Charutar Vidya Mandal's
NATUBHAI V. PATEL COLLEGE OF PURE AND APPLIED SCIENCES

INSIDE THIS ISSUE:

From the Chief Editor's Desk

By: Dr. Basudeb Bakshi

Being the chief Editor of the N. V. Patel College of Pure & Applied Science's annual newsletter SPECTRUM- the measure of progress, I am highly delighted to present its 2014-15 issue. 'Spectrum' is intended to explore the scientific talents of our staff and students. The newsletter also present to its readers the year's events and achievements that have gone by. With a sense of pride and satisfaction I would like to say that with the active support of the management, faculty and students, Spectrum has come alive. I would like to express my considerable appreciation to all authors of the articles in this issue. I firmly believe that Spectrum will not only make some interesting reading it will set a tradition to see the reflection of our continuous progress and achievements.

I congratulate the editorial team for making *spectrum* innovative and inspiring.
Thank you all!!

MICROBES: MAN'S BEST FRIEND

By: Dr. Akshaya Gupte

Do we all think our self as a simple human being? I do not, but we all are super organisms harbouring/sharing large amount of microbial population in our body. These bacteria which number around 100 trillion are living and dying right now on the surface of our skin, on tongue, deep in the coils of intestine, where the largest contingent of them will be found. We can say our human body as an elaborate vessel optimized for the growth and spread of our microbial in habitants.

Every morning we have our breakfast consisting of porridge, bread, eggs, milk etc., and when it lands in our belly their complex carbohydrates burn slowly to energise our body for hours. We all thus develop an internal glow, albeit less radiant and a lot more natural than the orange or blue kids. To have an experience of Duracell battery breakfast consisting of porridge is amazing. You won't be alone, your dear friends **"THE BACTERIA"** are always ready to give you a company and enjoy. The world is full of productive and prolific good bacterium that helps to sustain the life on the planet Earth. The little early known animalcules are able to convert light energy to chemical energy by the process of photosynthesis. Nitrogen

The Good Bacteria

fixers present in the leguminous plants and soil fix the atmospheric nitrogen.

A single bacterium whose survival explicitly depends upon the external environment. Human body provides an appealing habitat for many bacteria. 85% of trillions of bacteria are harmless if not beneficial. Each of us employs an array of antimicrobial defences so as to make our blood, lungs, urinogenital etc, a bug free zone.

The digestive tract of the humans is the most heavily occupied. More than 80% of the human body's normal flora resides in the gut having more than 600 species. The normal flora produces essential nutrients and generates by products which reduce the risk of developing cancers, digestive disorders and other diseases. The normal flora thus serves our body from cradle to grave.

The micro-organisms start making us their home before we hit the cradle. Germ free baby is released from the sterile confines of its mother's womb; it enters a world full of germs. Thus the bugless babe is at once no more. It has turned itself into a vessel accommodating a mass of microbes like fellow human beings. The baby carries with itself the presence of *E.coli*, *Enterococcus*, *Bifidobacterium*, and *Lactobacillus* when it carries out through the birth canal. If it is cesarean it may carry *Clostridium* and *Streptococcus*. The organisms ingested during the birth process colonize the infant guts within days. A breastfed baby's intestinal flora has 90% *Bifidobacterium*. This bacterium makes the gut acidic there by creating a barrier for other organisms which the child has yet to develop a natural immunity.

The Ugly Bacteria

Micro- organisms make their way into the digestive tract from the top. Just the smell of the meal can make the hungry person dribble. This is so because by the communication of the brain to the mouth. The saliva contains amylase which starts the process of digestion of starchy foods. Saliva also has the presence of antimicrobial substrates. *Streptococcus mutans* is an inhabitant of mouth thriving on sugar substrates and is responsible for the formation of plaque on the surface of teeth. The number of *S. mutans* suppress the growth of other bacteria found in the mouth. The number of *S.pneumonia* a deadly pathogen responsible for Pneumonia and meningitis is restricted by the presence of *S.mutans* there by decuring the risk of the disease. Microbes approach the acidic pit of the stomach through oesophagus. The processing of the food occurs here where it remains for 3 hours giving microbes plenty of time for the attachment to the stomach walls. The gastric juices secreted to liquefy food into chime and start the breakdown of protein are 5 times more acidic than lemon juice so lemon juice when flashed on mouth may cost a few tears from the eyes but the gastric juice will cast your eyes. The mansion of the bacterium *Helicobacter pylori* lies here.

Helicobacter pylori are found in the stomach of about 50% people yet only $1/5^{th}$ of them become unwell. Other companions which harbour the stomach are *Streptococcus* and *Lactobacillus*. Their role is the conversion of sugar to acid. Food reaches the small intestine through GI tract in help the breakdown of food into constituent molecules. The main residents at the acidic top of the small intestine are Lactobacillus and Enterococcus *faecalis*. Towards the bottom of small intestine the conditions of living are less arduous, less acidic and more conducive for other bacterial community. Here the other bugs join mainly *E.coli* and Bacteroides.

The colon makes a great place for the bugs to faster. The level of bacteria here is over 1000 per ml of faeces. The far most abundant spp. Here are Bacteroides and the oxygenated intolerant lactic acid produces *Bifidobacterium*.

It is estimated that due to diarrhoeal diseases an infant dies every minute worldwide. To treat such cases the good buys *Lactobacilli* and *Bifidobacterium* come to our rescue. A cocktail of *Lactobacilli*, *Bifidobacterium* and *Streptococcus* has proven to provide symptomatic relief.

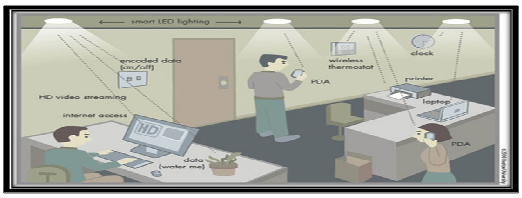
At present we don't know a lot but we do probably know enough to begin taking better care of them. We have a pretty good idea of what it likes to eat and what chemicals do to it. All we need to know, in other words to begin with modesty to tend the unruly garden within.

Wi-Fi vs Li-Fi

By: Dr. Chetan Dudhagara

Wi-Fi is wireless networking technology that uses radio waves to provide wireless high-speed Internet and network connections. It has become so popular and essential in our day to day life that without it life seems dull and comes to a halt. Li-Fi is a similar technology for such facility.

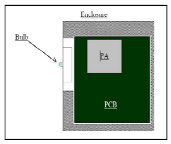
Professor Harald Haas from the University of Edinburgh, UK is the founder of Li–Fi. It is a bidirectional, high speed and fully networked wireless communications using light. It is wireless and uses visible light communication instead of radio frequency spectrum, which carries more information. Li-Fi uses transceiver fitted LED lamps instead of modems, which can light a room as well as transmit and receive information.

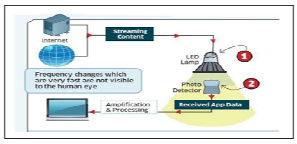


Construction of Li-Fi:

This technology is based on Visible Light Communication (VLC). It uses fast pulses of light for wireless transmission of information. There are two main components in Li-Fi system.

1. **A high brightness white LED:** It acts as a transmission source.
2. **A silicon photodiode:** With good response to visible light it acts as receiving element. The Li-Fi has following components
   - Bulb
   - Power Amplifier Circuit (PA)
   - Printed Circuit Board (PCB)





The working procedure of Li-Fi is very simple. There is a light Emitter on one end and photo detector on the other end. LED is used as light emitter and light sensor is used as photo detector. When LED is on, a digit 1 is transmitted and if LED is off, a digit 0 is transmitted. The block diagram of Li-Fi system is as follow:

Comparison between Wi – Fi and Li – Fi:

Sr. No.	Parameters	Wireless Technologies	
		Wireless Fidelity Wi – Fi	Light Fidelity Li – Fi
1	Data Transfer Speed	Data transfer speed is 150 mbps	High data transfer speed more than 1gbps
2	Data Transfer Medium	Radio spectrum is used for medium	Visible Light is used for medium
3	Spectrum Range	Radio frequency spectrum range is less than visible light spectrum	light spectrum is 10,000 time broad spectrum
4	Operating Frequency	Operating frequency is 2.4 GHz, 5GHz	Operating frequency is tera Hz
5	Cost	expensive because it uses radio spectrum	It is cheaper because it uses free band

Why Mathematics?

By: Mr. Bhailal Patel

The importance of mathematics is two-fold. It has its importance not only in the advancement of science and in understanding the workings of universe, it is equally important to individuals for their personal advancement.

Interestingly, employers are looking for graduates with strong skills in reasoning and problem solving - the skill that is developed through mathematics.

Career in Research/Teaching: There are various options for those who are interested in shaping their career in academics. One of them would be selecting a good post-graduate school/institute in India and going for Master degree. During M.Sc, one can appear for JRF (Junior Research Fellowship) exam conducted twice in a year by CSIR (Council of Scientific and Industrial Research) at the national level. The successful candidates in this exam receive a fellowship of up to Rs 3,00,000 per annum (for 4 years) for pursuing PhD at any university within India. However the level of this examination being quite high, it is extremely essential that a candidate chooses a reasonably good post-graduate school/institute for pursuing MSc in Mathematics. Some of these schools/institute offering such courses are:

1. Tata Institute of Fundamental Research (TIFR), Bombay.
2. Institute of Mathematical Sciences, Chennai.
3. Indian Statistical Institute, Calcutta.
4. Indian Institute of Technology at Bombay, Kanpur or Delhi.
5. Harishchandra Research Institute (HRI), Allahabad.
6. P.G.Department of Mathematics, Sardar Patel University.

If one performs well at Masters then there are bright opportunities abroad also. British universities/government also offers lots of scholarships to the deserving students who are interested in pursuing PhD at UK. There are similar openings in USA also. Those who are not interested in research and are aiming at teaching career in the high school or higher secondary school can go for B.Ed immediately after BSc or after MSc.

Mathematics and Finance: Mathematics has a big in role in the finance sector too. Sophisticated mathematical tools - such as the theory of chaos and time series forecasting are used to map trends on the world future markets. Actuarial science, a branch of statistics, concerns itself with the evaluation and management of financial risks, particularly those associated with insurance companies and pension funds. Actuaries are obviously employed by insurance companies, but they are also found in consultancy practices, government departments, stock exchanges, industry and commerce and universities. Actuaries are commonly employed in high-level management positions to advice on policy and strategies.

Mathematics and computing: The computing industry employs mathematics graduates; indeed, many university computing courses are taught by mathematicians. Mathematics is used to create the complex programming at the heart of all computing. Also cryptography, a form of pure mathematics, is deployed to encode the millions of transactions made hourly via the Internet and when we use debit or credit cards.

Colours To Dye Or Die For?

By: Dr. Shveta Joshi

Food colouring, or colour additive, is any dye, pigment or substance that imparts colour when it is added to food or drink. They come in many forms consisting of liquids, powders, gels, and pastes. Food colouring is used both in commercial food production and in domestic cooking.

Either the synthetic food colours or natural food colours, the colour has always had an important implication on the minds of people as far as food is concerned. Cuisines prepared in attractive colours have immensely lured men folk in all the quarters of the world. It is therefore necessary either to preserve the natural or maintain the characteristic colour of a food product while it is manufactured or stored for future use. A non-attractive colour however makes the food look un- fresh and is likely to be rejected. It not only now but archaeological evidences show the use of synthetic food colour to over 3000 years ago.

If you need further incentive to ditch artificially colored foods from your diet, remember the reason they're added to processed foods in the first place: to make a food that would otherwise be an off-colored mess look appealing.

When foods are processed not only are valuable nutrients lost and fibers removed, but the texture, natural variation and flavors are lost also. After processing, what's actually left behind is a bland, uninteresting "pseudo-food" that most people would find entirely unappetizing.

So at this point, food manufacturers must add back in the nutrients, flavor, color and texture in order to make them desirable, and this is why they become loaded with food additives.

Most commonly, additives are included to:

- Slow spoilage
- Prevent fats and oils from becoming rancid or developing an off-flavor
- Prevent cut fruits from turning brown
- Fortify or enrich the food with synthetic vitamins and minerals (which are lost during processing)
- Improve taste, texture, and appearance

In the case of kids' foods, bright colors are also added to attract kids' attention and make the foods appear "fun." But in most cases, if a food comes in an outrageous color that is not found in nature, consuming it is not a good idea.

Take one carefully designed, randomized, double-blind, placebo-controlled study published in the journal *"The Lancet"*. It concluded that a variety of common food dyes and the preservative sodium benzoate -- found in many soft drinks, fruit juices and salad dressings -- do in fact cause some children to become measurably more hyperactive and distractible. The study also found that the E-numbered food dyes do as much damage to children's brains as lead in gasoline, resulting in a significant reduction in IQ. The results of this study were what prompted the British Food Standards Agency (FSA) to issue an immediate advisory to parents, warning them to limit their children's intake of additives if they notice an effect on behavior. As mentioned earlier, they also advised the food industry to voluntarily remove the six food dyes named in the study back in 2009, and replace them with natural alternatives if possible.

#	Name	Hyperactivity	Asthma	Potential Cancer Risk
E102	Tartrazine (Yellow #5)	✓	✓	Kidney and Adrenal gland
E104	Quinoline	✓	✓	Liver cancer
E110	Sunset Yellow (Yellow #6)	✓	✓	Kidney and Adrenal gland
E122	Carmoisine	✓	✓	Bladder cancer
E123	Amaranth (Red #2)	✓	✓	Colon/Colorectal cancer
E124	Ponceau	✓	✓	Liver cancer
E127	Erythrosine (Red #3)	✓	✓	Thyroid cancer
E129	Allura Red (Red #40)	✓	✓	Immune System Tumors
E132	Indigo Carmine (Blue #2)	✓	✓	Brain Tumors
E133	Brilliant blue (Blue #1)	✓	✓	Kidney Tumors
E142	Green S	✓	✓	---
E143	Fast Green (Green #3)		✓	Bladder & Testes Tumors
E151	Brilliant Black	✓	✓	Kidney and Adrenal gland
E155	Chocolate Brown	✓	✓	Kidney and Adrenal gland
E160b	Annatto	✓	✓	---

Synthetic food colours have diverse applications, some of which include: Ice creams, Biscuits, Sweet meats, Fruit drinks, Seasonings, Pharmaceutical tablets, Syrups etc.

Citrus Red 2, Red 3, Red 40, Yellow 5, Yellow 6, Blue 1, Blue 2 and Green 3, --which include some of the most commonly used artificial food colorings--have been identified as being carcinogenic, or being contaminated with, potential cancer-causing chemicals, according to the Center for Science in the Public Interest. And Blue 1, Red 40, Yellow 5, and Yellow 6 are known to trigger reactions in those having allergies.

Let me make it clear that your diet should include a range of vibrantly colored foods … but these foods should be the ones that are naturally rich in color. **Red bell peppers**, **purple eggplant**, **green spinach**, **blueberries** and **rainbow chard** are all examples of healthy foods whose bright colors are signs of the important nutrients they contain.

Herbal remedy for Diabetes

By: Dr. Susmita Sahoo

Diabetes is a disorder that affects the way your body uses food for energy. Normally, the sugar you take in is digested and broken down to a simple sugar, known as glucose. The glucose then circulates in your blood where it waits to enter cells to be used as fuel. Insulin, a hormone produced by the pancreas, helps move the glucose into cells. A healthy pancreas adjusts the amount of insulin based on the level of glucose. But, if you have diabetes, this process breaks down, and blood sugar levels become too high. Type 2 Diabetes is the most common form of Diabetes affecting 90% of people with Diabetes.

Survey of medico Ethnobotanical literature pertains to individual human diseases which would help to focus attention on a few plants for more intensive and systematic investigations including chemical and clinical.

A list of important plants with herbal remedies is given here for further work.

In the list of useful plants used in Diabetes three distinct categories can be recognised.

Category I: ***Food plants***-These are mainly of food value and with little or slight medicinal or drug value. Few selected plants like Barley and Kodo millet among cereals, Bengal gram and Black gram among pulses and certain vegetables like tomato, radish and banana and fruits like cucumber. Many of these plants are rich in soluble food fibres which are useful for diabetes. Others are rich in Vitamin B and C.

Category II: ***Drug plants***-This category comprises medicinal plants having no food value. One of the most important anti diabetic plant is *Gymnema sylvestre* which illustrates certain point of interest.This plant has been neglected as a result of Western influence although it has been used to treat diabetes in India for 2000 years by traditional medical practitioners. Certain other potential plants are *Tinospora cordifolia, Lagerstroemia speciosa, Azadirachta indica and Aegle marmelos .Murraya koenigii* helps to postpone the onset of diabetes. Drug plants enhances secretion of insulin.

Category III: ***Food cum drug plants***- These plants can be used both as food and drug. These plants may be considered most useful and important category among anti diabetic plants. One of the best examples is *Momodica charantia.* It is a popular vegetable and may be valuable in the diabetic's diet. It is also known to contain insulin like compound phyto insulin. All parts of the plant are useful for diabetes.

- Bengal Gram (*Cicer arietinum*)-Seeds reduce plasma glucose in humans.
- Radish(*Raphanus sativus*)-Root and leaves useful in diabetes.
- Banana(*Musa paradisica*) – Flower and fruit useful. Flower good food for diabetics. Fruit cooked as a vegetable good for diabetes.
- Cucumber(*Cucumis sativus*) – Fruit used in Diabetes. A useful ingredient in the diet of diabetics.
- Bitter gourd (*Momordica charantia*) –Whole plant boiled in water and drunk for diabetes.
- Fruit juice contains insulin like compound.
- *Aegle marmelos* – Root, upper part, leaves and fruit useful. Two leaves every morning with two of neem in empty stomach reduces blood sugar.
- Amla(*Emblica officinalis*) –Fruit is hypoglycaemic. Fruit juice with turmeric powder and honey is said to cure diabetes.
- *Gymnema sylvestris* – Leaves when chewed paralyse for some time the taste of sweet substances.
- Cumin (Cuminum cyminum)---Seeds used as spice are effective in reducing blood sugar level.

COLLEGE RESULTS AT THE UNIVERSITY EXAM (APRIL 2014)

RESULT OF NVPAS APRIL - 2014		
	S.P. Uni. Result %	NVPAS Result %
T.Y.B.Sc. (VI Sem.)	50.09	91.19
T.Y.BCA (VI Sem)	70.15	95.28

GOLD MEDALS SECURED BY OUR STUDENTS AT S.P. UNI. T.Y.B.Sc. EXAMINATION APRIL 2014.

Sr No	Name	Subject	Name of Gold Medal
1	Ms. Rajal Hiteshbhai Patel	Industrial Chemistry	"Dipee Chem. Pvt Ltd, Gold Plated Medal"
2	Ms. Mitula Manojbhai Donga	Instrumentation	"Charutar Vidya Mandal Gold Plated Medal"
3	Ms. Dharitri Bharatbhai R	Environmental Science	"Charutar Vidya Mandal Gold Plated Medal"
4	Mr. Shalin Pradipbhai Shah	Information Technology	"Charutar Vidya Mandal Gold Plated Medal"
5	Ms. Anuja Yogin Parikh	Genetics	"Dr. B. R. Patel Gold Plated Medal"
6	Ms. Rajal Hiteshbhai Patel	Industrial Chemistry	"Dr. D. A. Raval Gold Plated Medal"

TECHNO-ASTRUM - 2015

ACHIEVEMENT OF THE FACULTY

HUNGRY GENES

SEMINAR ON ENERGY CONSERVATION

GIBION – 2015

INTERCOLLEGIATE STATE LEVEL SCIENTIFIC EVENT

ALUMNI ASSOCIATION



CARBON FOOT PRINT CLUB AND NATURE CLUB

N-BT-CBC of GSBTM and Entrance Exam Preparation Cell (EEPC)

NATIONAL SCIENCE DAY CELEBRATION

UDAAN (THE YOUTH FESTIVAL) – 2015

ANTI-TOBACCO CELL


NATIONAL CADET CORPS (NCC)

MINAXI LALIT EXAM

Sr. No.	Name of Student	Subject	CENTRE POSITION	STATE POSITION
1	Swashati Mahanta	Env. Science	I	I
2	Aakanksha Dixit	Env. Science	II	II
3	Ashwini Khandekar	Env. Science	III	-
4	Mitali Patel	Env. Science	III	-
5	Shiksha Sharma	Env. Science	III	-
6	Avani Patel	Zoology	I	II
7	Ratneshwar Ronik Kamleshbhai	Zoology	II	-
8	Roshni Kalal	Biotechnology	I	II
9	Riya Shah	Biotechnology	II	-
10	Devanshi Joshi	Biotechnology	III	-
11	Purvi Bangoria	Microbiology	I	I
12	Nisha Desai	Microbiology	II	-
13	Nidhi Kansara	Microbiology	III	-
14	Priyesh Pillai	BCA	I	II
15	Nehal Bambharoliya	Mathematics	I	-
16	Krishna Patel	Mathematics	III	-
17	Preksha Patel	Mathematics	III	-

NATIONAL SERVICE SCHEME

EXTENSION CELL

SPORTS

Sr. No.	Name	Class	Game	Place
01.	Tanwar Nishtha A.	F.Y.B.Sc.-A-102	Badminton	Bhopal
02.	Dobariya Abhishek B.	S.Y.B.Sc-ES-202	Badminton	Bhopal
03.	Tandel Kavita U.	S.Y.B.Sc-CH-339	Basketball	Banasthali
04.	Patel Nupur G.	T.Y.B.Sc-GT-338	Basketball	Banasthali
05.	Kava Darshika A.	F.Y.B.Sc-B-95	Basketball	Banasthali
06	Patel Abhishek V.	T.Y.BCA-411	Basketball	Pune
07.	Patel Urvish K.	S.Y.BCA-595	Football	Gwalior
08.	Patel Ronak N.	T.Y.B.Sc-BT-81	Football	Gwalior