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SCIENCE
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Science for Sustainable Development

GUEST EDITORIAL

Prof A Biju Kumar
Head, Aquatic Biology & Fisheries, UoK

Sustainable development has been defined as development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It warrants concerted efforts towards building an inclusive, sustainable and resilient future primarily by harmonizing three core elements - economic growth, social inclusion and environmental protection.

The 2030 Agenda for Sustainable Development, adopted by the United Nations General Assembly, and agreed upon by the nations across the world, suggest an ambitious set of universal goals and targets to tackle the developmental challenges of humanity. The 17 Sustainable Development Goals (SDGs) to transform our world are unique in that they call for action by all countries to promote prosperity while protecting the planet. They recognize that ending poverty must go hand-in-hand with strategies that build economic growth and addresses a range of social needs including education, health, social protection, and job opportunities, while tackling climate change and environmental protection.

Science, technology, and human resource development are the major pillars for achieving the goals as well as for implementation of programmes for the same. The Scientific Advisory Board of United Nations Secretary General "calls upon scientists and policy-makers to recognize science as a universal public good, to acknowledge basic science as a principle requirement for innovation, to enhance diversity in science for sustainable development, to strengthen science education, to raise investments in science as well as to promote an integrated scientific approach." Main recommendations include integrating the SDGs into research agendas, so that sustainability becomes the corner-stone for future research both in fundamental and applied science.

For countries like India, the priority goals should remain as poverty alleviation and maintenance of better environmental conditions for the growing populations in order to achieve environmental, economic and social sustainably. Scientists can provide information in characterising the challenges, providing solutions and strengthening institutions.

Despite the limitations in both implementation and interpretation of targets, SDGs are crucial for the future of our planet. In the higher education sector, further impetus should be given to undertake research and education which ultimately brings benefit to the society. Sustainability Science probes interactions between global, social, and human systems, the complex mechanisms that lead to degradation of these systems, and concomitant risks to human well-being. While many leading universities across the world consider it as a new transdisciplinary academic discipline, we should also take it up as a way to move forward in higher education…….

A VIEW FROM THE WORLD BEYOND

Akhila A.L
Thasneem Muhammed

Dr. Subha Warrier

Thumba: On February 15, India's PSLV C-37 placed a record 104 satellites from six countries in their orbits, as the world watched in admiration. The sight left the world speechless. And the nation honoured the woman who made the 'sights' possible by bestowing upon her the Nari Shakti Award on International Women's Day.

Subha Warrier, Sci/Engineer SG, Avionics Entity of the Vikram Sarabhai Space Centre, had conceptualised, configured and realised a full-fledged video system deployed in the PSLV C-37 mission to confirm collision-free separation of all the satellites in the mission.

"Seeing is believing, it is the proof of performance", Subha Warrier told Univ -Voice. Her crucial contribution to the mission was developing an on-board video system that would enable the live streaming of the satellite launch. "The mission was of much significance and we had to develop an error free system to make it possible. It was essential to have images of critical separating stages and the satellites. During the launch time, we could show the images real time on ground at Sriharikota and it was an exciting experience" Warrier added.

After months of cautious planning and trial-error methods, the team under her leadership developed an indigenous system for customising cameras and processing electronics so that not only did these fit within the constraints of the rocket, it had to meet performance targets too on-board the vehicle. The system helped in evaluation of satellite performance and accessibility of videos for the common man.

Though she had won performance excellence award from the ISRO for her work with Chandrayaan 1 and Space Capsule Recovery Experiment 1, this is the first time that a national level recognition has come her way.

'This award has come as a pleasant surprise to me. Nevertheless, I feel extremely honoured by this recognition', says the visibly jubilant scientist. On being asked as to how she would sum up her cheq-uered career so far, she has stated that being a woman wasn't easy in the initial days as one had to put in extra effort as compared to her male counterparts, in order to get recognised for any work or project.

'The essence of it lies in not giving up and transcending the "Lakshmanarekha" from the precincts of your home and placing it in space. In short, nothing is impossible. One must have the will to pursue goals', says Warier while exuding a contagious look of supreme self confidence and poise.

Warrier, an Engineering Graduate from CET, Thiruvananthapuram joined ISRO in 1991. With 11 years of service left, she is committed in making the best of her learning experience as a contribution to the organisation and to the nation.

Li-Fi: The Ultimate Technological Revolution

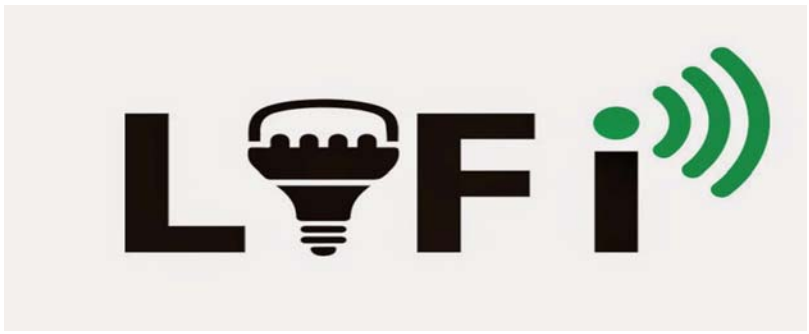
Aswathy Nair M.A
Midhula Sarma N

Kariavattom: Struggling with poor Wi-Fi connection? Complaining about the money spent for data consumption? What if we say there is something better/faster than the Wi-Fi or any other connectivity you believed was the best so far? Will you be able to believe? Then get ready to experience the ultimate future of connectivity- 'Li-fi' or Light Fidelity.

Li-fi can be simply explained as a Visible Light Communication (V LS) System transmitting data at a much faster rate than Wi-fi. Li-Fi uses common household LED (light emitting diodes) light bulbs to enable data transfer, boosting speeds of up to 224 GB per second that is 100 times faster than Wi-Fi. So what do you think about replacing your Wi-fi connection with Li-Fi, a ground-breaking technology which is recent in wireless-communication?

The Department of Optoelectronics at the University Of Kerala has a vision of making an impact through research and innovation in the field of Optoelectronics and Optical Communication.

"The concept of Lifi got more attention as it has a speed upto 1 gigabit per second that is 100 times faster than current Wifi speed. We can merge the lighting system and internet



connectivity to save energy" , said Dr. K G Gopichandran, Associate Professor and Research Guide in the Department of Optoelectronics of University of Kerala. His research group is focused on synthsis of phosphors for displays, LEDs and future Li-Fi communication systems.

Li-Fi simply is a new method of delivering data, which uses visible light rather than radio waves used in Wi-Fi. Li-Fi is faster, safer and much more efficient when compared to Wi-Fi.

The term Li-Fi is coined by Harald Hass, a Professor of Mobile Communication from the University of Edinburgh. He also envisaged light bulbs that could act as wireless routers. He hasbeen doing research on this particular topic and hasestablished a company named ' PureLiFi' . Already having launched two products, 'PureLifi' has become the recognised leaders in this technological revolution.

How LiFi works?

When a constant current is applied to LED, photons are released which we perceive as light. If the input current supplied to the LED is varied, then the intensity of the output light shows fluctuations. These fluctuations are imperceptible for the human eyes. LEDS are semi-conductor devices and hence both the input current and optical output can be modulated at very high speeds, which can be detected by a photo detector device and converts it into electric current. This is the working principle of Li-fi.

Some Interesting Applications

The main concept behind Li-Fi is very familiar to us. We use remote controls that send data as light pulses using an LED to the receiver in our television. Which then process the signal and change the channels as you desire. In Li-Fi, instead of a single stream of data as in remotes, it uses thousands of data streams. The evolution of present day LED bulbs is one of the key reasons for this technology. They can transmit signals at a speed of 1,000,000,000 bits per second compared to 1,000 bits per second in remote controls.

Lifi can be used in airlines, undersea explorations, and operation theatres in hospitals, office and home premises for data transfer and internet browsing. Numerous LED lights are found everywhere around us and if Li-fi would be made possible then wherever there is light there will be internet connection. As mentioned earlier Li-fi is a high speed wireless communication technology that uses visible light to transmit data wherever as wifi transmits information via radio waves.

There are numerous advantages of lifi over wifi. Li-Fi signals cannot travel through walls like radio waves. Which means it will be contained in one room thus provide security to your data streams from external hacking. Lifi donot have interference issues similar to radio frequency waves.

The main advantage of Li-Fi is Energy Efficiency. While radio-based wireless connectivity relies on base stations, the light-based connectivity depends on LED bulbs. Thus, a light bulb transforms into a wireless transceiver communication device, or a Li-Fi access point. This means more energy efficiency in future.

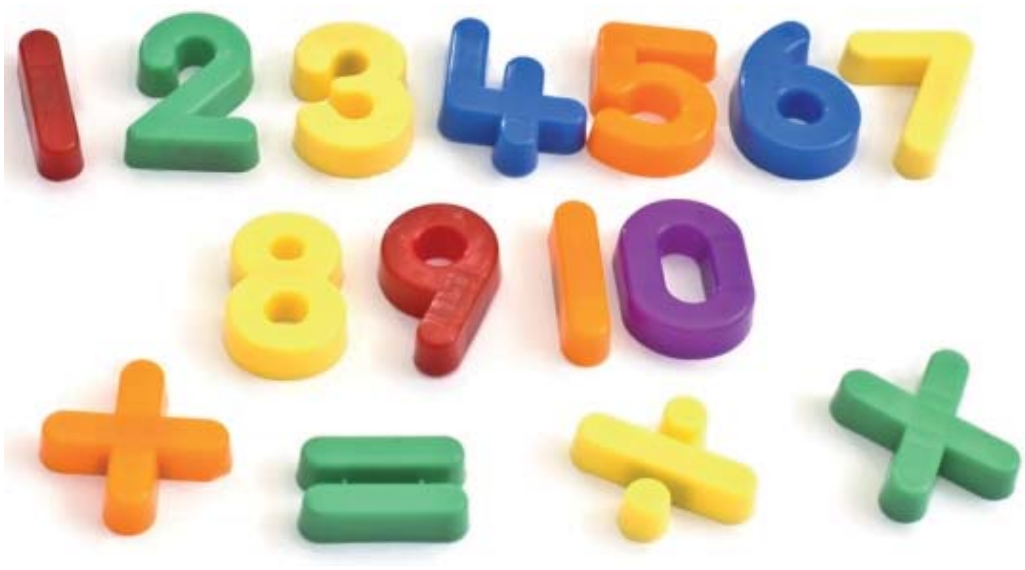
There are many research activities are taking place in the laboratory of the department of optoelectronics at the University of Kerala that is equipped with many advanced instruments like Raman spectrometer, Scanning electron microscope and Transmission electron microscopes.

Mathematics- The Road Ahead

Anila.S
Akshay Kumar V.U

Kariavattom: Department of Mathematics, Kariavattom campus conducted an Outreach Programme for making the graduates and postgraduates students of maths, to gain insights into pursuing career and employment opportunities in the field of Mathematics. Students from all over the state participated in the three day seminar funded by Kerala University.

It commenced on 8th February at CCF, Kariavattom Campus. CCF enables faculty and students to use computational methods and research for in-depth study of issues .The eminent speakers at the seminar included Dr Pradeep G. Siddeshwar (careers in mathematics), Dr Paul Raj Joseph (future scope in mathematics), Dr. Padmakumar (logic and reasoning in mathematics),Dr Achuth Sankar S Nair(visual mathematics),Sri Praveen (quantitative aptitude), Sri Anoop P Ambika (mathematics and marketing strategies), Dr K. Satheesh Kumar(real world applications and employment opportunities in mathematics),and Dr SN Kumar (conversation skills)



, were the speakers from the environment, both within and from outside the campus, who shared their experience and as well as mathematical concepts.

Through this programme they provided basics in quantitative aptitude,marketing,logic and reasoning. These are the key areas that are to be focused upon for competitive exams such as bank officers, SSC, UPSC . Specific attention was given in the fileds of quantitative aptitude, the covered areas are addition,multiplication, simple and compound interests aspects ,alligation,ratio and proportion,probability etc.

The Mathematical ability of the human brain is a sphere of concern of every individual. In most of the examinations calculators are not allowed. This programme helped to increase the mathematical potential and develop the reasoning ability in each student.Another important area is logical reasoning.in which coding, decoding,data interpretation,syllogism,sitting arrangements etc are covered. In reasoning questions, logic or common sense of the candidate is assessed and not intelligence.

In the field of marketing, the process of selling a service or a product with advertising techniques was stressed upon. Marketing terms such as cross selling prospects, innovation,and traditional marketing were explained.

"In all, the Outreach Programme was beneficial for the students to imbibe vital knowledge to prepare them for their careers. They were highly inspired by it" said Professor G Suresh Singh , Head of the Department of Mathematics,UoK.

ISF Fellowship for Dr S. Joseph

Anoma Thompson David
Vivek G Raj

Kariavattom: Dr.Sabu Joseph, Associate Professor at the Department of Environmental Sciences, University of Kerala received a three year International Indo-Israeli joint research programme fellowship. The fellowship was provided under the combined scheme of the Israeli Science Foundation (ISF) and UGC. For the Indian part of the work, UGC has sanctioned a total budget of Rs. 64.22 lakhs to Dr.Joseph. The Israel collaborator is Dr.Andrea Germandi from the University of Haifa, Israel who will receive Rs. 1 crore and 20 lakhs from ISF for this study.

The project is titled "Ecosystem Service Assessment and Mapping for Sustainable Management of Wetlands in Kerala, India". Kerala wetlands offer innumerable ecosystem services (ES) to society and economy.

The co-operation will take place at various levels including data retrieval, sharing, joint planning and analysis of the outcomes. A process which will take place both in Israel and India. The project offers exchange of visit, participation in International Conferences and other such mutual development programs as well.

Col Anand Kumar

On 3rd March , Finance Minister, TM Thomas Isaac presented the 68th State Budget in the Assembly. Interestingly, at approximately 9:15 am in the initial highlights itself he announced the allocation of Rs 127 Cr to the Suchitwa Mission for waste treatment and Rs 100 Cr each for modernization of abbatoirs and crematoriums.

This itself is ample testimony to the importance being given to the alarming issue of waste management in the state. The ***science of waste management*** thus includes a systematic and proactive scientific approach to manage waste, from its inception to its final disposal using technology intensive methods.

It involves managing the universally accepted seven components of sanitation i.e safe disposal of human excreta, home sanitation and food hygiene, personal hygiene, solid waste management, liquid waste management, safe handling of drinking water, and community environmental sanitation. A recent study reveals that over 6000 tons of solid waste is generated per day across Kerala, in its 999 Panchayats, 53 Municipalities, and 5 corporations. Waste management is an essential service being provided by the municipal and local government authorities. Failure to provide this efficiently could prove to be disastrous.

The basic concept should evolve around the much propounded 'waste heirarchy' theory of ***'Reduce-Re use-Recycle'***. Aided by technology this concept aims at minimizing waste based on its reusability value for alternative utilization or energy source.This would lead to extraction of maximum practical benefits and generate minimum final waste that has to be perforce disposed. Uncollected garbage pileup and stinking waste across both sides of national highways of Kerala is a common sight. Piling up of garbage and litter and failure to adopt state of the art methods of waste management processes has serious consequences .

There are degradable and non-degradable wastes. There are hazardous and non-hazardous wastes. As far as Municipal waste is concerned, a major chunk of it emanates from households, hotels, schools, institutions, marriage parties and slaughter houses. There are E- wastes as well.

Waste Management System in Kerala

The Government of Kerala had been spearheading its activities on environmental sanitation through two missions namely the Total Sanitation and Health Mission (KTSHM) and Clean Kerala Mission (CKM) that was launched in 2002. The KTSHM had been focusing on implementation of Total Sanitation Campaign (TSC), now known as Nirmal Bharat Abhiyan (NBA), a centrally sponsored scheme primarily for safe disposal of human excreta through individual, institutional and community toilets. The CKM had been facilitating the Local Self Governments, especially the urban ones, to establish Municipal Solid Waste (MSW) management systems to make Kerala garbage free.

Around 40% of the Urban Local Bodies (ULBs) have established MSW management systems and 57% of the ULBs have established it in partial compliance. A comprehensive action plan, namely, Malinya Mukta Keralam (MMK) Action Plan, is in vogue . In order to implement the action plan, an organizational reform has already been affected by integrating the KTSHM and CKM as *Suchitwa Mission (SM)*. The long-term objective of the Mission is to improve the living standards of the people of Kerala by inculcating in them a new sense and culture on health and environmental sanitation and to achieve a self-sustained health and environmental sanitation programme, managed and replicated by local initiative.

The Suchitwa Mission is a Society registered under the Travancore Cochin Literary Scientific and Charitable Societies Registration Act (Act 12 of 1955).It is an organization of the Government of Kerala, under the Local Self Government Department responsible for assisting Cities, Municipalities and Panchayats in sanitation and waste management.

The CKM project included participation of NGOs and, Community organizations such as Kudumbasrees across Kerala . The first phase of the project was implemented in five Corporations and 26 municipalities with the participation of Women Self-Help-Groups and `Kudumbasrees'. In the second phase of the `Clean Kerala Mission' another 27 cities and 25 villages were included. Other than Kozhikode and Thiruvananthapuram corporations, in Paravur town , a vermicomposting unit was set up with the help of an NGO, which colour codes seven tons of the town's daily waste each day, to segregate it to plastic and bio-degradable matter. With a mere 50% utilization of its vermicompost plant, Paravur municipality earns Rs 1.2 lakh per annum.

Kozhikode city was declared India's first litter-free city in 2004. Uniformed women doubling up as auto-drivers and as garbage pick up girls, handle over 300 tons of the city's solid waste. The Rs 6.13-crore solid waste management project is funded jointly by the Union ministry for environment and forests, state pollution control board and Kozhikode municipal corporation.

However there are challenges such as Kochi City which is a fine example of a fast-growing city, with 700,000 people plus a floating population of 100,000, that generates around 420 tonnes of municipal solid waste each day. With lack of proper waste treatment facilities , the only solution then was dumping waste in any available locations.

Private sector participation in waste management is the need of the hour since experiments in waste management are not affordable as any failure at any level can be risky. For the private sector it is an opportunity to take part in a responsible economic activity. By being part of waste management business, private sector is fulfilling its social responsibility, in addition to be part of a sustainable business venture.

Waste Processing involves ***three basic technological processes*** namely; Waste to Energy According to Planning Commission, there is a potential of 2,700 MW of power generation from urban and industrial waste in the country. Scrap Recycling business Scrap recycling and processing is yet another element of waste management. . Organic waste such as food materials can be used for preparing compost. It is to be noted that a case of collecting and processing biodegradable wastes from chicken shops, meat shops and slaughter houses itself would make a difference since today the prevalent practice is that of throwing these wastes into rivers or in water bodies and sometimes in unused old wells, resulting in ground water contamination .

According to some estimates there are approximately 700 authorized slaughter houses across Kerala. Close to 12 lakh cattle are transported into Kerala each year to be slaughtered. Further, 12 lakh kgs of chicken are transported into the state from Tamil Nadu every day. Every kg of chicken produces about 350 grams of wastes, while dressing.A typical slaughter house that deals with chicken alone generates about 100 kgs of waste on an average. Hence one can just imagine the quantum of waste available for conversion to reusable form such as fertilizers. Waste to Fertilizer would further benefit Kerala's agriculture sector as farmers could access fertilizer at a low cost.

Technological approach includes pipe composting, pot composting, bucket composting, bio-bin composting, pedestal composting, etc. in addition to vermi composting, ring composting and biogas plants. Identified and approved modern technologies and technology providers for common waste treatment through na tional level advertisement, interviews and discussions are required to combat waste. Technologies identified include improved biomethanation, and pyrolisis/gasification.

Waste management is indeed a cause of concern and is the need of the hour. The issue can gain momentum only through mass awareness campaigns and active participation of all citizens. A concerted effort by the government, private enterprises and the people themselves will go a long way to achieve a 'clean and green' state. It is the bounden duty of educated youth to spread this awareness in all forums and ensure implementation in our surroundings as part of our daily routine. Let us therefore pledge to uphold Gandhiji's vision of a ***'Swachch Bharat'*** and strive to make Kerala a shining example for other states to emulate.

BATTLING CANCER WITH TECHNOLOGY

Asif Abdul Kalam
Ralph Robert

Dr. Chandra Mohan, a world renowned surgical oncologist ,in conversation with the Univ Voice team. He is currently in service at Regional Cancer Centre, Trivandrum.

Medical College: Cancer is a disease which is not yet understood fully. Roughly one third of the population is estimated to get afflicted at some time or the other. The number of cancer patients are increasing because of two reasons. One reason is that longevity has gone up. The average life expectancy which was around 30 to 40 years in 1947 has gone up to 60 to 70 years. Cancer is most common in old age. So as the number of old aged people increase, the number of cancer cases increases.

The reason which is most worrying is that our atmosphere has become more conducive for cancer. We call it 'Carcinogenesis'. Changes in lifestyle, Changes in food habits, and changes in atmosphere all comes under this category. Most of the cancer is caused by the food, lifestyle or the environment including occupation. Only 1 to 5% of cancers come with the heredity.

At present, there are mainly 3 type of treatments for cancer namely surgery use of radiation to burn the cancer cells and lastly, the use of drugs. The drug kills the cancer cells. This is called 'Medical Oncology' or most people call it 'Chemotherapy'. The problem with these therapeutic modalities is that, we are still not able to direct them into the exact target cells because we haven't yet understood this disease completely.

Development in cancer treatment is occurring in different areas. Developments will come in the genetic level so that in about 15 years we will be able to tackle cancer at the genetic level. The ideal aim is to develop drugs which will target the particular cancer cells or sometimes the particular genetic defect that leads us to cancer and correct it. Diagnosis is also a challenge in cancer treatment.DNA is what controls the cells. Damages in genetic DNAs can also cause abnormal division of cells. So we can also go directly into the genes and study the abnormalities in the DNA and find the cause. With the growth of technology, the level of cancer diagnosis has gone up.

Developments in Surgical Oncology.

Surgical oncology is a latest development in cancer treatment. It's a new super specialized area in doing cancer surgeries. Development in cancer treatment has two aims; one is to increase the effectivity of the treatment. The other is to reduce the side effects. Previously, we used to remove the entire breast for curing breast cancer. We can stop by just removing the cancerous lumps. Another major progress in cancer surgery which made a paradigm shift is 'Keyhole Surgery'. Keyhole surgeries are now possible for cancer. The main advantage of keyhole surgery is that there won't be any big wounds so that the patient can walk freely after the operation.

Basically, the most important thing in surgery is to control the blood vessels. Earlier surgeon used knifes to cut into the organs. Now we don't use knifes. We use electro surgery were heat is used. And there are also other new methods like ultra sound. Either heat or ultrasound are used now to cut the tissues and stop bleeding. Each patient has their own variations. Like our faces are different, our organs are different too. Take the example of Kidneys. Blood supplement to the kidneys are different in different people.

Unless the doctors know everything, he might commit mistakes. Sometimes the doctor might miss a blood vessel because of the variation in a particular patient that he doesn't know. To rectify this, now doctors do rehearsal surgeries. Before surgery they do some practise. This is enabled by practising on exact dummy replica of organs. These organs are 3D Printed.

With the arrival of these image systems, the surgeons can see bigger pictures and surgery has become more accurate than ever. Surgeries have become very precise and chances of injuring other organs are avoided. Recent addition to the surgical equipment is 360o cameras.While doing surgeries, a camera is mounted on the doctor so that people from other continents can see the process in 360o view where they can look around the whole operation theatre. This technology is still under development.

Robotic Surgery

Robots are now taking over cancer surgeries. Of course, the robots are just machines without any intelligence. The surgeon will be in another room controlling the robots. It has helped a lot in terms of manoeuvrability. Google is now teaming up with 'Johnson & Johnson' company to develop robots with artificial intelligence. In future, robots will perform cancer surgery with precision greater than human beings. A surgeon can handle a surgery here by sitting in a distant place . Before performing robot surgeries, doctors will be sent to USA for expert training. Human errors have also caused deaths at operation tables. Robotic surgeries are intended at eliminating human errors. The future is 'Bio-Intelligence'. We must adapt to it. Operation theatres of the future will have multiple data servers. We will be able to do surgeries inside the body without even a single wound outside by inserting optical tubes through mouth inside the stomach. Operation theatres will be equipped with 4K optic technologies for high quality image systems.

Organ Cloning

Some companies have started reconstituting organs. Maybe in future we might be able to clone each organ and put it back into the system. For example, for liver cancer, the patient has to wait for a donor. When cloning comes up, this wait will become a thing of the past. Genetic engineering is also an important aspect. Now people know how to change the genes and make cells behave in a particular way.

There is progress in radiation treatment as well. Usually in radiation treatment, we target cancer cells but it can also damage other normal cells around them. Now there are ways to reduce these damages and at the same time increase its effectiveness. This is made possible by the invention of radiation machines called 'linear accelerator'. There are many add ons to it like 'Intensity Modulated Radiation therapy' and 'Image guided radiation therapy'. Also we have developed small pin like things which can be implanted into the body and give radiation to that particular region. It is called 'Brachytherapy'.

The term 'Brachy' means close.There are drugs which acts on particular receptors in cells. These drugs can go selectively go to the particular cancer cells and destroy them. This kind of treatment is called 'Targeted Treatment'. With this, even leukaemia is not anymore a deadly disease.

Breast cancer rates are much more than any other cancers. Breast cancer is caused by a hormone called Oestrogen. We are getting oestrogen from lots of other sources nowadays – from chicken etc. Our lifestyle has become more congested with lots of factors that causes cancer. There are two kinds of substances in our food – cancer promoting and cancer reducing. Oestrogen in chicken or red meat, processed foods like hot dogs, alcohol etc. are cancer promoting substances. On the other hand, green leafy vegetables which is grown in pesticide free environment are cancer reducing substances.

Green vegetables are full of anti-oxidants and anti-oxidants help prevent cancer. Cancer is triggered 30% by food, 30% by environment, and 30% by lifestyle. Reduce non-veg consumption, avoiding fast food and junk food, having food cooked at home, avoiding bad habits like smoking and consumption of alcohol, can help you prevent this disease.

Green leafy vegetables are good for health as they are rich in anti-oxidants, provided they are grown in a pesticide free environment. Promote home gardening by using bio pesticides. Exercise regularly. Most importantly, don't ignore the symptoms.

Fruitful cancer research in Kerala is much less than what it should be. Our focus is only at treating patients, so majority of the money goes for the treatment and a part only goes for research. Some years back, the ministry of health pumped huge amount of money into a scheme called 'Ayush' which is supposed to promote indigenous medicines. As of now, indigenous medicines have no scientific backing. There is no treatment with Ayurveda, Homeo or Unani for cancer. More hospitals like RCC should be established in the state with research facilities.

CARTOON SPOT

Shahana A.R

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NEW 'GIAN' ON MICROSCOPY AND IMAGING

Col Anand Kumar
Abhijith S.S

Dr N Veeramanikandan, Pro VC, and Prof Dr MC Subhash Peter lighting the inaugural lamp during the opening ceremony, accompanied by Dr Scott J Howell and Dr Sreejith P .

Kariyavattom: It is a rare distinction for the University of Kerala to bag its second course under the Global Initiative of Academic Networks (GIAN) initiative, which has usually been the preserve of IITs and IIMs. As part of this initiative , the Zoology Department, Kariavattom campus, University of Kerala, conducted a week long course on "Principles and Applications of Wide-field and Confocal Microscopy/ Image Analysis and Live Cell Imaging". The aim of the course was to enable the participants to get an overview of the trends in modern microscopy and its applications. At the same time the focus was on highlighting various job and entrepreneurship opportunities in the field of microscopy and imaging.

GIAN is a Government of India (HRD Ministry) approved programme in Higher Education aimed at tapping the talent pool of scientists and entrepreneurs internationally and to encourage their engagement with the institutes of Higher Education in India. The aim is to augment the country's existing academic resources, accelerate the pace of quality reform, and elevate India's scientific and technological capacity to global excellence. It also aims to garner the best international experience into our systems of education, enable interaction of students and faculty with the best academic and industry experts from all over the world as also share their experiences and expertise to motivate people to work on wide ranging issues.

The guest faculty was Dr Scott J Howell , Case Western Reserve University, Cleveland, Ohio, USA. Dr Scott is an expert in microscopy based experiments (including live cell), and has been training users on the correct use of microscopes and image analysis.

The programme was coordinated by Dr Sreejith P , Associate Professor, Dept of Zoology, UoK. Dr Sreejith P has attended post doctoral fellowship in USA and is proficient in Two-Photon Microscopy and Confo cal Microscopy. Confocal microscopy is an advanced form of optical imaging technique for increasing optical resolution and contrast by eliminating out-of-focus light. On the other hand,Live cell imaging as part of cellular dynamics involves the study of living cells using time lapse microscopy .

The course involved detailed explanatory interactions followed by practical sessions. In the end of it all, the students could grasp high end techniques in microscopy including laser scanning confocal and 2 photon confocal microscopy. The course was conducted at the Sophisticated Instrumentation and Computation Centre, Kariavattom campus, and was attended by students and faculty members from all over Kerala and other states.

The Inaugural function was presided over by Dr N Veeramanikandan, Pro VC, UoK, and the presidential address was rendered by Prof Dr MC Subhash Peter, Dean and Director, School of Life Science, UoK. In addition, the other eminent members included Prof Dr Achuth Sankar S Nair, Director IQAC, Dean of Applied Sciences, Syndicate members Dr P Rajesh Kumar, Sri KS Gopakumar and Prof Dr Ashalata S Nair, Research and SICC Director, UoK . ' It was a very useful and educative course' , said Praveen Kamalakar, who attended from the University of Hyderabad.

"Interacting with the students and the faculty was an enriching experience. The student – teacher relationship is a striking aspect here, as it reflects deep reverence towards the teacher. I take back very good memories of a pleasant association on my first visit to Kerala," said, Dr Scott on the final day of the programme. The objectives of the course will go a long way in providing the much needed boost in technological know- how in the realm of modern day microscopy.

Kinginipoonchola: Catching them young

Parvathy R.S Nair
Jithu G.A

Kariavattom: Children are the future of our society, proper guidelines has to be given to them for protection of the society and environment. Kerala University's Botany Department at the Kariavattom campus is all set to prepare the children for a greener future as part of their extension activity. 'Kinginipoonchola' is a project undertaken by the Botany department with the support of the school authority of Government UPS, Kariavattom to educate the young minds about the vegetation around us. Through this project, around 60 medicinal plants were planted in the school premises. The plants include Ashoka tree, Kancholam, Panikoorka, Thulasi, Sarpagandietc. The students are much enthusiastic about their responsibility in maintaining their garden.

The most awakening level of the project is yet to come. This programme will bring to life those plants that are simply trapped in the school text books. The Botany department has already started growing the propagules of some of the rearest plants such as Psilotum (living fossil),Cycascircinalis, Ophiyoglosum reticulum (the plant with highest number of chromosome) within the department.

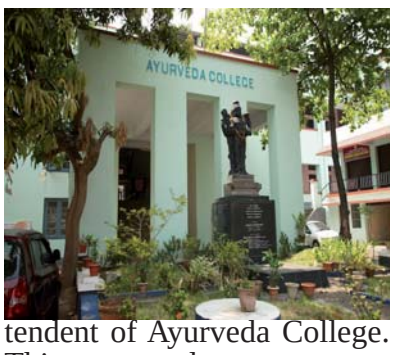
The objective of the 'Kinginipoonchola' is to present before the students, the medicinal plants which were abundantly available in Kerala. The faculty and research students of the Botany department frequently visit the garden to equip the young gardeners with ample guidance. 'We are also planning to set a butterfly garden and organic farming methods in the school. Students and teachers are quite excited about the project' says Dr.E.A.Siril, Asst.professor of the department of Botany. The butterfly garden is to attract students and gift them a pleasure of gardening. It would also educate them about the specific relationship between plants and their pollinators. Expanding this garden as well as the kids' social commitment, more plants will be planted by June.

Ayurveda College towards digitization

Veena Vijayan

Thiruvananthapuram: Govt Ayurveda College in Thiruvananthapuram, the oldest of its kind in the country is something of a cherished heritage with its 125 year old history. The ayurvedic treatments provided here not only attracts the natives but also the foreigners .Inorder to provide the best treatment and excellent provisions to the patients,a new facility has been introduced in the Ayurveda College Hospital namely'The Hospital Management Computerised System'.

The main aim behind this endeavour is to digitalise all the hospital administration including OP tickets .Thus the doctor can easily access the data, status and medical history of the patient, transparency in the hospital functioning will also be ensured. The prescribed medicines and the improvements in patient's health condition will be recorded as well .That is if a patient is referred to another doctor he can access all details about the patient in his personal computer,says Dr Chandra Kumar , Superintendent of Ayurveda College. This proposal got a govt funding of Rs 1 crore and the necessary software was developed by The National Informatic Centre.



"We are facing an entry-level difficulty in implementation because every day hundreds of patients seek treatment here and we lack adequate number of staff to balance this situation .Also we need an operator to manage this entire system", says Suresh Kumar S ,Public Information Officer.This system links the other two hospitals under Ayurveda College that is, the Panchakarma Hospital and Women and Child Care Hospital situated in Poojappura. This unique facility would distinguish Ayurveda College from other hospitals making it the first to implement this technology.

WITHIN A DEMOGRAPHIC FRAMEWORK

Anoma Thompson David
Vivek G Raj

Kariavattom:Are you interested to know about the decennial census from 1991 of our country? Do you want to study India on social, economic, demographic and related aspects for your personal research? The Department of Demography at Kariavattom Campus is the best place to fullfil your requirements.

The Department of Demography in the Kariavattom campus provides public access to relevant census data at the micro level through a workstation set up at the Department. The project which has been set up jointly by the office of the Registrar-General of India, the Census Commissioner of India and the University of Kerala is gaining prominence. The workstation will have the facility to access all the published census tables from 1991-2011. The workstation set up at the Demography department is the country's third and the state's first research based census data workstation opened for researchers, teachers and public.

"The workstation will provide raw data, which would enhance public to gain familiarity with census data products and data collection methods in order to improve their utility and quality. And the accessibility of the information for the public would make them knowledgeable and well informed", says Anil Chandran, Assistant professor at the Department of Demography, Kariavattom campus.

The first time a similar workstation came into effect was at the Jawaharlal Nehru University, has got a tremendous response and was widely acclaimed as it fullfilled a long-standing demand of the academic community for providing such a facility, during 2011-2012. The second one soon followed and was set up at the Punjab University.Since collection of information is very expensive, many countries provide access to micro level data from census for individual research. On this basis Dr.C.Chandramouli IAS, RGI and Census Commissioner of India embarked upon an ambitious scheme under the 12th Five Year Plan(2012-17) for Modernizing Data Dissemination Activity in Census where in setting up 18 such workstations in different universities across various parts of India.

Demographic information is a major requirement for scholars, academicians, planners, social workers, government and non-government agencies. Census data is the only data source which provides data at both macro and micro level for use and analysis for the entire country. Such reports are considered a major demographic information source for academic activities.

At the time of each decennial census, a huge array of information is collected from each person in the country on social and economic aspects. Information is also collected about households and housing conditions, assets and amenities. This information collected is then used to generate specific tables for the use of wide range of data users. During the census 2001, about 300 tables were generated using database of more than a billion people of India. Similarly a large number of reports, maps and tables are being placed in public domain in 2011 census. The workstation will allow the students and researchers looking to make an in-depth study of the above mentioned facts of census. The entire series of publication of 1991, 2001 and 2011 census pertaining to housing census and population enumeration are available at the workstation in the form of reports, tables, atlas and mapping products.

The objective of the workstation is to permit qualified researchers optimum use of anonymised micro-data from census for in-depth research by allowing access for generating cross-tabulation not published by the census. The facility is open to all, including those who are not enrolled or part of the University. Such research would allow greater utilization of data by generating cross tabulations from confidential micro-data, otherwise not possible by using aggregate level data available in public domain.

The main speciality of the workstation is the micro-data facility and the published data products, which is accessible for the general public. Micro-data is the data at the level of organization, individual or household that are collected through census and survey programmes. The workstation is fully air-conditioned and has a network of computer terminals for accessing the data. An official from the University is posted at the workstation to provide access to the datasets required in the approved research proposal.

The researchers are permitted to only use the software made available at the workstation for tabulation. The researchers are also allowed to use the printer installed in the workstation to print the approved outputs. However they are not allowed to take out the soft copy of the micro-data in any format to protect confidentiality.

WHY DESIGN DRUGS?

Anandhu. R. Nair
Shahana A. R

A life devoid of therapeutic drugs is unimaginable. Hence, drugs are now a regular feature in our lives whether it is for treatment of illness or in the field of agriculture or any other science. Constant research in this field is an ongoing process and as new drugs enter the market , they are making the world a safer place by assisting us in combating diseases etc. The inventive process of finding new medications based on the knowledge of a biological target is the science of drug designing.

The trial and error process is complex, expensive and time consuming. Recently, the Department of Biochemistry, UoK organized a national seminar on recent bio chemical approaches in Therapeutics. Extensive use of biophysical techniques such as X-ray crystallography and NMR spectroscopy has led to the elucidation of several 3Dstructures of human and pathogenic proteins. Advancement in structural bioinformatics also hastened the elucidation of molecular structures of various biomolecules .Lad discovery and lead optimization, needs 3d structural information of the ligand, the protein receptor, or both. Most of these data is stored in the public domains. These developments have paved the way for modern drug development using computation techniques and so it is called computer aided drug design (CADD). CADD can be classified into two general categories: structure- based and ligand based. structure - based CADD relies on the knowledge of the target protein structure to calculate interaction energies for all the compounds to be tested , whereas ligand based CADD exploits the knowledge of known active and inactive molecules through chemical similarity searches or construction of predictive , quantitative structure- activity relationship models.

M.Indira, emeritus scientist presented a seminar paper on Drug designing in the modern era. Drug discovery has evolved through various stages into more rational and evidence-based drug designing. Compared to conventional methods which were time consuming and less logical, new drug designing based on structure is rational, evidence based, faster and more scientific in nature. New drug discovery methods are furthered by developments in the technology especially computers, bioassay techniques and calibrated instruments. Computational structure-based drug designing opens the door to novel treatments in modern medicine.

Traditional drug targets have been characterised on an individual basis and lead compounds sought with specific clinical effects.These compounds are usually isolated from natural resourses are synthesized and experimentaly tested until a compound with the desired pharmacological properties has been developed.This trial- and error process is complex, expensive and time consuming . Post genomic era witnessed rapid advancement in the sequensing of human and bacterial genomes which opened newer targets.

Hence modern era drug designing has come a long way in promoting effective research and development for the overall benefit of mankind in the treatment of various diseases.

ECO-FRIENDLY PACKAGING

Ardhana S.P

Kariavattom: In the current scenario, packaging materials based on biopolymers derived from renewable sources is gaining much importance since non-degradable and non-renewable nature of plastic packaging is leading to heavy environmental pollution. Meanwhile, biodegradable active packaging can provide a solution to the environmental problem of solid waste resulting from the use of non-biodegradable petrochemical-based plastic packaging materials. In this regard research works in the Department of Biotechnology headed by Dr. A. Jayakumaran Nair is gaining attention; here they try to develop polymer based food packaging films and coatings by the addition of essential oils and polymer nanocrystals. They developed a polysaccharide based food packaging film by the addition of essential oils and starch nanocrystals which shows improved properties such as biodegradability, non toxicity, antimicrobial activity and antioxidant activity. The results of the ongoing researches in the department establishes that polymer films can be considered as a potential active alternative packaging material, possibly aim to preserve food and to extent shelf-life of food materials. The fruits coated with this film forming solution is showing enhanced shelf life compared to the non-coated fruit which contributes to its another and important application in the field of food preservation.

The department is also performing researches the in vitro cytotoxic activity of some selected medicinal plants against cancer cells. For the discovery of new anticancer agents, here the plant species are selected (usually based on random, chemosystematic, ecological and/or ethnobotanical criteria) and the herbal extracts are subsequently evaluated using several cancer cell lines. The preliminary studies in the Cannon ball tree (Couroupitaguianensis) are showing that this tree is a potential source of bio active compounds against cancer. The studies are progressing in this area with promising results. The Department also focuses on developing some industrially important enzymes and other compounds from natural microbial sources. Overall the scientific researches in the department are obtaining commendable outputs required to exploit the current biotechnological advances needed for the sustainable development of the society.