



KSRCT IEEE-EMBS Student Chapter Newsletter

(K.S.Rangasamy College of Technology
Institute of Electrical & Electronics Engineers
Engineering in Medicine and Biology Society)



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Editors Desk

It gives us immense pleasure to present the first issue of KSRCT IEEE-EMBS Newsletter, the measure of progress.



We, the editorial board members of the KSRCT IEEE- EMBS Student Chapter are rejoiced to present the Newsletter published by the Department of Biotechnology, KSRCT.

We owe our special thanks to our Chairman Lion Dr.K.S. Rangasamy MJF, Principal Dr.K.Thyagarajah and the members of the various committees for their whole-hearted support .We also thank Shri.R.Srinivashaan, Secretary and Smt.Kavitha Srinivashaan, Assistant Secretary, K.S.R. Educational and Charitable Trust, Tiruchengode for their excellent support and constant encouragement in brining out this magazine successfully every semester.

Department Activities

New Funded Major Project for the year 2011!

Received from Department of Biotechnology,
Ministry of Science & Technology, New
Delhi

Principal Investigators:

1. Dr.N.Mathivanan, Professor, CAS in Botany, University of Madras, Chennai.
2. Dr.P.Ponmurugan, Professor & Head, Dept. of Biotechnology, K.S.R.C.T.

Title of the Project: Development of bioformulations for the management of rhizome rot of turmeric plants.

Total Outlay: Rs. Rs.40,72,000/-

Reference Number:

BT/PR13718/AGR/05/498/2010 dated June 20, 2011

Theme of the project: The project envisages exploiting the PGPRs in controlling the rhizome rot disease caused by *Pythium graminicolum* f.sp. *aphanidermatum* in turmeric plants. Efforts will be made to isolate different PGPRs from rhizosphere soil samples in which colony PCR will be performed to find out the presence of lytic enzymes and antibiotic coding genes. Efficacy of the selected PGPRs against the pathogen is to be tested under field condition.

Another New Funded Major Project for the year 2011!

Received from Indian Council for Medical
Research, New Delhi

Principal Investigators

1. Dr.P.Ponmurugan, Professor & Head, Dept. of Biotechnology, K.S.R.C.T.
2. Dr.Rama S. Verma, Associate Professor, Dept. of Biotechnology, Indian Institute of Technology, Chennai

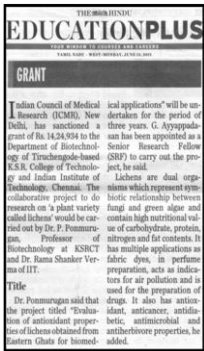
Title of the Project: Evaluation of antioxidant properties of lichens obtained from Eastern Ghats for biomedical applications

Total Outlay: Rs. Rs.14,24,934/-

Reference Number: ICMR No.

59/14/2008/BMS/TRM dated 17-03-2011

Theme of the project : Collection, characterization and identification of lichens obtained from Eastern Ghats covering Yercaud and Kolly hills in Tamil Nadu state will be carried out followed by standardization of culturing techniques and medium formulation for growth of lichens under *in vitro* condition. Preparation of aqueous extracts of identified lichens with different solvent system and finding out the active components for antioxidant properties will be undertaken followed by performing cytotoxicity assays of lichen extracts against *in vitro* cell line models. Finally exploration of antioxidant activity of the aqueous extracts using animal models will be studied.



Annual Report For The Academic Year 2010-2011

The Department of Biotechnology was started in the year 2002, with the primary aim of providing high quality education in Biotechnology from the formative years of bachelor degree to Ph.D., programme to rural people of Tamil Nadu. We are very happy to submit the annual report for the academic year 2010-11 in which the activities of staff members and students of Biotechnology Department are enormous and noteworthy.

Ranking

Biotechnology Department of K.S.Rangasamy College of Technology stands 8th Rank among 280 Private Indian Institutions offering Biotechnology course as per the survey conducted by “Biospectrum Asia Magazine” (Bengaluru). The Department has been ranked third in terms of industry-institute interaction with a score of 37.16. It stood

eighth in terms of faculty strength with a score value of 26.71. In terms of placement activities, 7.55 points have been scored. With a score

value of 11.13 it stood eighth position in infrastructure development. It puts altogether, its overall ranking to eighth.

Academic achievement of Faculty

Awards and Honours

Dr.P.Ponmuran has received “Best faculty award”



for the academic year 2010- 2011 from the Nehru Group of Institutions, Coimbatore.

Mr.R.Subbaiya has received “Young Scientist Fellowship” from Tamil Nadu State Council for Science and Technology (TNSCST), Chennai in the current academic year in the field of Nanobiotechnology.

Conference / Workshop organized by the Department



A
National
level five
days
workshop
on



“Entrepreneurship development programme for biotechnology Graduates” was organized conducted during March 1-5, 2011 in which a total 65 candidates from all over India was participated. Various funding agencies like DRDO, CSIR, MES, New Delhi and DAE, Mumbai sanctioned financial assistance magnanimously to conduct of the workshop successfully. Dr.J.Philip Robinson and Mrs.B.Kalpna acted as the organizing Secretaries of the workshop.

Abroad visit by faculty members

Dr.P.Ponmurugan
has visited at
University of Bonn,
Germany to participate
Third International
conference on



“Precision on crop protection” in which a research paper entitled “Evaluation of *Streptomyces* species for the biological control of Rhizome rot disease in Indian turmeric plantations” was presented.

Internal travel grant from Department of Science and Technology (DST), New Delhi (File No.: SR/ITS02153/2010-2011) and Tamil Nadu State Council for Science and Technology (TNSCST), Chennai (Ref No.: TNSCST/Travel/VR/14/2010-2011/466 dated 26-08-2010) was sanctioned to him for his abroad visit.

Summer Research Fellowship

The following three Biotechnology students were received their “Summer Research Fellowship” from Indian Academy of Sciences, Bangaluru. The students were undertaken their project work at the following reputed Institutes for a period of two months.

Biozoom magazine

An
inhouse
magazine
called
“Biozoom” is



regularly released by the Department of Biotechnology every semester in which research articles, general articles, jokes, drawings and legendary works are compiled. A total of four issues have been released so far. In the academic year,

Biozoom Volume 3, Issue No 1 and 2 have been released.

K.S.R. Biofertilizers

In order to maintain soil health and increased productivity of different food and forage crops,

K.S.R.

Biofertilizers have been prepared for Tamil Nadu rural



farmers at the rate of lowest cost. One kg of K.S.R. Biofertilizers is Rs. 25.00/- only. Biofertilizers such as Nitrogen fixers, Potassium solubilizers and Phosphorous mobilizers are being sold to the farmers at the Biotechnology Department especially for cereals such as rice, wheat, sorghum, ragi and maize and pulses such as green gram, black gram, bengal gram and horse gram. The K.S.R. Biofertilizers are exhibited at the time Entrepreneurship Development programme conducted at K.S.R. College campus.

IEEE-EMBS News

General Articles.

Rheumatoid arthritis (Ra)

Rheumatoid arthritis (RA) is an autoimmune disease that causes chronic inflammation of the joints. Rheumatoid arthritis can also cause inflammation of the tissue around the joints, as well as in other organs in the body. Autoimmune diseases are illnesses that occur when the body tissues are mistakenly attacked by its own immune system. Because it can affect multiple organs of the body, rheumatoid arthritis is referred to as a systemic illness and is sometimes called rheumatoid disease.

Causes rheumatoid arthritis

The cause of rheumatoid arthritis is unknown. Even though infectious agents such as viruses, bacteria, and fungi have long been suspected, none has been proven as the cause. The cause of rheumatoid arthritis is a very active area of worldwide research. Some scientists believe that the tendency to develop rheumatoid arthritis may be genetically inherited. It is suspected that certain infections or factors in the environment might trigger the immune system to attack the body's own tissues; resulting in inflammation in various organs of the body such as the lungs or eyes. Environmental factors also seem to play some role in causing rheumatoid arthritis. Recently, scientists have reported that smoking tobacco increases the risk of developing rheumatoid arthritis.



Symptoms

When the disease is active, symptoms can include fatigue, lack of appetite, low-grade fever, muscle and joint aches, and stiffness. Muscle and joint stiffness are usually most notable in the morning and after periods of inactivity. Arthritis is common during disease flares. Also during flares, joints frequently become red, swollen, painful, and tender. This occurs because the lining tissue of the joint (synovium) becomes inflamed, resulting in the production of excessive joint fluid (synovial fluid). The synovium also thickens with inflammation (synovitis).

Diagnosis

The doctor reviews the history of symptoms, examines the joints for inflammation and deformity, the skin for rheumatoid nodules, and other parts of the body for inflammation. Certain blood and X-ray tests are often obtained. The diagnosis will be based on the pattern of symptoms, the distribution of the inflamed joints, and the blood and x-ray findings. Several visits may be necessary before the doctor can be certain of the diagnosis. The distribution of joint inflammation is important to the doctor in making a diagnosis. In rheumatoid arthritis, the small joints of the hands, wrists, feet, and knees are typically inflamed in a symmetrical distribution (affecting both sides of the body). When only one or two joints are inflamed, the

diagnosis of rheumatoid arthritis becomes more difficult. The doctor may then perform other tests which we'll discuss on the next slides.

RA diagnostic test

1. citrulline antibody test
2. Sedimentation rate (sed rate)
3. joint X-rays
4. arthrocentesis

Treatment

There is no known cure for rheumatoid arthritis. To date, the goal of treatment in rheumatoid arthritis is to reduce joint inflammation and pain, maximize joint function, and prevent joint destruction and deformity. Early medical intervention has been shown to be important in improving outcomes. Aggressive management can improve function, stop damage to joints as seen on X-rays, and prevent work disability. Optimal treatment for the disease involves a combination of medications, rest, joint-strengthening exercises, joint protection, and patient (and family) education.

Medications

Two classes of medications are used in treating rheumatoid arthritis: fast-acting "first-line drugs" and slow-acting "second-line drugs" (also referred to as disease-modifying antirheumatic drugs or DMARDs). The first-line drugs, such as aspirin and cortisone (corticosteroids), are used to reduce pain and inflammation. The slow-acting second-line drugs, such as gold (Solganal), methotrexate

(Rheumatrex, Trexall), and hydroxychloroquine (Plaquenil) promote disease remission and prevent progressive joint destruction, but they are not antiinflammatory agents. Some newer "second-line" drugs for the treatment of rheumatoid arthritis include leflunomide (Arava) and the "biologic" medications etanercept (Enbrel), infliximab (Remicade), anakinra (Kineret), adalimumab (Humira), rituximab (Rituxan), and abatacept (Orencia).

Why is rest and exercise important?

A balance of rest and exercise is important in treating rheumatoid arthritis. During flare-ups (worsening of joint inflammation), it is best to rest the joints that are inflamed. When joint inflammation is decreased, guided exercise programs are necessary to maintain flexibility of the joints and to strengthen the muscles that surround the joints. Range-of-motion exercises should be done regularly to maintain joint mobility. Swimming is particularly helpful because it allows exercise with minimal stress on the joints. Physical and occupational therapists are trained to provide specific exercise instructions and can offer splinting supports. For example, wrist and finger splints can be helpful in reducing inflammation and maintaining joint alignment.

Bodyguard for the Brain.

Researchers from the Universities of Bonn and Mainz have discovered a mechanism that seems to protect the brain from aging. In experiments with mice, they switched off the cannabinoid-1 receptor. As a consequence, the animals showed signs of degeneration -- as seen in people with dementia -- much faster.

Humans are getting older and older, and the number of people with dementia is increasing. The factors controlling degeneration of the brain are still mostly unknown. However, researchers assume that factors such as stress, accumulation of toxic waste products as well as inflammation accelerate aging. But, vice versa, there are also mechanisms that can like a bodyguard protect the brain from degenerating, or repair defective structures.

Researchers from the Universities of Bonn and Mainz have now discovered a hitherto unknown function of the cannabinoid-1 receptor (CB1). A receptor is a protein that can bind to other substances, triggering a chain of signals. Cannabinoids such as THC the active agent in cannabis sativa and endocannabinoids formed by the body bind to the CB1 receptors. The existence of this receptor is also the reason for the intoxicating effect of hashish and marijuana.

Not only does the CB1 receptor have an addictive potential, but it also plays a role in the degeneration of the brain. "If we switch off the receptor using gene technology, mouse



brains age much faster," said Önder Albayram, principal author of the publication and a doctoral student on the team of Professor Dr. Andreas Zimmer from the Institut für Molekulare Psychiatrie at the University of Bonn. "This means that the CB1 signal system has a protective effect for nerve cells."

Mice prove their brain power in a pool

The researchers studied mice in different age categories -- young six week old animals, middle-aged ones at five months, and those of an advanced age at 12 months. The animals had to master various tasks -- first, they had to find a submerged platform in the pool. Once the mice knew its location, the platform was moved, and the animals had to find it again. This was how the researchers tested how well the rodents learned and remembered.

The animals in which the CB1 receptor had been switched off (the knock-out mice) clearly differed from their kind. "The knock-out mice showed clearly diminished learning and memory capacity," said Privatdozent Dr. Andras Bilkei-Gorzo from Professor Zimmer's team, who led the study. So, animals that did not have the receptor were less successful in their search for the platform. "In addition, they showed a clear loss of nerve cells in the hippocampus," he explained further. This part of the brain is the central area for forming and storing information. In addition, the researchers found inflammation processes in the brain. As

the mice advanced in age, the degenerative processes became increasingly noticeable.

Amazing parallels with the human brain

The animals with the intact CB1 receptor, to the contrary, did clearly better with regard to their learning and memory capabilities, as well as the health of their nerve cells. "The root cause of aging is one of the secrets of life," commented Albayram. This study has begun to open the door to solving this enigma. The processes in the mouse brains have a surprising number of parallels with age-related changes in human brains. So, the endocannabinoid system may also present a protective mechanism in the aging of the human brain. The principal author cautioned, "This will require additional research." The scientists would like to better understand the mechanism by which CB1 receptors protect the brain from inflammation processes. And based on these signal chains, it might then be possible to develop substances for new therapies.

Role of Green Tea in prevention of cancer and other diseases

Green tea has been found to aid in prevention of cancer in many ways. A recent study explored in greater detail the epidemiological findings on green tea's protection against breast cancer. Researchers found that green tea constituent epigallocatechin-3-gallate inhibits topoisomerase activity in human colon

carcinoma cells. Similarly it was suggested that EGCG was converted to EGC in the oral cavity, and both catechins were absorbed through the oral mucosa through drinking green tea rather than using extracts. Green tea extract is a potent nucleoside transport inhibitor, interfering with tumor cells' repair of DNA after chemotherapy. Thus green tea extracts "markedly potentiated" the effectiveness of chemotherapy. These findings suggest that epigallocatechin gallate and green tea extract could be used as a nontoxic adjuvant therapy for leukemia. Green tea has been found to prevent other types of cancer such as those of the liver, lung, ovarian, pancreatic, prostate, skin, stomach, etc. In other non-cancer conditions, Green tea has been shown to protect the brain from oxidative stress, and lower monoamine oxidase (MAO) activity. Flavonoids in general are particularly effective in regulating the levels of nitric oxide in the brain. Green tea is among a handful of substances that can reduce nitric oxide production at concentrations of less than 300 parts per million.

Green Tea contains fluoride that helps prevent cavities and strengthens teeth and is able to kill oral bacteria that may cause bad breath. The active ingredient in green tea, catechin, has also been found to outperform Vitamin C and beta-carotene ten times in scavenging the alkyl peroxy radical. It has been proved that green tea polyphenols to be more potent antioxidants than Vitamin C, Vitamin E, rosemary extract,

and even curcumin in some systems. It is possible that sufficient green tea consumption might protect against Parkinson's disease. Both green and black tea is also potent inhibitors of intestinal absorption of non-heme iron, lowering the amount of free iron reaching the brain in the first place.

Japan has a much lower rate of Alzheimer's disease than western countries. The ability of green tea to significantly lower blood glucose has also been confirmed in studies using diabetic rats. It is shown to possess anti-diabetic activity, and to be effective both in the prevention and treatment of diabetes. A relatively little known compound found in onions and in tea, especially green tea, called diphenylamine, seems to have a strong sugar-lowering action. Weight loss studies claim that the polyphenol content of green tea has antioxidant properties that can help prevent cancer. There is also the suggestion that it can increase endurance in exercise by improving fat metabolism.

20 Things You Didn't Know About...

DNA

Hiding crooks from the DNA in their fingerprints, the 8 percent of our genome that came from viruses,



and the plant that laughs at our puny genetic endowment.

1. Sorry, Jimmy: **James Watson** and **Francis Crick did not discover DNA**. That honor goes to Swiss biochemist **Friedrich Miescher**, who in 1869 found the molecule in the nuclei of white blood cells and called it nuclein.

2. Nor did they figure out that DNA is our genetic blueprint; bacteriologist **Oswald Avery** and his colleagues did that in the early 1940s.

3. What Watson and Crick did do, in 1953, was **decipher the double-helix structure** of DNA. Their discovery ran as a single-page paper in Nature.

4. Phosphorus is a key component of DNA, but late last year a team of NASA scientists published a controversial study reporting that they had found a bacterium that could use arsenic instead. “What else can life do that we haven’t seen yet?” wondered lead researcher **Felisa Wolfe-Simon**.

5. Don’t try this at home: If uncoiled, the DNA in all the cells in your body would stretch 10 billion miles—from **here to Pluto and back**.

6. Most of that DNA resides not in the cell nuclei, which control heredity, but in our mitochondria, the organelles (units within cells) that generate metabolic energy.

7. **Puny humans**: *Paris japonica*, a flowering plant native to Japan, has the longest known genome, nearly 150 billion base pairs. That’s 50 times as long as the human genome.

8. Aside from bacteria, the smallest genome belongs to the intestinal parasite *Encephalitozoon intestinalis*, with a trifling 2.3 billion base pairs.

9. Scientists are working to create vaccines against HIV, flu, and hepatitis C from snippets of synthetic DNA; the DNA tricks the body into producing harmless viral proteins that train the immune system to attack real viruses.

10. **DNA** vaccines for West Nile virus, melanoma, and hemorrhagic disease are already available for horses, dogs, and salmon, respectively.

11. At the Chinese University of Hong Kong, fetal DNA was extracted from a pregnant woman’s blood plasma and tested for Down syndrome. Prenatal DNA screening could someday replace amniocentesis.

12. Telomeres, sequences of DNA at the tips of chromosomes, get shorter every time a cell divides; when they get too short, the cell dies. Some scientists are trying to extend life by extending the telomere.

13. Good news if you're a mouse: Researchers at Dana Farber Cancer Institute in Boston engineered mice with telomerase (an enzyme that adds DNA to telomeres) that could be switched on and off. With the enzyme activated, the mice grew new brain cells and lived longer.

14. Bad news if you're a mouse: Scientists at Osaka University recently developed mice that are especially susceptible to DNA copying errors, seeking to increase the rate of mutations and see what new traits appear.

15. The results so far include short-legged mice, mice with fewer toes than normal, and mice that chirp like songbirds.

16. Guess who's in your DNA? At least 8 percent of the human genome originated in viruses, whose genetic code was integrated with ours over roughly 40 million years of primate evolution.

17. Over the next five years, the International Barcode of Life Project aims to establish genetic identifiers for 500,000 species—short sections of unique DNA in the same location on the genome, a bit like the UPC on your box of Froot Loops.

18. Already, forensic specialists can identify criminals from traces of “touch DNA” left in fingerprints at a crime scene.

19. Next up: food forensics. British microbiologists sequenced DNA to identify the bacteria in a round of Stilton blue. They found that at least six microbial groups influence the flavor of the cheese's “dairy matrix.”

20. And scientists at the University of Guelph in Ontario showed that DNA from the worm (actually an agave butterfly caterpillar) traditionally placed in bottles of mescal leeches into the liquor. So now we know: You don't actually have to “swallow the worm” to swallow the worm.

Do You Know???

- Starfish don't have brains.
 - A crocodile cannot stick its tongue out.
 - The venom of a stonefish can kill a human in two hours.
 - The human eye blinks an average of 4,200,000 times a year.
 - A bird's normal body temperature is usually 7-8 degrees hotter than humans.
 - Banana oil is made from petroleum.
 - Nutmeg is extremely poisonous if injected intravenously.
 - Dendrochronology is the science of calculating a tree's age by its rings.
-