univ voice

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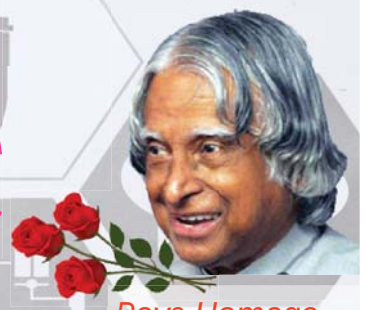
University of Kerala

SCIENCE special issue



Pays Homage…

Guest Editor Speaks

Connect Science to Community

Dr. Achuthsankar S. Nair
Professor & Head, DCB, UoK

Let me first of all express my happiness over a Univvoice issue on scientific research. As a science teacher and humble researcher, I feel that science communication is crucial for science to connect to the community. That our own Department of Journalism and Communication is scripting it make me very happy.

Innovation is a key word in academia today. In ordinary parlance, the world is simply a reference to any new or curious method or product. In science and technology field it is a reference to economically or socially successful innovation.

The Jaison Watertap patented by a non-technical Trivandrumite, J. Subramany in 1960s is perhaps the best local example. The amount of water wastage it would have prevented and the consequent saving it would have made to the society is easily imaginable.

Our University in its early incarnation as University of Travancore was a pioneer in need based research. The problems that arose due to Second World War, practical issue of traditional forest and fish industry were the focus of research and the university did impactful research. at present, we have no stock-taking. Univvoice is doing exactly that and impresses us that our university and state is active in innovation.

AS Gandhi reminds us every piece of research must be relevant to the Daridra Narayana. Let the readers decide.

READ INSIDE

Some carnivorous plants act as blue 'fluorescent lamps' to lure prey, discovered in the researches by scientists at Jawaharlal Nehru Tropical Botanic Garden and Research Institute, Thiruvananthapuram.

Read More...Page 5

The Department of Computational Biology and Bioinformatics has come up with an interesting study on the effect of music upon the growth of foetus.

Read More...Page 4

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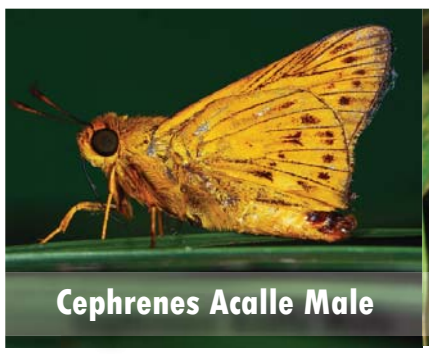
Read More...Page 4



Cephrenes Acalle Male

Southern Birdwing

105 species of butterflies are found at Kariavattom Campus

Flying Jewels of Campus

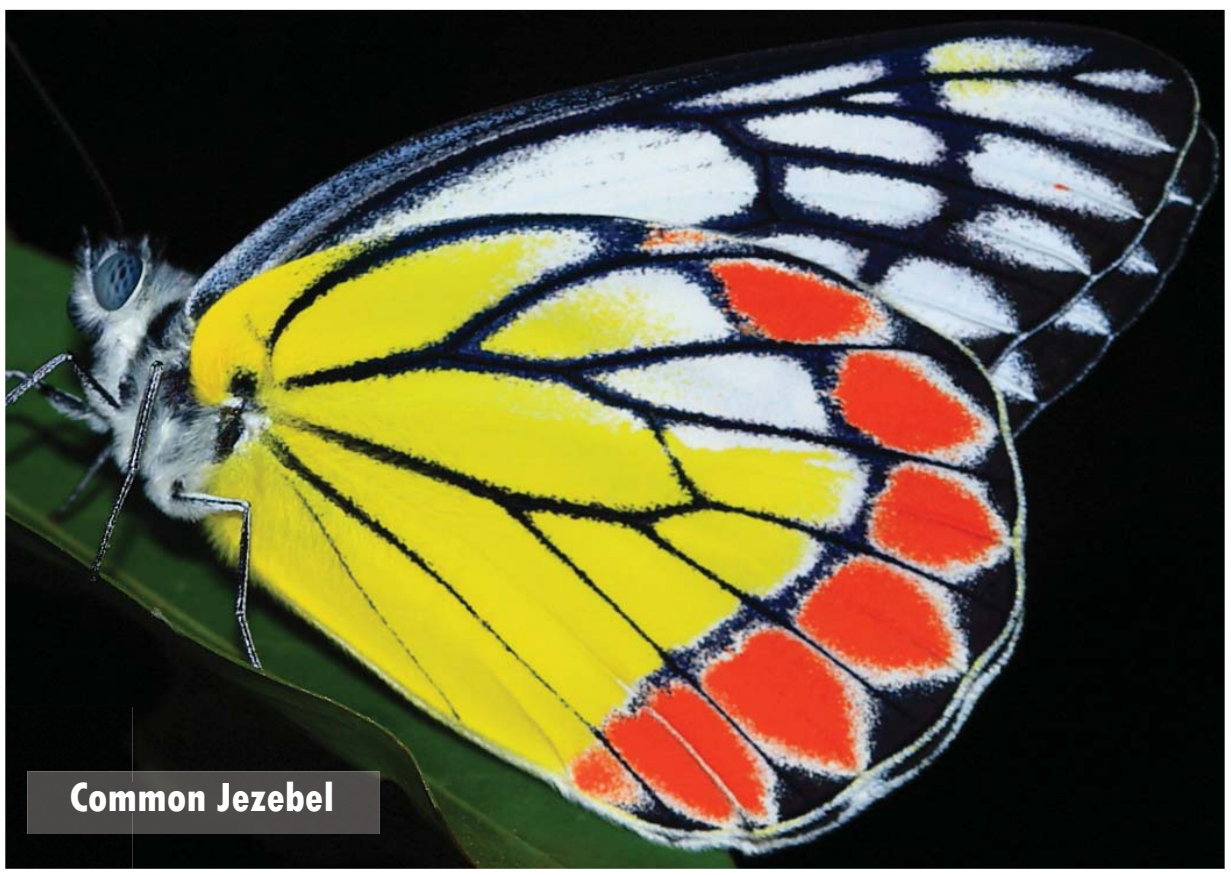
Anooja Z.N. | Savitha Vijayan

Kariavattom: Botany garden on the Kariavattom campus is not only a place of rare species of plant kingdom but of home to spectacular butterflies too. A recent study done by Dr. G. Prasad, Head of the Department, Zoology, University of Kerala and Anupa K.Antony (former MSc student) has found the presence of 83 butterflies in the garden. The study also recorded 105 species of butterflies in the whole of Kariavattom Campus.

Butterflies are good biological indicators of habitat quality as well as general environmental health, as many species are strictly seasonal and prefer only particular set of habitats. Butterflies may react to disturbance and change in habitat and act as an ecological indicator and may get severely affected by the environmental variations and changes in the vegetation structure, as they are closely dependent on plants. Thus minor changes in their habitats may lead to either migration or local extinction. Because of their dependence on the plants, butterfly diversity may reflect overall plant diversity in the given area. Hence, butterflies can be used as umbrella species for conservation, planning and management.

Of the 105 species of butterflies recorded on the campus, the highest number of butterflies was from Nymphalidae (40 species), followed by Lycaenidae(23 species), Hesperiidae (18 species), Pieridae (13 species) and Papilionidae (11 species). This study revealed that Nymphalidae was the most dominating family with a highest number of species and individuals. Most butterfly species were observed during June and May and least in April and March. Among the 105 butterflies recorded, 21 species come under the protection category as per the Indian Wild Life Protection Act 1972 and 3 are endemic to Western Ghats

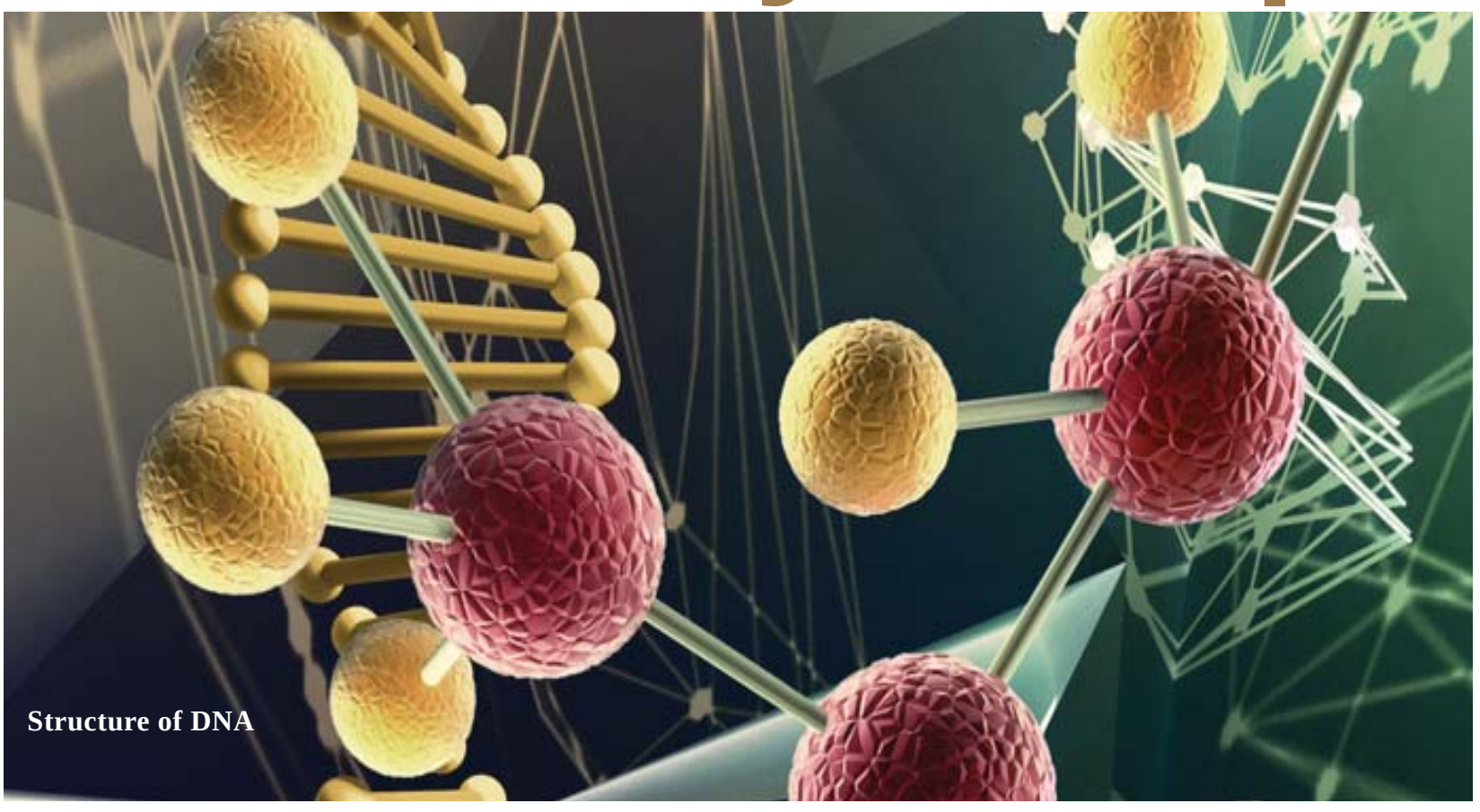
The present study reveals that Kariavattom Campus provides favourable ecological factors and habitat for butterflies. Rare and endemic species sighted on the Campus, raises the need for conservation of this area as a butterfly friendly ecosystem. In this study they observed more diversity of butterflies in artificially maintained habitats suggesting the importance of creating such habitats like gardens, herbal parks, etc. Host plants of rare and endangered butterflies can be planted and conserved to improve the butterfly population.



Common Jezebel

Molecular Diagnostics in RGCB: a new ray of hope

Liza Susa George,
Sandhya Raj S


Structure of DNA

Jagathy:A burden of viral diseases is seen to be increasing at the global level. While Ebola, Middle East Respiratory Syndrome, and Severe Acute Respiratory Syndrome have been reported from several countries, Kerala's encounter with bird flu and influenza virus and the possibility of new strains pose threats, highlighting the need for early detection of diseases and development of vaccines.

Our capital city is home to one of the prestigious centres of molecular diagnostics. Rajiv Gandhi Centre for Biotechnology has an excellent molecular diagnostics and laboratory medicine wing extending support to the public on various clinical tests. Rajiv Gandhi Centre for Biotechnology (RGCB) has its main campus at Jagathy in Thiruvananthapuram. The campus concentrates on Disease Biology Research and does innovative research in cellular and molecular mechanisms of human, animal and plant diseases.

The institute has made impressive advances in selected areas of Biotechnology and Disease Biology. The transit facility located at the KINFRA Film and Video Park in Thiruvananthapuram now houses the RGCB's Bio-Imaging, Genomics and Laboratory Medicine & Molecular Diagnostics (LMMD) core facilities in addition to laboratories for Chemical Biology and Tropical Disease Biology.

The facility here provides DNA-based testing for a number of inherited and acquired genetic diseases besides molecular virology and bacteriology.LMMD provides rapid-turnaround diagnostic virology for more than 30 viruses of clinical importance. Virus detection is mainly carried out using Polymerase Chain Reaction (PCR)- based assays, several of which are multiplexed as well as real time PCR tests. LMMD also runs a Biotechnology Skills Development Program in molecular diagnostics intended to generate immediately employable work force.

While other private labs are highly expensive for common man, RGCB offers the tests at an affordable fixed rate not exceedingRs. 2000 and at a free cost for those who are certified by the consulting doctor as BPL. Rajiv Gandhi Centre offers these services to public as a part of its social commitment.But in most times, private labs are benefited by these services. They act as an intermediary between the customer and RGCB to take huge profits. Through molecular diagnostics immediate results can be generated within 48 hours and the rate of infection also can be tested. In the current scenario, molecular diagnostics in infectious disease testing offers one of the most promising areas of growth and innovation.

Low cholesterol leads to hair loss

Vidya P. G.,
Neelanjana Prakash

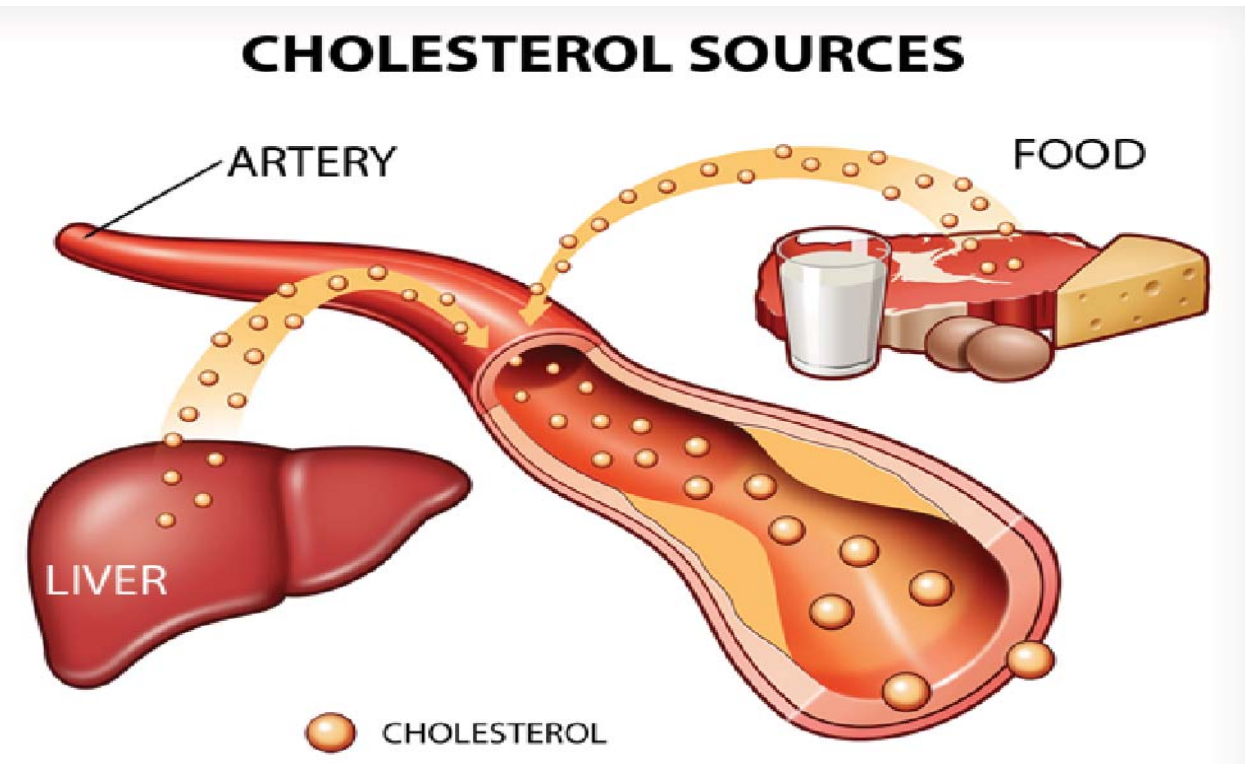
Kariavattom: Permanent hair loss from head or body is one of the major health problems among human beings.

This phenomenon is known as Alopecia in medical term. Since Alopecia is considered as a neglected disease, only a few studies have been done in this area. Sreejith P. Panikker, Assistant Professor, Department of Zoology, University of Kerala has conducted a study about the reasons of Alopecia.

In fact, the analysis of Alopecia can be used as an easy diagnostic tool for many of the severe diseases. This makes the study more important.

The disease Alopecia can be classified into two categories. They are Cicatrical (Scarring) Alopecia and non-scarring Alopecia. There is no clinically visible inflammation in most presentations although historic inflammation may be present. But in Cicatrical Alopecia the inflammation affects the bulge region of hair and it leads to permanent hair loss.

The study was conducted using scalp biopsies from 38 patients. The scalp biopsies are then subjected to gene expression profiling to identify gene expression variations in affected and non-affected samples. From this study it is clear that there is a difference of gene expression in PCA [Patients Affected Cicatrical Alopecia] tissues related to the normal tissues.



It is found that the genes that are down regulated mostly include the cholesterol bio synthesis that regulates the genes; on the other hand the inflammatory genes showed a dramatic up regulation in cicatrical alopecia samples.

So it states that reduction in cholesterol initiates permanent hair loss.

Campus Needs Efficient Water Conservation

Fiyaz Khan S. N
Binu K Varghese

Kariavattom: Do you know that our Kariavattom campus was once a place blessed with some of the best natural water bodies in the region? But now due to the extreme pressure on land for various developmental activities and negligence have resulted in the depletion of most of these precious water resources.

An earnest effort is required for the preservation of the remaining water resources on a war footing for the benefit of the entire campus community. It is in this context a proposal to preserve the natural water resources of Kariavattom by Dr. Shaji N., Asst. Professor at the Department of Geology gets much attention. His proposal is significant as the fresh water crisis is already evident on the campus in varying proportions seasonally.

The Kariavattom campus, around 400 acres, is a rugged terrain with an altitude ranging from 15 to 48 m above mean sea level. The area is covered by fairly steep hillocks with narrow valleys in the western and eastern sides. The valley positions within the campus are potential sites for ground water with some natural ponds.

Hymavathy Pond at Kariavattom Campus

The campus requires about 5 lakh litres of water per day for the various activities such as domestic use in quarters, hostels and offices, etc. the Kerala Water Authority provides 2 lakh litres/day while the remaining requirement is met from dug wells located within the campus.

- **The campus requires about 5 lakh litres of water per day**
- **Fresh water eco-system on the campus is getting degraded**

Though a significant amount is being spent by the university on fresh water supply, the campus faces water shortage during the summer season as well as during the period of breakdown in water supply by water Authority.

The campus is a mini watershed of Kulathur stream and there are many surface water bodies and dug wells on the campus. But the fresh water eco- system is gradually getting degraded and slowly disappearing due to the improper water management plans, human interventions and acacia plantations.

There are some abandoned ponds and percolation tanks available on the campus. More than ten dug wells exist on the campus. Among these, 6 wells are dry. The depth of dug wells ranges from 6.5 to 25 m with an average diameter of 2m.

The deepest water level during summer months is recorded from dug well near the Men's Hostel and shallow water level is recorded in the dug well located in the Women's Hostel.

Rain water harvesting, artificial recharge of ground water, two large diameter dug wells for pumping- one near the pond behind Botany building and another one near the Haimavathy pond- are the major schemes to be implemented on the campus, says Dr. Shaji.

A New Plant found in Western Ghats

Sunesh M . S.
Anoop M . S.

Kariavattom: The team comprising Dr.A.Gangaprasad, and R.Jagadeesan from the Department of Botany, University of Kerala, Kariavattom campus along with Sam P. Mathew from Centre for Jawaharlal Nehru Tropical Botanic Garden, Thiruvananthapuram reported the discovery of a new species from south western ghats of the peninsular India.

The new plant was named Cinnamomum mohananni. the plant is a erect shrub with long linear leaves and white flowers. The flowering period is fromApril toAugust and yielding of fruits from February to June.

The species has been named in honour of Dr. C. N Mohanan, former Head Environmental Science Division, Centre for Earth Science Studies, Thiruvananthapuram.

The genus Cinnamomum mohananii schaeffer belonging to the family lauraceae, consists of about 250 species having the geographical distribution from south to southeast Asia and Australia.

Best poster award for Optoelectronics in Indian Science Congress

Aswajith C.
Sreehari R . S

Kariavattom: The work entitled "Effect of Cristallinity of Nb2O5 electron blocking layer in dye sensitized solar cell" won the best poster award in Physical Science section, at the 102nd Indian Science Congress (ISC) 2015, held at University of Mumbai from January 3 to 7.This was a collaborated work of Department of Optoelectronics, Kariyavattom campus, Kerala University, Trivandrum and Amritha School of Biotechnology, Amrithapuri, Kollam.

The work was presented by Mr. Suresh S., research scholar under the guidance of Dr. V. P. Mahadevan Pillai, Prof. and head department of Optoelctronics and Dr. M. Satyanarayanan – Visiting Professor.

The study investigated the effects of annealing on the structural, optical and morphological properties of RF sputtered Nb2O5 Nano structured thin film on quartz substrate. Film annealed at 600 degree Celsius is crystalline in the erthrombic phase.

From the existence of mixed orthrombic and monoclinic phases in the film it is annealed at a temperature 900 degree. The film undergoes a complete phase transformation to monoclinic phase. Films have high refractive index and the values increase upon annealing.

Mr. Suresh S. receiving the award on behalf of the Optoelectronics Department,UoK.

From the surface morphology, film in the monoclinic phase was porous in nature and hence not suitable as an electron blocking layer in Dye Sensitized Solar Cells (DSSC). DSSC with Nb2O5 blocking layers were studied.

The effects of crsytallinity of the blocking layer were investigated.

It is seen that the efficiency of the cell improves by about 50% with crystalline blocking layer. The blocking layer thickness also influences the cell performance, and also found that increased thickness of the blocking layer increases the current density of DSSC.

Cancer Cure by Mother Earth

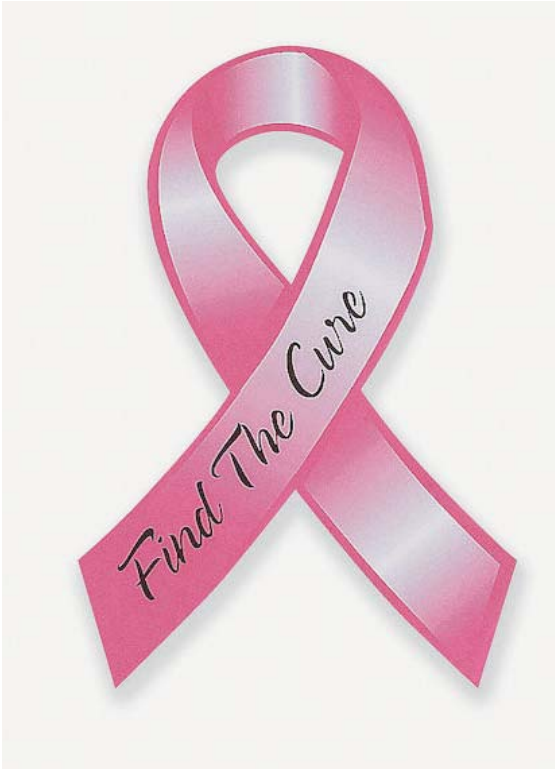
Akhila S
Rukku Sumayya

CANCER….. The term itself brings terror to our mind , right???? Cancer is a multifactorial disease and one of the most severe health problems in both developing and developed countries. Deaths due to different types of cancers are projected to increase continuously. It has been estimated that there will be 11.5 million deaths in the year 2030 and 27 million new cancer cases and 17.5 million cancer deaths are projected to occur in the world by 2050.

In spite of the adverse condition of cancer, the side effects of chemotherapy and radiation therapy are high. Hence, various experiments are being conducted to find out the natural healing methods for cancer.

In this area, the Department of Biotechnology, University of Kerala, Kariavattom campus is trying to pave new avenues through their studies to control the deadly progression of cancer. It is not published officially. Discovery of new anticancer agents derived from nature, especially from plants is currently under investigation.

The active constituents of the medicinal plants is known to exert cytotoxic activity against certain cancer cell lines, being a potential source of new chemotherapeutic agents. Molecules derived from plants like vincristine, taxol and etoposide have played an important role in cancer therapy and continue to be a promising source of new therapeutic agents.



The studies are progressing under the guidance of Dr. A. Jayakumaran Nair, Head of the Department of Biotechnology, University of Kerala, Kariavattom campus. Dr. Supriya, Assistant Professor, and Chinthu V. Saji are also associated with the studies.

Catalogue of living plants

Sunesh M.S.
Anoop M.S.

Palode: Botanic gardens are institutions holding documented collections of living plants for the purpose of scientific research, conservation, display and education. Government of Kerala established the Tropical Botanic Garden and Research Institute (TBGRI) in 1979 at Trivandrum.

The 121 hectare garden is located in a natural forest land, right in the lap of Western Ghats at Palode, 40 km northeast of Thiruvananthapuram city. River Chittar, a tributary of the Vamanapuram river flows by the side of the garden.

The garden system spread over 300 acres, is reckoned as the biggest conservatory garden in Asia with over 50,000 accessions belonging to about 5000 species. The garden system is managed by two divisions. The garden management, education, information and training division and the plant genetic resource division. These divisions manage the live plants of the garden.

The Jawaharlal Nehru Tropical Botanical garden consists of five research laboratories. The latest research was in a coxinium fenestrate which was endangered. It's a plant which needs 30 years to bloom, stem is its main part. The institute is preparing a book which details all the plant species in the garden, namely "Catalogue of Living Plants Collected @ JNTBRI".

Magnitude of Music

Akhila M.
Aswathy Krishnan P.P.

Kariavattom: "If music be the food of love, play on" says William Shakespeare. The Department of Computational Biology and Bioinformatics has come up with an interesting study on the effect of music upon the growth of foetus.

The study named as Music- Embryo study is done in chick embryos. Chick embryos are used for the purpose as they have similarity with human embryonic growth. Also, they hatch within twenty- one days and are easy to handle. Zero day fertilized eggs, are being bought from government cottage farms. They are kept in three separate incubators at a temperature of 310 C.

Two of the incubators have pre-installed stereo systems. The inbuilt stereo in the first incubator plays only flute music. The second one plays a music harmony (*Kacheri)* and the third plays no music. Selected ragas of Carnatic music like Bilahari, Anandhabhairavi, etc. which are presumed to create an impact on living beings, flow through the stereos. From the experimental findings it has been observed that the chick embryos which grow by listening to flute music have more brain weight and body weight. Also, they are active and healthy on the very next day of hatching.

In matters related to health and weight the first is followed by the second set of chicks that hears harmonic music. The third set grows in a normal way. Dr. Achuthsankar S. Nair, the Head of the Department is the principal investigator of the study and the research work is carried out by PriyaVenugopal.

"The initial findings are quite positive and we have a lot of expectation on the project. Now we are doing the conformational run", says Priya.

The funding for the project is provided by Mahatma Gandhi Inter University Centre for Study of Music. It would be a scientific proof for age old belief that music can enhance the mental equilibrium of living beings and can create a positive aura in them.

Incubatror kept for the study

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Sensor to detect pesticide presence

Sarika S . Dev
Chinchu V . S.

Kariavattom: In the background of high pesticide content found in fruits and vegetables brought to Kerala from farms of Tamilnadu, researchers in the Department of Chemistry, University of Kerala have developed a novel potentiometric sensor for the determination of lindane (-hexachlorocyclohexane), an organo chloride pesticide. Their results are featured in the cover of Biosensors and Bioelectronics, a journal by Elsevier Publications.

A study by Prof. Thayyath S. Anirudhan and Sheeba Alexander is set to wipe out the presence of toxic lindane from our food items.

They have designed a molecularly imprinted polymer based sensor from the surface modified multi-walled carbon nanotube. The presence of lindane modifies an imprinted polymer film on to the surface of copper electrode in the nanotube. The technique discovered by the researchers involves the detection of lindane by the sensor within a limit of 10 nanometers.

Lindane has been widely used as an insecticide and pesticide for the treatment of scabies and lice. It has been described by the international agency for research on cancer as a possible human carcinogen and has been linked with breast cancer and birth defects.

In 2002, European Nations proclaimed a ban on the usage of lindane all over the region.

Lamps to Lure Prey

Anoop M . S
Sunesh M . S

Palode: The famous adage "All those glitters are not gold" fit for these plants. Some carnivorous plants act as blue **'fluorescent lamps'** to lure prey, discovered in the researches by scientists at Jawaharlal Nehru Tropical Botanic Garden and Research Institute, Thiruvananthapuram.

The research team discovered blue fluorescent emissions from the plants' **'capture spots'** when tested in ultraviolet (UV) light. Carnivorous plants are known to attract insects with nectar, colours and smell. But the alluring blue glow reveals a new prey capture mechanism in some species, according to the findings. The results of the study were published in the journal **'Plant Biology'.**

"These distinct blue emissions were so far not known in carnivorous prey traps," said research team member Dr. Sabulal Baby. "To the best of our knowledge, this is the first study reporting such strong and distinct fluorescence emissions in the plant kingdom", he said.

Nepenthus through Normal eye view(top), Microscopic view(bottom)

The team found the blue emissions, caused by molecular mechanisms, in **'prey traps'** of pitcher plants Nepenthes and Sarracenia and in Venus flytraps (Dionaea muscipula).

The blue glow was revealed on the inner sides of Venus flytraps when scanned at UV 366nm and distinct blue fluorescence appeared on the lids, interior pitcher tubes and peristomes (upper rims) of pitcher plants.

Most insects and other ar thropods can perceive UV regions of the electromagnetic spectrum. The glow may also attract visits from small mammals such as rats, bats and tree shrews.

To test the significance of blue fluorescence as a prey-attracting device, the team "masked" the blue rings of Indian pitcher plants (Nepenthes khasiana) growing in the botanic gardens by coating them with a non-fluorescent extract.

The plants' prey capture success reduced drastically over the 10 day period when their blue emissions were hidden. This indicates that blue fluorescence acts as a **'very significant signal'** in attracting prey, Dr Baby explained. "They have a chemical structure called conjugated double bond, and they have the ability to absorb light and re-emit it," he said. Fluids from a pitcher plant in the Nepenthes species fluoresce.

The plants' light is emitted as an ultraviolet wave length tailored to appeal to potential prey, including insects and other arthropods, the group that includes crustaceans, insects, and spiders. Insects often can see wavelengths that emphasize food sources. For example, the research suggests that honeybee eyes have evolved to pick out the brightest and most nectar-rich flowers.