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From the Chief Editor's Desk

By: Dr. Basudeb Bakshi



From Chief Editor's Desk

I am extremely pleased to release the 4th issue of biannual e-magazine SPECTRUM- *The Measure of Progress*, September, 2016. This particular copy is from our young bubbling scientists whose contributions have made this issue a very special one.

It is indeed cheering to put together these wonderful writings. This magazine will bring lots of new in Science through these contributions. I know that these scientific articles are not enough to demonstrate our statement that NVPAS always strives for quality education but it definitely reflects some. I express my appreciations and thanks to the devoted staff and their team work. It is very rightly said that "Teamwork is the ability to work together toward a common vision. It is the fuel that allows common people to attain uncommon results." The Editorial Board feels gratitude to Dr. C L Patel, Chairman, Charutar Vidya Mandal (CVM) for his enthusiastic concern and kind support. I wish good luck to all my dear students for their University examinations ahead.

Wish you all a very Happy Deepawali and Happy New year!!!

Can DNA be used as for digital data storage?

By: Mr. Digvijay Virpura



Yes! It sounds weird but wonderful too when we say that in near future DNA - an important molecule of heredity will be used to store digital data of computer. In recent years biological techniques have gained more popularity, as they are applied to many kinds of applications, authentication protocols and cryptography. Emerging Internet applications make the transmission security and data storage a very important issue. However, the Internet is a public but insecure channel to transmit data. So the important information must be manipulated to be concealed while delivered via the Internet such that only the authorized receiver can get it. We do have many techniques to encrypt important information but it requires more space to store them. Recently data hiding based on the DNA sequence has been attracting much attention, and several methods have been proposed. One of the most interesting biomolecules is deoxyribonucleic acid (DNA) which is storing all the genetic information of living organisms starting from bacteria to human. The question is can we use this molecule to store our digital data also? Hiding data in DNA becomes an important and interesting research topic. As the exposedness during transmission gives rise to the requirement of encryption when transmitting private or confidential data. The DNA is composed of four distinct letters, A, C, G and T; each letter corresponds to a specific nucleotide. The property of a DNA sequence has been manipulated in most DNA-based methods. The most important part to use data hiding in DNA is the sequence is the sequence which are composed of letters which are meaningless for the most people, So we do not need to worry about the manipulation in data. And second advantage of storing data in DNA is we can store vast amount of data in DNA. This article focuses on the

technique available for storing vast amount of data in DNA and also to encrypt the data.

First advantage of using DNA sequence is that it requires less space than any other encryption technology secondly it can store large amount of data in it. As we store data in disk we can store the data in DNA. Digital data can be stored with only two bits either '0' or '1', whereas, DNA contains sequences of four bases- adenine, thymine, guanine, and cytosine (ATGC). So with ATGC we can form all the possibilities of binary. First, each symbol of DNA sequence is converted into a binary string. A logical strategy is to encode each alphabet with two bits in alphabetical order, which form a sequence of binary digital which can be easily encrypted or decrypted.

DNA is two twisted strands composed of four bases, Adenine (A), Cytosine (C), Thymine (T) and Guanine (G). The four bases represent the genetic code. (A) bonds with the complementary (T), (G) bonds with the Complementary (C), and vice versa. Here every nucleotide encoded with a binary code. For example A is encoded with '00', C is encoded with '01', G is encoded with '10', and T is encoded with '11'.

Nucleotide	Binary Code
A	'00'
C	'01'
G	'10'
T	'11'

Now several bits of the binary formatted DNA sequences are combined to form a bit string, and then the bit string is converted to a decimal integer. Each integer in the decimal formatted DNA sequence is called a word. Let w be the length of a bit string to form a word.

- (1) Let us take a DNA sequence 'ACTGTACGTACA' as an example. (A=00, C=01, G=10, T=11)
- (2) The binary format of the sequence is '0001 1110 1100 0110 1100 0100'.
- (3) So we have converted our DNA sequence into the Binary we can do it vice-versa so we can store our data in DNA.
- (4) Now let's go further for the encryption of data. Consider the above example again.
- (5) Assume that w (Encryption Code) = 4
- (6) First four bits '0001' are converted to the decimal integer 1 because $(0001)_2 = (1)_{10}$.

(7) Hence the decimal format of the DNA sequence 'ACTGTACGTACA' is '1 14 12 6 12 4'. After that, the decimal formatted DNA sequence can be used to conceal the secret message.

Problems in the Existing Storage devices: All Digital Storage Devices Generate e-waste that effect the environment. Like hazardous waste, the problem of e-waste has become an immediate and long term concern as its unregulated accumulation and recycling can lead to major environmental problems endangering human health. Central Pollution Control Board (CPCB) estimated India's e-waste at 1.47 lakh tones or 0.573 MT per day. A report of the United Nations predicted that by 2020, e-waste from old computers would jump by 400 per cent on 2007 levels in China and by 500 per cent in India. Preserving electronically-held data is a complex and challenging problem. The instability of the storage media and the rapid obsolescence of the equipment needed to read the data pose problems which can seem insoluble in the face of accelerating techno-logical change. After use the device become E-Waste. An estimated 50 million tons of E-waste are produced each year. The Environmental Protection Agency estimates that only 15-20% of e-waste is recycled, the rest of these electronics go directly into landfills and incinerators. Digital Storage devices has limited Life.

Advantages to use DNA as storage Option:

- ◆ Environment Friendly. DNA does not infect the environment.
- ◆ DNA can store data for long period of time.
- ◆ It can store the information from a million CDs in a space no bigger than your little finger, and could keep it safe for centuries.
- ◆ Recently, Harvard scientists managed to stuff 5.5 petabits (around 700 terabytes) of data onto a single gram of DNA.
- ◆ One of the great properties of DNA is that you don't need any electricity to store it.

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Computer & Graphics By
Ranubha Gohil

DNA Barcoding: Consortium for the Barcode of Life

By: Mrs Pratibha Chaurasia



In 2003, Paul Hebert, researcher at the University of Guelph in Ontario, Canada, proposed "DNA barcoding" as a way to identify species. Barcoding uses a very short genetic sequence from a standard part of the genome the way a supermarket scanner distinguishes products using the

black stripes of the Universal Product Code (UPC). DNA barcoding is a technique for characterizing species of organisms using a short DNA sequence from a standard and agreed-upon position in the genome. DNA barcode sequences are very short relative to the entire genome and they can be obtained reasonably quickly and cheaply. DNA barcoding is a taxonomic method that uses a short genetic marker in an organism's DNA to identify it as belonging to a particular species. It differs from molecular phylogeny in that the main goal is not to determine patterns of relationship but to identify an unknown sample in terms of a preexisting classification

A desirable locus for DNA barcoding should be standardized (so that large databases of sequences for that locus can be developed), which must be present in most of the taxa of interest and able to sequence without species-specific PCR primers, short enough to be easily sequenced with current technology, and provide a large variation between species yet a relatively small amount of variation within a species. Although several loci have been suggested, a common set of standardized regions were selected by the respective committees:



For animals and many other eukaryotes, the mitochondrial COI gene

For plants, the concatenation of the rbcL and matK chloro-

plast genes. These provide poor resolution for land plants, and a call was made for regions to be assessed that could complement rbcL and matK.

For fungi, the internal transcribed spacer (ITS) region. The Barcode of Life Data Systems (BOLD) is a web based workbench and database supporting the acquisition, storage, analysis, and publication of DNA barcode records. By assembling molecular, morphological, and distributional data, it bridges a traditional bioinformatics chasm. BOLD is the most prominently used barcoding software and is freely available to any researcher with interests in DNA barcoding.

Applications include, for example, identifying plant leaves even when flowers or fruit are not available, identifying insect larvae (which may have fewer diagnostic characters than adults and are frequently less well-known), identifying the diet of an animal, based on its stomach contents or faeces and identifying products in commerce (for example, herbal supplements, wood, or skins and other animal parts). Finally such important contributions from barcode project, will leave an important legacy; a comprehensive repository of high quality DNA extracts that will facilitate future genomic investigations.

Household Chemicals - Handle with Care

By: Dr. Bhavin Patel



Chemistry is a big part of your everyday life. You find chemistry in daily life in the foods you eat, the air you breathe, cleaning chemicals, your emotions and literally every object you can see or touch.

Many common household chemicals are dangerous. They may be reasonably safe when used as directed, yet contain toxic or degrade over time into a more dangerous. Here's a list of some of the most dangerous household chemicals, including the ingredients to watch for and the nature of the risk.

Air fresheners - Air fresheners may contain any of a number of dangerous chemicals. Formaldehyde irritates the lungs and mucous membranes and may cause cancer. Petroleum distillates are flammable, irritate the eyes, skin, and lungs, and may cause fatal pulmonary edema in sensitive individuals. Some air fresheners contain p-dichlorobenzene, which is a toxic irritant. The aerosol propellants used in some products may be flammable and may cause nervous system damage if inhaled.

Ammonia - Ammonia is a volatile compound that can irritate the respiratory system and mucous membranes if inhaled, can cause a chemical burn if it is spilled on skin, and will react with chlorinated products (e.g., bleach) to produce deadly chloramines gas.

Antifreeze - Antifreeze is ethylene glycol, a chemical which is poisonous if swallowed. Breathing it can cause dizziness. Drinking antifreeze can cause serious brain, heart, kidney, and other internal organ damage. Ethylene glycol has a sweet flavor, so it is attractive to kids and pets. Antifreeze typically contains a chemical to make it taste bad, but the flavor is not always a sufficient deterrent. The sweet smell is enough to lure pets.

Bleach - House hold bleach contains sodium hypochlorite, a chemical that can cause irritation and damage to the skin and respiratory system if inhaled or spilled on the skin. Never mix bleach with ammonia or with toilet bowl cleaners or drain cleaners, as dangerous and possibly deadly fumes may be produced.

Drain cleaners - Drain cleaners typically contain lye sodium hydroxide or sulphuric acid. Either chemical is capable of causing an extremely serious chemical burn if splashed on the skin. They are toxic to drink. Splashing drain cleaner in the eyes may cause blindness.

Laundry detergent - Laundry detergents contain a variety of chemicals. Ingestion of cationic agents may cause nausea, vomiting, convulsion, and coma. Non-ionic detergents are irritants. Many people experience chemical sensitivity to dyes and perfumes present in some detergents.

Mothballs - Mothballs are either p-dichlorobenzene or naphthalene. Both chemicals are toxic and known to cause dizziness, headaches, and irritation to the eyes, skin, and respiratory system. Prolonged exposure can lead to liver damage and cataract formation.

Motor oil - Exposure to the hydrocarbons in motor oil can cause cancer. Many people are unaware that it contains heavy metals which can damage the nervous system and other organ system.

Oven cleaner - The danger from oven cleaner depends on its composition. Some oven cleaners contain sodium hydroxide or potassium hydroxide, which are extremely corrosive strong bases. These chemicals can be deadly if swallowed. They can cause chemical burns on the skin or in the lungs if the fumes are inhaled.

Rat poison - Rat poisons (rodenticides) are less lethal than they used to be, but remain poisonous to people and pets. Most rodenticides contain warfarin, a chemical which causes internal bleeding if ingested.

Windshield wiper fluid - Wiper fluid is toxic if you drink it, plus some of the poisonous chemicals are absorbed through skin, so it is toxic to touch. Swallowing ethylene glycol can cause brain, heart, and kidney damage, and possibly death. Inhalation can cause dizziness. The

methanol in wiper fluid can be absorbed through the skin, inhaled, or ingested. Methanol damages brain, liver, and kidneys and can cause blindness. The isopropyl alcohol acts as a central nervous system depressant, causing drowsiness, unconsciousness, and potentially death.

REMEDIES

Make your own cleaning products: It's easy, fun and cheap to make non-toxic cleaners from safe and effective ingredients like vinegar and baking soda. Shop for cleaners, detergents and personnel care products labeled "fragrance free".

Give your personal care products a makeover: Read the label to avoid chemicals like parabens, sodium lauryl sulphate and oxy benzene. Use them less frequently to reduce exposure.

Go "BPA- Free": Ditch the canned foods when possible and opt for fresh fruits and vegetables instead, look for products packaged in glass or line cardboard instead of cans. Don't take paper receipts at ATMs or grocery stores unless you really need them.

Choose alternatives to plastics (where possible): use glass jars or ceramic bowls to store food. Never microwave plastic. Avoid plastic with recycled symbols #3(PVC), #6(polystyrene) and #7(other) which have greater potential to leach toxics and are difficult to recycle.

Keep chemicals out of the house: Take off your shoes before entering your house to avoid tracking in oils and chemicals from the streets outdoors. Dust with a micro fiber cloth and wet cloth and vacuum your house regularly. (With HEPA-filter vacuum if you can)

Turn down the heat on non-stick cookware: keep the stove at or below medium heat when using Teflon or non-stick cookware. Opt for cast-iron or stainless steel pans for cooking when possible.

Ditch the air fresheners: Eliminate odor - identify the smell and eliminate or prevent it. Open a window, ventilating your home with outdoor air has been shown to reduce symptoms associated with asthma, allergies and infections.

Dengue

By: Ms. Bansi Sharma

TYBSc Genetics



World's 70% population is facing a possible threat to dengue disease. India, a developing nation, is also affected with this fatal disease. Every year around 400 million suffer from dengue in the world. In India alone, 99,913 cases are registered till September, 2015 and of which 220 people had lost their lives. Till September 25, 2016, 45,490 cases have been registered and 88 patients died. (Source: National Vector Borne Disease Control Programme, Health and Family Welfare Department, Govt. of India).

Both Malaria and Dengue are spread by mosquitoes. Dengue is more dreadful than malaria. Aedes (a female mosquito) is responsible for the carrier of dengue parasite. The government has been trying to create awareness among the general public through mass media. But still people in villages are not aware of the illness. A survey carried out in one of the villages of Anand district has found that most of the village people are not aware of dengue symptoms. Moreover, the level of awareness among women is higher than men.

Symptoms of Dengue: High fever (103- 105 degrees Fahrenheit), Severe Headache, Pain - backside of eyes, Fatigue, Joint and Muscle pain, Vomit, Low blood pressure, Respiratory problem, Stomach pain, Bleeding from nose, mouth or gum, Red spots on the skin and Loss of appetite

Diagnose: As dengue is a fatal disease, one should not be afraid of it. It can be cured and prevented. It is somewhat difficult to diagnose dengue because its symptoms are similar to Chikungunya. It is very necessary to consult a doctor at the earliest because no vaccine is available for dengue.

Preventive Measures for Dengue: There is a saying in English, "Prevention is better than cure". To curb dengue, it is necessary to stop breeding. As the breeding of mosquitoes carrying dengue parasite happens in clean water, it is very important to inspect water bodies of the surroundings at regular intervals. Here are some of the measures which should be taken:

Keep all drains free from choke.
Change water in vases at regular intervals.
Wear a long-sleeved shirt, long pants, socks and shoes.
Use mosquito repellent cream or sprays.
Use bed netting.

Reduce the breeding habitat such as old tyre, fridge, open water tank, air cooler etc. to lower mosquito populations. Always cover your trash can or dustbin when not in use. Install mosquito screens on windows.

Consult a doctor immediately if symptoms of dengue are found.

Avoid crowded places.

Home Remedies: Apart from the above mentioned preventive measures, the following home remedies can assist in curing.

Juice of Papaya leaves is very effective in increasing White blood cells and platelet count.

Orange juice helps improve digestion and helps to replace fluid loss of the body or dehydration.

Basil Leaves helps to improve immunity.

Use of coriander while cooking food helps to reduce fever and joint and muscle pain.

Do not smoke or consume alcohol.

Do not take medicines without doctor's prescription.

Consumption of Fenugreek seeds helps in reducing joint and muscle pain.

Eat simple food which is easy to digest and is less oily and spicy.

Drink plenty of fluids like juices, water and soups.



Ethics and New Genetics

By: Ms Haimi Jariwala

TYBSc Biotechnology

Ethics and New Genetics by The Dalai Lama, covers technological advancement in the field of modern genetics by stating the possible outcomes of such a study. He states, "At heart the challenge we face is really a question of what choices we make in the face of the growing options that science and technology provide us." By this he means that the real challenge is actually just a matter of our choices which in turn will help us decide how much we want these scientific advancements to affect our lives. Scientific advancement in the field of genetics has opened numerous doors to mankind which have a lot of potential to help a lot of people but also holds the power to wipe humanity off of its very existence making it a necessary evil.

Genetic modification can also have a huge impact on the agricultural field. With the help of genetic modification we can eradicate the food problems all over the world and there will be plenty of food for everyone. Even though it might seem as if there are no setbacks to the field of agriculture due to genetic modification but we are risking the quality of the food that we eat by accepting this change. It's not like the food will damage an individual's body but the food might turn out to be only half as nutritious as the natural food that we eat. But we should always look at the brighter side in this scenario because it is helping us eradi-

cate hunger from the world which has been a major concern for every major country.

Sometimes the reason why people choose not to grow their family is simply because they cannot afford to feed one more stomach. By manufacturing more than enough food for everyone all across the globe we risk the possibility of massive rise in the population of the world. This also has one more setback as people will have a lot of food to eat but they won't have the physical strength that they used to have when they had access to natural food only.

Sometimes people are born with some physical disfigurement or imperfection. With the help of genetic modification people can actually solve those problems by just getting rid of the imperfect body part and replacing it with a new one. When you think of it this way you can possibly see no bad coming out of this but when you think clearly you will realize the amount of problems this type of facility can cause! What if everyone starts looking the same? What if people don't recognize their loved ones anymore because they don't look what they used to look like a few days ago? What kind of power are we handing over to the terrorists and the bad guys by making this available? Every single answer to every question here leads to the destruction of the human race.

One of the main problems in today's world is how quickly and how often we judge other people. We don't even care about knowing the name of a stranger or why they are the way they are before labeling them. One of the most awful bases of differentiation is race. Even though it is considered as a serious crime people still do it and there is no way to stop them. What if everyone starts having the same skin

tone because genetic modification can make that possible? Why do we need to take such steps to stop differentiating between human beings itself?

Genetic Modification almost guarantees a perfect human being to everyone who can afford it. If everyone in the world becomes perfect then the competition level in the already highly competitive world will go out of our hands. Our imperfections actually make us unique and different from any other person. Should we be willing to give up our uniqueness so easily? Perfection is a rare thing in today's world, it might not even exist, but do we want to live in a world which is full of perfect people? Every single nation will become a superpower because every human might just become superhuman. This will make every country want to be the only country in power. This will lead to a whole new war which will actually be a world war where every single nation will fight for the ultimate power. Where will this lead humanity to? The human race as we know it will cease to exist. And why? Because we gave the world an option to be perfect.

At the end of the day it all comes down to the fact that there are things which you want but you can't have them always. If the world worked that way then there would be no problems but life is not a wish granting factory and it certainly doesn't work out the way you hoped it would every time. We are making great strides in the field of science and every day we come up with some new tech but the society that we currently live in is not smart enough to understand its benefits or how to use them in a positive way. For now, Genetic modification is something we want but we can't really have.



Harlequin Ichthyosis (HI)

By: Archana D Pandit

TYBSc Biotechnology

a severe genetic disorder that mainly affects the skin, often lethal in the neonatal period is characterized by a profound thickening of the keratin skin layer, result in contraction abnormalities of the eyes, ears, and mouth. Also restricted movement of the chest can lead to breathing difficulties and respiratory failure. The skin forms large, diamond-shaped plates that are separated by deep cracks (fissures) leaving organs prone to infections. Patients are at high risk of hypo/hyperthermia, hypoventilation dehydration, malnutrition, seizure.

The ABCA12 gene (on chromosome 2) provides instructions for making a protein that is essential for the normal development of skin cells. This protein plays a

major role in the transport of fats (lipids) in the outermost layer of skin (the epidermis). Some mutations in the ABCA12 gene prevent the cell from making any ABCA12 protein. The loss of functional protein disrupts the normal development of the epidermis resulting in hard thick scales. Abnormal keratinocyte lamellar granules are the hallmark of the disease and 5 mutation are identified in the ABCA12 gene.

This congenital disease is inherited in an autosomal recessive pattern, which means both copies of the gene in each cell have mutations. The parents of an individual with an autosomal recessive condition each carry one copy of the mutated gene, but they typically do not show signs and symptoms of the condition. However, the disease is very rare (nearly 1 in 3,00,000 births); its exact number of incidence is unknown. No racial predilection is known for Harlequin Ichthyosis. A higher incidence may be encountered in cultures where parental consanguinity is common. The disease was first described in 1750 from South Carolina. Nusrat "Nelly" Shadeen (born 1984), oldest survivor from Pakistani muslim family. Hunter Steinitz

(born 1994) is one of only twelve Americans living with the disease. A boy with HI was born at 37 weeks of pregnancy with 2.9kg in a Polish family. Two cases were reported from mashhad, Iran. In 2014 first case in South Africa was reported. India witnessed the birth of a 1.2 kg baby girl born on 11th June 2016, who was found infected with HI. The case was reported in Amravati, a small place in the Vidarbha region of Maharashtra. The baby's body was although kept moist by applying petroleum jelly, still the life could not be saved for more than two days. Prenatal diagnosis with 2D, 3D, 4D ultrasonography, analysis of foetal DNA obtained by chorionic villus sampling or amniocentesis, biopsy of skin can be done to assess the histological characteristics of the cells which usually reveal hyperkeratotic skin cells. A study published in 2011 in Archives of Dermatology concluded, "Harlequin Ichthyosis should be regarded as a severe chronic disease that is not invariably fatal. With improved neonatal care and probably the early introduction of oral retinoids such as Isotretinoin (Isotrex), the number of survivors is increasing."

'Reverse Photosynthesis' - A Phenomenal breakthrough in Plant Biotechnology.

By: Ms Kanishka Thakur

TYBSc: Environmental science

Introduction: 'Reverse Photosynthesis' as the name signifies is a process which is simple photosynthesis performed backwards. This process utilises oxygen and sun's energy to breakdown plant biomass with the help of an enzyme-lytic polysaccharide monooxygenase. Researchers in Denmark have discovered this process.

The Process: This process, similar to photosynthesis,

works by trapping sunlight in chlorophyll molecules. Thereafter, natural enzyme monooxygenase is added which facilitates the solar energy to start breaking down plant biomass, producing chemicals and energy in the process. This is the result of breaking of C and H bonds in plant's biomass. In nature fungi use reverse photosynthesis to access sugars and nutrients in plants, e.g. fungus *Aecidium magellanicum* growing on the bush *Berberis microphylla*.

Benefit of this discovery:

This process will revolutionise industrial production. The petrochemical industry is indispensable for the society. The end product of 'reverse photosynthesis' can be used to process it into biofuels, materials, chemicals.

Also this is a rapid process and saves time. It is carried out in 5-10 min. In the absence of sunlight it may take 24 hours to obtain the same amount of energy. It is an environment

friendly method and causes less pollution.

According to the reviews of Dr. David Canella, from the university of Copenhagen's Department of Geo-science and Natural Resource management- this discovery means that by using the sun's energy one can produce biofuels, biochemicals for things like plastics- faster, at lower temperatures and with enhanced energy efficiency. Since reverse photosynthesis has the potential to break down the chemical bonds i.e between C and H as found in the plant biomass. This quality can be used to convert biogas- methane (plant source) into methanol (a Liquid fuel).

Conclusion: This is an amateur concept and further research and development is needed before the discovery could directly benefit society.

Four new elements in periodic table

By: Parth M. Patel

TYBSc Chemistry

Four new chemical elements with atomic numbers 113, 115, 117, and 118 have been formally added to the periodic table, completing the table's seventh row.

The additions have been made following the verification of the discoveries of the elements by the International Union of Pure and Applied Chemistry (IUPAC). Scientists in Japan, Russia and the US discovered the elements, which are the first to be included in the table since 2011. Elements 114 and 116 were included in the table in 2011.

All the four elements are super heavy, lab-made, and very radioactive, with which scientists will be able to create

even heavier and synthetic elements in times to come. IUPAC inorganic chemistry division president professor Jan Reedijk said: "The chemistry community is eager to see its most cherished table finally being completed down to the seventh row."

"IUPAC has now initiated the process of formalising names and symbols for these elements temporarily named ununtrium, (Uut or element 113), ununpentium (Uup, element 115), ununseptium (Uus, element 117), and ununoctium (Uuo, element 118)." A mythological concept, a mineral, a place or country, a property or a scientist's name can be used to name the new element.

A group led by Kosuke Morita of Riken institute in Japan has discovered the element 113, which is the first element on the periodic table found in Asia.

Morita said: "For over seven years we continued to search for data conclusively identifying element 113, but we just

never saw another event. I was not prepared to give up, however, as I believed that one day, if we persevered, luck would fall upon us again."

Element 115, 117 and 118 were first discovered over a decade ago by researchers at the Joint Institute for Nuclear Research in Russia and the Lawrence Livermore National Laboratory in California.

d	In	Sn	Sb	Te	I	Xe
indium	tin	antimony	tellurium	iodine	xenon	
113	114	115	116	117	118	
Uut	Uuq	Uup	Uuh	Uus	Uuo	
ununtrium	ununquadium	ununpentium	ununhexium	ununseptium	ununoctium	

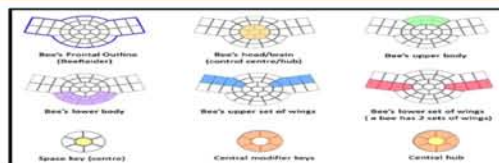
Radial Keyboard

By: Vijay H. Thakkar (M.Sc. IT SEM -V)



The Radial keyboard has been designed with a view to addressing the current shortcomings of the QWERTY standard keyboard whose layout was conceived in the 1870s for use on early mechanical typewriters. Unlike the QWERTY design, the Radial Keyboard has been designed to be logical, efficient, ergonomic and compact. These characteristics of the new design are considered to be especially relevant to the portable device market and users of smart-phone, tablet, net-book and laptop devices.

Design Philosophy of the Radial Keyboard:



The development and production of the new Radial Keyboard design followed several fundamental guidelines. The aim was to produce a design that would result in:

- A keyboard that would be more logical, ergonomic and efficient
- A reduction in user familiarisation-time
- An improvement in a user's data-entry keying-speed
- A reduction in the keyboard's footprint size from that of

a full-sized desktop QWERTY keyboard

Conclusion: The new keyboard design is being presented as a serious contender to the standard QWERTY keyboard and other competing alternatives.



The case for change has never been stronger with the advent of Digital-Convergence now giving rise to a myriad of ever smaller portable devices. The future is about portability, connectivity and wear-ability. With these changes in mind, it seems rather obvious that the standard QWERTY keyboard no longer meets the requirements of a modern data-entry keyboard device.

John Nash: A mind confused or beautiful or both?

By: Nishtha Patel & Shaifali Jain

TYBSc Mathematics

In 1994 at Stockholm, Sweden, three scholars John Forbes Nash Jr., John Harsanyi and Reinhard Selten were going to get noble prize in economic sciences. They were getting noble prize as a result of their work on game theory. They all are genius and intelligent but amongst them one character Dr. John Forbes Nash Jr is more interesting than others because he got noble prize although he was having mental disorder paranoid schizophrenia during his work on game theory. The question arises in one's mind is that by having mental illness how one can get a prize like noble prize? The person should be really genius and having a beautiful mind as of John Nash Jr.

John Forbes Nash Jr. was born on June 13, 1928, in Bluefield, West Virginia, United States. His father was an electrical engineer and his mother was a school teacher. In his childhood, he was very shy. He didn't like to play with the children of his age. He wanted to spend time with himself. His father often used to take him to the factory to teach him about electricity and astrology. In his teenage, he liked to read "Times Magazine" and by reading articles on famous peoples in it, he dreamt to become one of them. He loved the theories of science in his teenage, when other kids unlike it. He learnt at home more than at school.

He had no friends around him. His sister Martha told that he was different from others and he was really bright one who wanted that the things should be done in his own way. He always chose brain power games. During the second world war, the scientific weapons and the defense system saved many lives, due to which Scientists and Mathematicians became Hero overnight, that inspired him for Mathematics.

Nash won a scholarship in the "George Westinghouse Competition" and was accepted by the Carnegie Institute of Technology, which he joined in June 1945 with the intention of taking a degree in chemical engineering.

Soon, however, his growing interest in Mathematics had made him took courses on Tensor Calculus and Relativity. There he came in contact with John Synge, who had recently been appointed as Head of the Mathematics Department and taught the relativity course. Synge and the other Mathematics professors quickly recognized Nash's remarkable Mathematical talents and persuaded him to become a Mathematics specialist. They realized that he had the talent to become a professional Mathematician and strongly encouraged him.

In a competition "Putnam math competition" held for the young geniuses of the American colleges he got 5th position from here his self-confidence increased and he could realize his potential as a natural mathematician who can take any challenges.

At that time, Nash was known as genius and universities like Harvard, Princeton, Chicago and Michigan universities were keen to take him as their student. But he choose Princeton University, as it was the home for genius like Albert Einstein. This University gave him a good platform to express his intelligence. In the ending of the first year, while all the students were busy submitting their research paper, Nash wanted to meet Einstein to talk about the ideas of Physics. He directly reached to the Einstein's office and put forward his ideas in the form of sketches and diagram's for "Amending Quantum Theory".

In the ending of 1949, when he was 20, he named as Dr. John Nash Jr.; He described his first success in Mathematics as "A nice discovery relating to manifolds and real algebraic varieties" which was regarded as important and remarkable work.

While he was working in the RAND Corporation in math department, it was watched by his colleagues that he had a child's heart. In those days, sometimes he found to be lying on the table, reading and talking to himself. He was highly unorganized on his tilde, they found heaps of paper.

At the age of 23, He got a job in MIT (Massachusetts institute of technology) in his recommendation letter from Princeton, they contained only one sentence. "This man was really genius". In the MIT, he was inspired by two Mathematicians, one was Norman Levinson who was suffering from depression and another one was Norbert Winner who was suffering from bipolar disorder.

Nash was a Natural code breaker and also a great cryptographer who could crack the secret enemy code.

The fortune magazine represented him as "New - Math" "the most brilliant of the young generation of new ambidextrous Mathematicians." But he wanted to win the Field medal, he wanted to be known as a big mathematician in the world. He clearly believed that the quantum theory was the ticket for the Field medal.

John Nash's mental illness was detected first time when he was taking the lecture and in the middle of the lecture, he rushed to one bright student and took over him to the class after some time he came to MIT with New York Times and told that aliens trying to contact with him through code message encrypted in paper.

Nash later described the situation that all the people of Boston are behaving strangely towards him. He posted letters to embassies of Washington DC through MIT postal service. One time in his seminar, suddenly he started speaking something to himself and went outside the auditorium.

His wife Alicia who met him first at MIT University was the student of Physics, she felt horrified when she found a letter in blue, red & green ink which was written by Nash to United Nations stated "one world government". He was creating fear in his family and friends. Once at night time, Alicia found that Nash was drawing block spots all over in his bedroom. This situation with Nash was getting serious day by day and his behavior was spoiling his work. So, he was taken to the hospital for the treatment. At one moment he will be very angry and behaving strangely and the next moment he will be calm & polite. His situation remained stable for some time only. But later, it went worst and coma therapy and shock treatment was given. The people having respect for him collected donation for his treatment after sometime he went to the Princeton University for requesting them that he want to continue his research on quantum fluids for his contribution in Mathematics field. He was invited to Paris but at that time Alicia didn't want to go with him and she wanted to over their marriage. For that Nash said to his friend "My perfect little world is ruined". The schizophrenia disappointed him so much that it endangered his personal as well as academic life.

Stem cell - A boon or a crime against

Humanity.....????

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Stem cell research is a topic almost everybody in the world has a viewpoint on. Many view the issue of stem cell research and stem cell therapy as morally wrong and crime against humanity; others view the use of stem cells as the next step in modern science.

Stem cells are non-specialize cells that have the ability to mature into more specified cells to help with certain functions or diseases.

Cells are the basic building blocks of the human body and these tiny structures compose the skin, muscles, bones, and all of our internal organs. Cells are necessary for our body to live; there are over one-hundred specialized cells in our body. Stem cell research should be supported due to the plethora of potential benefits to the medical community and the human race as a whole. Medicine today is moving quickly to make more effective cures for diseases and new techniques for treating illness. One of the new techniques being practiced today is stem cell therapy. Stem cell therapy can be defined as a group of new techniques, or technologies, that rely on replacing diseased or dysfunctional cells with healthy, functioning

ones.

Two types of stem cells. 1. Embryonic Stem Cells (ESC): received from: a. Embryos created in vitro fertilization and b. From aborted embryos. 2. Adult Stem Cells (ASC): can be received from: a. Limited tissues (bone marrow, muscle, brain), b. Discrete populations of adult stem cells generate replacements for cells that are lost through normal wear and tear, injury or disease, c. Placental cord and d. From Baby teeth.

Potential of Stem Cells

1. Totipotent:-- Total potential to differentiate into any adult cell type and total potential to form specialized tissue needed for embryonic development

2. Pluripotent:-- Potential to form most or all 210 differentiated adult cell types

3. Multipotent:-- Limited potential Forms only multiple adult cell types eg. Oligodendrocytes, Neurons.

Recent experiments have raised the possibility that stem cells from one tissue can give rise to other cell types. This is known as **plasticity**. Adult stem cell plasticity examples are blood cells becoming neuron, liver cells stimulated to produce insulin, Hematopoietic (blood cell producing) stem cells that become heart cells

Cell based therapies: Regenerative therapy to treat Parkinson's, Alzheimer's, ALS, spinal cord injury, stroke, severe burns, heart disease, diabetes, osteoarthritis, and rheumatoid arthritis.

Stem cells in gene therapy: Stem cells as vehicles after they have been genetically manipulated, Stem cells are used in

therapeutic cloning and in cancer also.

Claims against ESC (unsubstantiated thus far!)

- Difficult to establish and maintain
- Difficulty in obtaining pure cultures from dish
- Potential for tumor formation and tissue destruction
- Questions regarding functional differentiation
- Immune rejection
- Genome instability
- Few & modest results in animals, no clinical treatments
- Ethically contentious

Challenges of Reproductive Cloning

Many animals were cloned after Dolly eg. Cats, pigs, mice, goats, cattle, rabbits

Obstacles: Very inefficient process, Most clones have deleterious effects & die early, Surviving clones show premature aging signs, Signs of abnormal embryonic development:

Clones & their placentas grow much faster than expected in surrogate mom

Status of SC research in other countries---Global Status---Ongoing debate regarding use of embryos; United Nations: proposal for a global policy to ban reproductive cloning only.

Common Opinions---Reproductive cloning is a criminal offense (it is ILLEGAL worldwide!)

Therapeutic cloning is acceptable, however there is still significant controversy over whether: