid Forests
2. Tropical Dry or Deciduous Forests (including Monsoon Forests)
3. Warm deserts and semi-deserts
4. Coniferous forests and
5. Alpine meadows.

Bio-geographic Zones

Biogeography deals with the geographical distribution of plants and animals.

Biogeographic zones were used as a basis for planning wildlife protected areas in India.

There are 10 biogeographic zones which are distinguished clearly in India. They are as follows:

Trans-Himalayas,

Himalayas,

Desert,
Semi arid,
Western Ghats,
Deccan peninsula,
Gangetic plain,
Coast,
North east India,
Island.

India has two hot spots- the Western Ghats and the Eastern Himalayas. India is considered as 25th world's biologically richest and most threatened ecosystem.

FEW ENDEMIC SPECIES OF INDIA

Salim ali's fruit bat
Wroughton's free tailed bat
Leaf nosed bat
Lion tailed macaque
Kondana soft furred rat
Nilgiri leaf monkey
Namdapha flying squirrel
Nilgiri tahr
Indian flying squirrel

THREATENED SPECIES OF INDIA

The species that are going to extinct in the nearby future.
Asiatic wild ass
Gaur
Slow Loris
Sikkim rat
Andaman rat
Barasingha
Four horned antelope
Black buck

Wild goat

Assamese macaque

ECONOMIC BENEFITS OF BIODIVERSITY

FOOD:

All our food comes from plants and animals. About 80,000 plant species are used as food.

MEDICINE:

The plants that have medicinal value are used in pharmaceutical industry. Ex: *Aloe vera*, *Catharanthus*, *Rauwolfia serpentine*, *Datura*, *Withania somnifera*, etc.

SOCIAL BENEFITS:

Biodiversity is important for the maintenance and sustainable utilization of goods from our ecosystem. It helps in maintenance of hydrological cycle, protect soil, increase soil fertility, etc.

ETHICAL BENEFITS:

Many plants, animals, forests, landscapes and rivers are considered as holy and worshipped by people. These belief play an important role in conservation of many species.

SACRED SPECIES: plants like tulasi, neem, ashoka tree, papal tree. Animals like cow, monkey and cobra etc.

SACRED GROOVES:

It is a small patch of land with fauna and flora protected by local community in dedication to deities. ex: nagabanas. It is the storehouse of many rare and endemic species.

SACRED LANDSCAPE:

It is a large area contains a variety of natural and traditionally managed ecosystems. Ex: river Ganga.

PRESENT STATUS OF BIODIVERSITY:

As days goes on the richness of species starts to decline. The last survey states that for every 10 minute a species is becoming endangered, for every year 10 to 15 % of species becoming endangered.

MAIN THREATS TO BIODIVERSITY:

Loss of habitat, degradation, fragmentation, over exploitation of resources, climate change, poaching, conflict between man and wildlife.

BIODIVERSITY CONSERVATION:

The process of conserving the ecosystem with its flora and fauna for its benefits.

NEED TO CONSERVE BIODIVERSITY:

To maintain the ecological balance, to maintain the beauty and richness of the place, to assure our survival, stability and our existence.

EVERY PARENT NEED NOT SAVE ANY WEALTH FOR THEIR CHILDREN, EACH MUST PLANT ATLEAST A SINGLE TREE WHICH IS THE WEALTH OF THE FUTURE.

“THE DIVERSITY IN NATURE IS OUR FUTURE SO TRY TO CONSERVE AND CO-EXIST WITH IT. “

ART WORK

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