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Published by

National Science Foundation
47/5, Maitland Place
Colombo 07.

Tel: 2696771-3
Fax: 2694754
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Vidu poth path puwath
Sithiyam Vidyawa

Complex Problems Need Simple Solutions

Vidurava owes its credibility not only for its versatility in transmitting the messages of science and technology to the people and enhancing their scientific literacy, but also to its unique role in showing how complex problems could be solved with simple solutions.

There is a moral obligation on the part of professional scientists and technologists to consider new knowledge and factual information as matters of public domain, and thereby ensuring an equitable sharing of benefits of such information. **Vidurava** takes pride in making the communication and transmitting process of new knowledge a reality.

This volume contains few examples of how scientific and technical information can be of assistance to the general public to sustain a healthier lifestyle in a harmonious living environment.

Mathematics, considered by many of us to be a brain twister, can turn out to be a soft tool in home economics for cost effective decision making in day to day chores. This is the theme of a paper on 'Mathematics for Everyday Life'. Likewise a common urban problem discussed so often is the disposal of garbage consisting in part of non-degradable material, especially plastics and polythene. Substituting such non-degradable hazardous material in domestic use with degradable biological material that could be harvested in a sustainable manner is the theme of another presentation.

A review of measures to inculcate a sense of healthcare consciousness in the public minds about the ill effects of 'modern' lifestyles, and patterns of food consumption, is both timely and appropriate. Non communicable diseases as compared to communicable diseases may not sound so frightful, but obviously seems much more life threatening. Despite higher risk factors, it is interesting to note how simple observations and measurements can be used to assess one's vulnerability to such potentially fatal diseases. An understanding of such simple home diagnostic devices in resolving the complexities of life threatening non-communicable diseases through re-adjustments in lifestyles is certain to be picked up by many readers who may have been longing for sound medical guidance on tackling such diseases.

Asoka De Silva

The World of Tarantulas

Dr Jayantha Wattavidanage

Today several names are being used for tarantulas by people in different parts of the world. In Africa they are called 'Baboon spiders', in Australia as 'Barking spiders' and in Asia as 'Earth tigers' or 'Bird spiders'. In most parts of Sri Lanka these theraphosid spiders are referred to as tarantulas. In certain areas of Monaragala and Buththala Districts in the Uva province, they are called the tiger spiders.

If you had the opportunity to bring up a pet dog, a cat or a rabbit how happy would you be? But I do not know how many of you are willing to bring up a tarantula as a pet. However, in many European countries tarantulas have a high value as a pet. Although this is the case in Europe, in Sri Lanka people in areas where tarantulas are found naturally show great fear. They consider stinging by tarantulas is worst than that of a deadly bite of a cobra or viper. Therefore the majority of the people in these areas on encountering a tarantula attempt to kill it immediately. Such incidents raise many questions in our minds. What type of an animal is a tarantula? How does the destruction of tarantulas affect us? Are tarantulas truly poisonous and dangerous animals? Let us find answers to these questions. Tarantulas are spiders that are large and flat with hairy bristles covering their body. Tarantulas belong to the Phylum Arthropoda, Class Arachnida, Order Aranea and Family Theraphosidae. The word 'Tarantula', which as used in English for this specific group of spiders, was first used for the European wolf spider. Even though the wolf spiders are slightly bigger in size, they are in a different group of spiders.

Today several names are being used for tarantulas by people in different parts of the world. In Africa they are called 'Baboon Spiders', in Australia as 'Barking Spiders' and in Asia as 'Earth Tigers' or

'Bird Spiders'. In most parts of Sri Lanka these theraphosid spider are referred to as tarantulas. In certain areas of Monaragala and Buththala Districts in the Uva province, they are called the tiger spiders.

Tarantulas use their poisonous sting to paralyze the prey. This poison is not deadly to humans, but according to medical opinion its action is similar to a sting of a bee. However, people prone to allergic reactions may show complications. Among the spiders that are deadly to human beings is the well known 'Black Widow' spider in Australia. It does not belong to the Family Theraphosidae, but to the Family Teridiidae and the genus *Latrodectus*.

The 3 parts of the body head, thorax and abdomen characteristically seen in insects are not present in spiders. Their body is formed of two parts, the anterior prosoma and the posterior opisthosoma. Instead of having 3 pairs of legs attached to the thorax as in insects, the prosoma of spiders have 4 pairs of legs. This feature helps to clearly identify spiders from insects. At the anterior end of the body is the tubular mouth. Associated with the mouth are the paired 2-segmented chelicerae, and behind these are the paired 6-segmented pedipalps. Chelicerae of spiders are hardened structures with a pore-like opening in the middle. As a poison gland is associated with the chelicerae it acts as a fang. It is also used for crushing food and to



attack prey or enemies. Pedipalps also handle food and in male tarantulas the terminal segment of the pedipalps is enlarged forming a bulb. This structure is used for the temporary storage of sperms, and during copulation for the transfer of sperms into the female reproductive opening. Situated above the chelicerae are simple eyes that are arranged in 2 rows. According to scientists, in most terrestrial tarantulas, the eyes can detect only light, darkness or movement and not any object. Yet, arboreal spiders have been found to have good vision.

In tarantulas each of the four pairs of legs has 7 segments. The last segment of the leg has 2-3 claws which are retractable, and around the claws is a ring of hairs. The claws and the hairs help to hold on to the surface while walking. At the posterior end of the body are 2 pairs of spinnerets, that secrete silken fibers for web spinning.



Unlike most spiders, tarantulas do not spin a web to catch their prey. Instead they stay in ambush and hunt. After pouncing on the prey, they hold the prey and rotate to the left and to the right and thereafter secrete digestive enzymes onto the prey. As the prey is digested progressively, the contents are sucked into the mouth. Finally the remains of the prey are left behind and the spider moves away.

In most tarantulas, the fine hairs (urticating hairs) on the dorsal abdomen are directed towards the enemy with the help of hind legs. These hairs pierce the skin of the enemy producing pain. If the hairs enter the respiratory tract, the lungs may be damaged, and may cause permanent damage to the eyes.

Tarantulas are nocturnal and shy. They live in tree holes, under bark, under stones and in holes dug in the ground. Through a study conducted in Monaragala and Ratnapura Districts, it was found that tree holes in which tarantulas live are covered with fine silk-like white webs. During day

time the tarantulas stay mostly in their holes and at night they come out in search of food. Often tarantulas that feed on insects have also been observed to feed on frog-lets and geckos. Tarantulas have the ability to remain without feeding for nearly a year consuming only water. However, they are extremely sensitive to chemicals, vibrations and environmental changes.

Studies on the life cycle of tarantulas show that their breeding behaviour is very different to most other animals and consists of special features. The female is usually bigger than the male and is not very colourful. The male is smaller than the female and is brightly coloured. The breeding period of most tarantula species in the northern hemisphere is at the end of summer and in

early spring. In Sri Lanka it is usually during the months of July, August and September. After the last moult the mature male spins a horizontal web above ground among the grasses. This is termed the 'sperm-web'. Thereafter, the male spider rubs the ventral surface of its body against the web and this results in the ejection of sperms from the reproductive opening on to the web. Thereafter, the pedipalps at the anterior end of the body are moved to and fro touching the sperm fluid on the web. Then the sperm fluid enters the bulb-like structure in the pedipalps. The bulb of the pedipalps when filled with sperm fluid becomes swollen, red and shiny.

Now this male tarantula is ready for mating and it leaves the hole and goes in search of a female. Most tarantulas on the move in this state are the males, and they are the ones that are seen by persons involved in their study and research. A male spider in this state moves close to a female and invites her by rhythmically moving the fore legs and the pedipalps. This behavior is termed 'pedipalp drumming'.

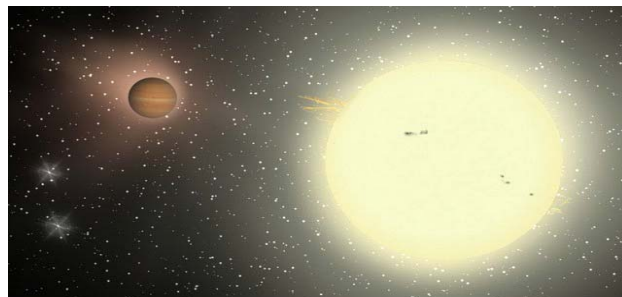
If the female is ready to mate, she too would start drumming using her forelegs and pedipalps. With the help of their drumming and the dance, they come close to each other and the male touches the female with its legs. Thereafter, the female raises its body exposing the ventral surface. This allows the male to introduce sperms from the bulb of its pedipalp into the female reproductive opening. Immediately after sperm transfer the male should leave the female. If not, the female will prey on the male. During our studies we observed a female preying on a male that copulated her. However, in the case of *Chilobrachys* species following several matings the male was observed to leave the female very peacefully.

Usually a tarantula species lays about 50-2000 eggs at a time, and these eggs are deposited in a silk-like egg sack. The egg sack is protected by the female for 6-7 weeks. The young spiders come out when the egg sack bursts, but remain close to the mother for about 2- months. The mother hunts and provides food for the young ones during these 2 months. Thereafter, they become independent and hunt for their own food.

In the world about 860 species of tarantulas belonging to 107 genera have been identified. In neighbouring India, about 40 species of tarantulas in 14 genera have been identified. In Sri Lanka so far only 10 species have been identified. Of them 5 species are endemic to Sri Lanka. However, our recent studies in Rathnapura and Monaragala Districts indicate that these tarantulas which are an important factor in ecosystem balance are under threat. These threats include habitat destruction, land fragmentation, heavy insecticide use and direct killing by man. We should all contribute towards the conservation of these attractive hunters that control the ever increasing insect populations and also maintain ecosystem balance.

Dr Jayantha Wattavidanage
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Largest extrasolar planet found!



A new planet was identified by scientists in the Lowell Observatory Planet Search using a network of small automated telescopes in Arizona, California, and the Canary Islands. This planet named TrES-4, is 20 times larger than the earth and mainly consisting of Hydrogen. TrES-4 is about 1400 light years away and orbits its host star in three and half days.

This new planet has 1.7 times larger diameter than that of Jupiter, the Solar System's largest planet, and its temperature is about 1,260°C.

According to the scientists there may be large planets in the space and this planet TrES-4 orbits around one of the stars in the cluster known as "Herculis".

Vitamin B₁ for Diabetics

A research scientist says that deficiency of Vitamin B₁ (thiamine) is one of the major reasons to cause failures in kidneys, retina, and nerves in the arms and legs of diabetics.

This study published in 'Diabetologia' the diabetes journal and was conducted by Prof. Paul Thornalley of the University of Warwick, United Kingdom. The study has shown that diabetics have three-quarter less Vitamin B₁ (thiamine) in their blood than healthy people. According to Prof. Thornalley, this is common to both type one and type two of diabetes, and Vitamin B₁ supplement could be taken by all diabetics and would work alongside conventional glucose control.

-Thusitha-

Substitute for polythene - Bio Wrappers

Dr Sujatha Weerasinghe

Banana is the second largest fruit crop in the world produced in tropical and subtropical regions. It is the fourth important food crop in terms of gross value exceeded by paddy, wheat and milk products. Banana is the major fruit crop grown in Sri Lanka with an extent of about 60000 ha. It produces nearly 780,000 mt / yr ensuing a per capita availability of 27 kg/yr.

Banana is a wonder berry forming a staple food of millions across the world assuring a balanced diet more than any other fruit. It is a rich source of carbohydrates with a calorific value of 67 g per 100g. The unripe fruit which becomes palatable after cooking is generally referred to as plantain, while the fresh ripe fruits consumed are referred to as dessert banana. The importance of banana as a food fruit crop can be highlighted because of its multifaceted uses as food, fiber, fuel and therapeutic values.

Among different parts of the banana plant, the sheath and leaves are used as plates and wrapping material in many Asian countries. However in Sri Lanka with cultural changes these traditional materials have gradually been replaced by many synthetic materials such as oil paper, regiform boxes, aluminum foil and polythene sheets.

Though these materials are cheaper and convenient they cause definite environmental and health hazards. Hence the time has come to move from synthetic material to natural leaves for the betterment of the natural environment.

We all like to taste a meal wrapped in banana leaves as it gives a distinct flavour and also keep the food fresh for a longer period of time. However, due to the unavailability of fresh banana leaves an optional material especially

polythene sheets was introduced. These polythene sheets take more than a year to undergo degradation and thus creating environmental pollution leading to many undesirable consequences. In addition these sheets could contain various chemical compounds or polythene dust which may be harmful to consumers when exposed for a longer time period. These compounds are added during manufacturing as anti static agents to facilitate the separation of sheets at the end of the manufacturing procedure. These polythene sheets are injurious to domestic animals due to the obstruction caused to the digestive tracks. As far as agriculture is concerned embedding and accumulation of polythene in soil layer lead to development of drainage problems. In addition, numerous detrimental effects of polythene on soil fauna and flora disturbs the natural balance of the soil environment.

Therefore an investigation was carried out at the Agriculture Research Station, Telijjawila to use banana leaves as a food wrapper and to keep it for a longer duration without causing a change in its colour or quality. As a result a technique has been perfected to produce cured banana leaves that can be kept for more than a month under refrigerated condition without any changes in colour or quality.

Any banana variety grown in Sri Lanka can be used for the purpose. Well grown and fully expanded leaves are trimmed and separate into pieces (45 cm x 45 cm) excluding the mid rib. These pieces may be rectangular or round in shape depending on the requirement. These pieces are initially washed in pure water to remove dust and any other

inert particles deposited on leaves. Thereafter curing can be done in several ways depending on the availability of the facilities. There are four methods that can be easily practiced to cure the fresh banana leaves.

Oven drying

Leaves can be dried in an oven at the temperature of 80 – 85 °C for 5 minutes.



Steaming

Leaves can be placed in a steamer for 25 – 60 seconds till the appearance of olive green colour.

Hot water treatment.

Leaves can be dipped in boiling water till the appearance of green colour change and immediately transfer to cold water.

**Curing in a pressure cooker**

Leaves can be processed in a pressure cooker for a few minutes.

After curing of leaves using any of the above methods any excess water must be drained out immediately and the leaves should be air-dried for 8 – 10 hours. Well cured leaves should be properly packed and stored under refrigerated conditions. Each leaf should be packed with a piece of moisture absorbent paper (newspaper, wrapping paper or paper serviette) and bundled in packs containing 10 or 20 pieces. They can be packed in small boxes or in aluminum foil. These packs can be kept for 5 days under room temperature and more than one month in a refrigerator without adversely affecting their original colour and quality.

This hardened banana leaf can be effectively used to wrap the food. It does not tear when folding and also gives the fresh smell when the wrapped parcel is opened. The meal

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wrapped in banana leaves can be warmed in a microwave oven without any changes. Thus this is an environmentally sound material and a perfect substitute for polyethylene sheets.



About 10 leaves can be harvested from a plant per year in a normal banana cultivation while obtaining a bunch. From each leaf 5 – 8 pieces (45 x 45 cm²) can be obtained. Hence from one hectare of land, a minimum of 120,000

wrappers can be produced. If a single banana wrapping sheet costs Cts. 50, an additional income of Rs 60,000 can be obtained apart from the bunches from an hectare of banana cultivation established under the annual planting system.

Apart from banana leaves from other plant species leaves also can be used as wrappers. Eg. Kanda (*Macaranga peltata*), Lotus (*Nelumbia spp.*), Diyapara (*Wormia trijestra*), Thekka (*Tectona grandis*), Halmilla (*Berrya cardifolia*), Suriya, Buthsarana, Kottamba (*Terminalia carappa*), Wal beli (*Naringi crenulata*), Pumpkin (*Cucurbita maxima*), Spinach (*Bacilla alba*), Cabbage (*Brassica oleracea*) and Kiriala (*Xanthosema sagitifolia*).



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Mathematics for everyday life

Dr Kirthi Premadasa



A couple of decades ago if one asks the question, “what is mathematics useful for?”, the answer will be very clear: “It is a must for engineering!”. This was of course the primary reason why Sri Lankan students are loaded with quite an advanced mathematics screening at the Advanced Level examination.

However there is an irony in all this. Though a small minority of the students who follow and excel in A/level mathematics, do end up as engineers and use the mathematics that they have learnt in their workplace, the vast majority of the students (those who do not gain admission to Engineering or Science Faculties) end up “dropping” their mathematics at A.level, making years of state investment in mathematics education a total waste.

However, since recent times, emphasis has been made to highlight applications of mathematics in non-engineering areas such as finance, insurance, economics, biology etc.

Lets us look at some simple examples from everyday life. Lets go to the marketplace and see how mathematics can be used for the purchase of apples. You see two types of apples in the store. A smaller type (say Type A) and a bigger type (say Type B). To your eye it seems that the radius of the bigger apple is about twice as much as the smaller apple.

The vendor says that the smaller apple cost Rs. 25 and the bigger apple costs Rs. 70. Would you buy two of the smaller apples or one big apple ?

When you are faced with this option it seems that since the two smaller apples cost Rs 50, it appears that buying one big apple at Rs 70 is really not worthwhile.

However, mathematics says something different. An apple can be thought of roughly as a sphere and what you eat is the volume. Recall that the volume of a sphere of a radius r is given by the formula

$$V = \frac{4}{3} \pi r^3$$

Notice that the volume formula carries a r^3

term. What does this say? This says that if the radius is doubled, then the volume is increased by $2^3 = 8$ times. Which means that the bigger “looking” apple has about 8 times more volume than the smaller apple. So actually the bigger apple is worth around Rs 200. So buying the bigger apple for Rs. 70 is a really good deal!

Another place you can start using your mathematics knowledge is when laying the floor and painting your houses. Most of the painters and masons laying the floor give you a “per square feet” rate. So to calculate the total cost, you need to calculate the area accurately to ensure that you have the accurate cost estimate.

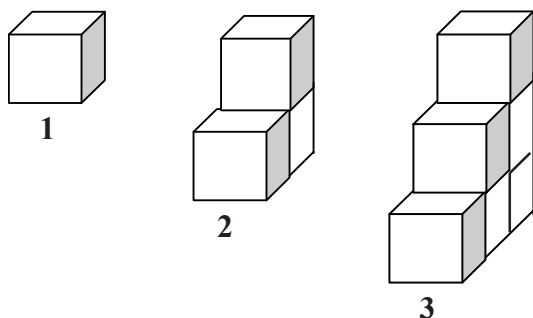
No matter how complicate an area is you can calculate it by breaking up in to squares, rectangles, trapezoids, circles,

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ellipses etc. So if you know how to calculate the areas of these basic shapes then you can combine them to get the area of the more complicate shapes.

We will leave the following “painting” problem as an exercise to the reader.

Same sized cubes are glued together to form a staircase as shown below.



For example, a staircase of 2 steps is created by 3 cubes glued together. A staircase of 3 steps is created by 6 cubes glued together.

All of the unglued faces of the cubes need to be painted. The reader can find the number of squares that needs to be painted in a staircase which has 20 steps (or any number of steps for that matter).

Another area where mathematics enter the day-to-day life is in finance. There is a lot of mathematics involved in loan calculations as well as in the calculation of Bond and Option prices. Lets take a look.



Suppose you want to get a car loan for 1 million rupees at a 12% fixed annual interest rate to be paid in 4 years. You would want to see what the monthly installment could be. This type of problems appears as a standard problem in financial mathematics under annuities.

For a simple loan with fixed payments and fixed interest rate, the monthly payment m can be calculated by the following formula (assuming payments are made at the end of each period).

$$m = \frac{-rL(1+r)^n}{((1+r)^n - 1)}$$

Here

L = Loan Amount

r = Monthly interest rate (as a decimal)

n = Number of months

So for the above example, $L=1000000$, $r=0.12/12$ and $n=48$. Putting these in the above formula, we get the monthly payment $m = -26,333.84$ (The minus sign reflects that we make the payment). So even before you go to the car leasing company, you have a pretty good idea what installment you have to pay.

At this time you may think that even if you do not know the mathematics behind this, by simply substituting the values for the loan, interest rate and the number of months, you can arrive at the monthly payment. It is true, if the case is straightforward. However if you need to make an adjustment on the schedule (say remove the April payment on account of the Sinhala New year), then the above formula will no longer work as it is. You must then know the mathematical theory behind the formula to calculate the monthly payment.

Therefore it is important for students who plan to specialize in finance to have a solid mathematical background to understand the mathematics behind the formula.

Another “hot” area that has created a severe demand for good mathematicians is in option pricing. An option is a contract between two persons (a buyer and a seller) which gives the right (but not an obligation) to the buyer to buy or sell the underlying asset at an agreed price before the date of expiry of the

contract. Lets try to explain this in simple language.

Suppose you are interested in buying an asset between this June and the end of year. If you buy an option for this asset, then you get the right to buy this asset at an agreed price before the period is over. However if you do not want to buy this, then you can stay without buying it. For having the right but not the obligation, you will have to pay some money to buy this contract (option).

The price of this option is calculated using very heavy mathematics and comes as a solution of a second order partial differential equation called the Black Scholes differential equation. If you need to fully understand the pricing of options, you should have a good grasp of solving second order partial differential equations which is today covered in the mathematics curriculum in most good universities. The massive interest in option pricing all over the world has resulted in financial companies hiring good mathematicians to their teams.

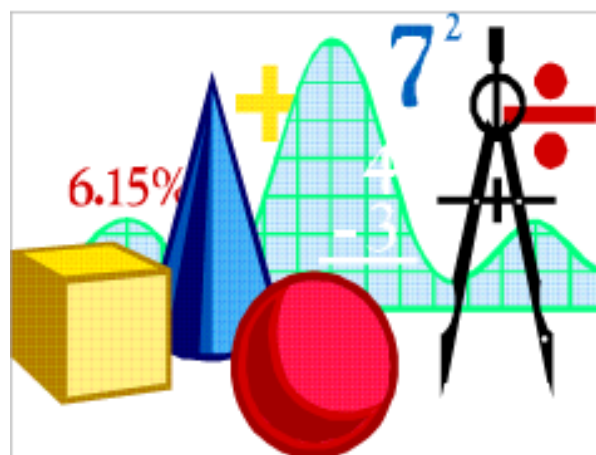
Another area that mathematics is intensively applied is in the field of insurance. When you buy an insurance policy, based on your profile, the insurance agent comes up with a premium that you need to pay every month.

The calculation of this premium involves complex mathematics and the subject is called Actuarial Science. To be an actuary, one must have a strong background in mathematics as well as statistics. The Actuarial profession in Sri Lanka is severely understaffed and offers excellent opportunities to students who are strong in mathematics to find lucrative employment.

Advanced Level students who are reading this article will be familiar with the maxima and minima curve sketching that is done for calculus. What is done there is to find the maximum and minimum points of a given function. This is yet again another strong application area in mathematics. In real life examples, differentiation is used to find the points where profit and revenue are maximized and cost is minimized. Even though in the Advanced level curriculum, you only handle functions of a single variable, you can without much difficulty extend the techniques to many variables.

As an example, suppose the revenue R of a certain product is a function of both the capital investment K and the labour cost L . By using calculus, one can find the values of K and L which optimize the revenue.

Sometimes optimization is required under a constraint. For example, suppose we need to create a cylindrical can to store a beverage. Suppose we have a constraint that the cylinder must contain 400 ml of beverage. Subject to this constraint we need to minimize the cost of manufacturing the cylinder. In other words we want to minimize the surface area of the cylinder given by $A = 2\pi rh + 2\pi r^2$, where r is the radius of the cylinder and h is the height of the



cylinder. However there is a constraint on the volume given by $\pi r^2 h = 400$.

We need to find r and h which minimize the surface area A subject to the given constraint. This type of constrained optimization problem can be solved using a technique known as Lagrange multipliers. This technique is well known in Engineering and Micro Economics.

We will end this article using another application in finance. Suppose you are planning to make an investment. You know the saying “Do not put all your eggs in to the same basket”. So you are planning to invest in several investments creating an investment portfolio. Now you need to know how much to invest in each investment in the portfolio. Each of the different investments carry a different return and a risk. So how should you invest? Well you must invest in a manner so that your total return is maximized while the total risk is minimum.

Finding this optimum investment portfolio is called portfolio investment and this process involves a lot of advanced mathematics.

As you can see from the above, applications of mathematics have now found their way in to almost every possible subject area, and no matter whether you are buying apples in the marketplace, painting your house or planning a car loan, mathematics will come to your assistance in a significant manner.

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Non communicable diseases

Prof. Shyam Fernando

What are non communicable diseases?

Most of us are familiar with the phrase communicable diseases. Diseases such as chickenpox, measles and dengue, caused by infectious agents and transmitted from person to person are some examples of communicable diseases. These diseases can spread in a community in epidemic proportions. History tells us how diseases like plague wiped out entire communities.

We are now experiencing a worldwide increase in the incidence (number) of another group of illnesses such as diabetes, high blood pressure, coronary heart

Some examples of NCD

- Diabetes
- Coronary Heart Disease
- Hypertension (high blood pressure)
- Mental illnesses
- Stroke
- Cancers
- Accidents
- Poisoning

Box 1

diseases and strokes, which are not due to any infectious agent. Yet they pose a significant threat to humanity. These non communicable diseases significantly influence our well being, lifespan, cost of health care, and are a huge burden to the society. World bodies like the WHO, and even developing countries like ours have begun to pay special attention to curb the threat of these non-communicable diseases.

Under the umbrella of non communicable diseases or NCDs, several diseases are listed (see box 1). The rising trend (figures 1 and 2) of these NCDs is a result of an ageing population and adopting non-traditional lifestyles with industrialization and urbanization. Even some of the cancers are related to

lifestyle changes. For example, cigarette smoking directly affects the lung, esophagus (gullet) and the bladder. Diets rich in fiber are known to reduce the risk of cancers of the large bowel.

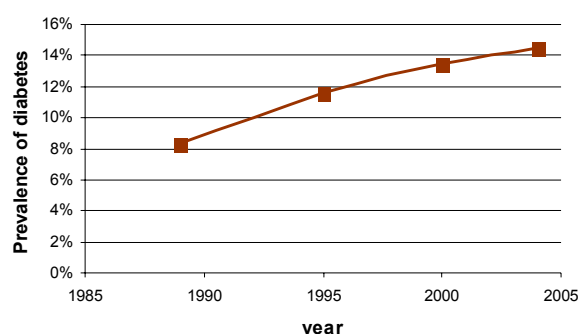


Figure 2 Increase in diabetes from 1989 to 2005 in India. Similar trends are seen in Sri Lanka as well².

Some investigators predict that from 2005 to 2010 there will be an increase in hospitalization for illnesses related to diabetes (by 36%), hypertension (by 40%), and coronary heart disease (by 29%) in our country¹.

However, the good news is that there is convincing scientific evidence to indicate that reverting to healthier life styles can prevent many of these NCDs.

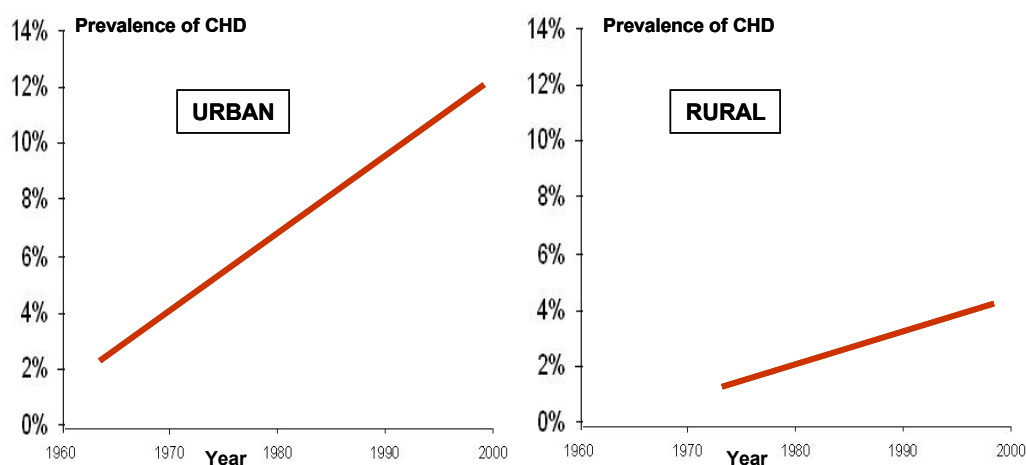


Figure 1 Increasing prevalence of Coronary Heart Disease (CHD) in urban and rural India. Similar trends are seen in Sri Lanka

In this article, I shall discuss a few NCDs, their risk factors and explore the ways of preventing them by adopting life style modifications.

Diabetes

Most of the carbohydrates (starch) we eat are turned into glucose, the main source of energy for our muscles and other tissues. Glucose, once absorbed, is transported in blood. We need the hormone insulin for glucose to be absorbed from blood and utilized by muscles and other tissues. Insulin is produced by the pancreas, a tongue-shape gland situated behind the stomach. If the pancreas does not produce enough insulin or if the body does not respond to insulin secreted by the gland, tissues will not be able to make use of the glucose effectively. As a result, the level of glucose in the blood will rise. This is what happens in diabetes. A normal individual has a blood glucose level between 70 – 110 milligrams per 100 millilitres of blood (4 to 6 millimols per litre) in the fasting state. High levels of glucose in the blood lead to complications.

The International Diabetes Federation estimates that more than 245 million people worldwide have diabetes. This is an increase from 30 million in 1985! In South Asian populations (which accounts for almost one fifth of the world population), there had been a marked increase in the prevalence (number of cases per 100,000 population) of diabetes over the last couple of decades. In a Sri Lankan survey conducted by Katulanda and colleagues in 2006,

about 17% of urban population and about 10% rural population were found to have diabetes³.

Diabetes is a major health problem because of its complications. Diabetes is the main cause blindness in adults in developed countries and accounts for the majority of

non accidental limb amputations. Diabetics are at higher risk of getting heart attacks, strokes and kidney failure requiring transplantation. It is estimated that over 10% of money spent on health worldwide is spent for treatment of diabetic complications. This places a large burden on the society, particularly

in countries like ours, where expenditure for health per person is rather small (17 USD annually per person, 2004 data) compared to developed countries (eg. Switzerland 3,776 USD annually per person, 2004 data).

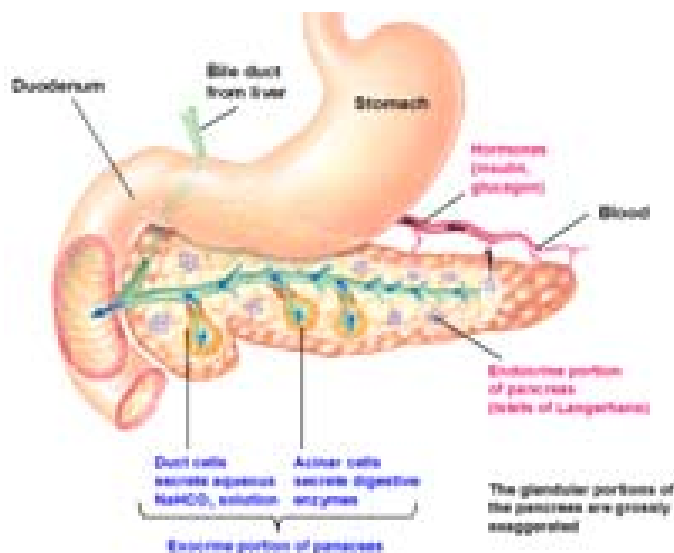


Figure 3 The pancreas

What is Type 1 and Type 2 diabetes?

In type 1 diabetes the defect is in the pancreas which does not secrete enough insulin. Type I diabetics are often children or young adults. The cause is thought to be due to the body immune system turning itself against the insulin secreting islet cells in the pancreas. There is nothing one can do to prevent this type of diabetes. Treatment is with injections of insulin. Insulin cannot be given by mouth as it is a peptide and gets digested in the stomach.

In type 2 diabetes, the pancreas secretes enough insulin, but the body does not respond to the insulin that is secreted. They are said to be insulin resistant. Type 2 diabetes tends to occur in middle aged, overweight people. About 90% of all people with diabetes have the type 2 variety. Life styles changes aimed at keeping the body weight under control and increasing physical activity help to prevent type 2 diabetes.

People who are overweight, physically inactive and have diabetes among close family members are at risk of developing diabetes. Prevention and early recognition of diabetes in these high risk individuals are important to avoid complications such as kidney failure, nerve damage, heart attacks, strokes and loss of eye sight.

Preventing diabetes

People who are overweight, physically inactive and have diabetes among close family members are at risk of developing diabetes. Prevention and early recognition of diabetes in these high risk individuals are important to avoid complications such as kidney failure, nerve damage, heart attacks, strokes and loss of eye sight.

Complications of diabetes

Diabetes affects the retina of the eye (retinopathy). Some patients with retinopathy may even require laser therapy to seal off tiny fragile blood vessels in the retina to stop bleeding into the eye. About 10% people who have had diabetes for over 15 years develop severe loss of vision as a result. Diabetes is a leading cause of kidney disease (nephropathy). Routine checking of urine for micro quantities of albumin (microalbuminuria) helps in recognizing early kidney disease. Terminal cases of kidney failure require kidney transplantation. Another complication of diabetes is neuropathy; damage to nerves. Lack of sensation in the feet makes them injure their feet without realizing it. These injuries can lead to ulcers and possibly amputations. This is particularly so if arteries taking blood to the feet are also narrowed because of diabetes. Diabetes is the most common cause of non accidental (that is not as a result of an accident) amputations worldwide. People with diabetes are 15 to 40 times more likely to require lower limb amputation compared to the general population.

If the internal nerves to the male sex organ (penis) get caught up in neuropathy, sexual dysfunction (impotence or erectile dysfunction) could occur. Diabetes is a leading cause of male impotence. Diabetes increases the risk of atherosclerosis, and hence, cardiovascular diseases such as heart attacks and strokes. Risk of heart attacks in people with diabetes is 2-4 times higher than non-diabetics. Heart attacks are a leading cause of death in diabetics.

Blood pressure and high blood pressure (hypertension)

Blood pressure (BP) is the pressure of blood in the arteries. Blood pressure is measured and recorded as two numbers. For



example, 150/90 mmHg (150 over 90 millimeters of mercury) means that the pressure in the artery is 150 mmHg when the heart contracts, and 90 mmHg when it relaxes between heart beats. The top number is the systolic blood pressure and the bottom number is the diastolic blood pressure. A blood pressure of 130/80 mmHg could be considered as normal for most people. However, even this may be considered high for a person who has had a heart attack, stroke or a diabetic complication such as nephropathy. Blood pressure varies from moment to moment (for example, BP could rise in excitement when entering the doctor's consultation room!). Therefore, several blood pressure measurements are usually taken before deciding a person as having high blood pressure.

How common is it?

In western populations, nearly one in four adults has high blood pressure. In a recently conducted study in Sri Lanka, Wijewardene and colleagues⁴ reported a prevalence of about 20% (one in five adults has hypertension).

In most of the people with hypertension, the cause cannot be found (see box 2). In a minority, however, an underlying cause such as a kidney problem or a hormone problem could be identified.

You are at risk of developing hypertension, if you

- are overweight
- eat a lot of salt
- drink alcohol
- don't eat many fruits and vegetables
- don't do enough exercise, or
- have close family members with hypertension

Box 2

Why bother with blood pressure?

Hypertension is asymptomatic. That is to say that a person will not feel whether the blood pressure is high or not, unless it is measured, as there are no symptoms. Yet, it is an important risk factor for cardiovascular (heart and blood vessels) diseases like heart attacks and strokes, and for kidney diseases. If the blood pressure remains high over a long period of time, it damages the arteries and exerts strain upon the heart. Arteries get stiffer (arteriosclerosis) and the heart muscle gets thicker (hypertrophy of the left ventricle). Generally, the higher the blood pressure, the

greater is the risk for death (mortality). Several large studies have shown conclusively, that the risk of cardiovascular death could be reduced by lowering the blood pressure.

Coronary heart disease (CHD)

The heart is a non-stop pump made of special muscle. A system of blood vessels, called coronary arteries arising from the aorta (pronounced 'ay-o-ta') take oxygen-rich blood to the contracting muscle. If one of the small branches of the coronary arteries get blocked, the blood supply (and therefore, oxygen) to that part of the heart muscle will get cut off. Unless the block is quickly removed, a part of the heart muscle could die. This is known as a myocardial infarction (MI) or a heart attack.

interior becomes irregular. The surface of the plaques cracks and a blood clot forms on the plaque. These plaques are called atheroma and the blood clot is called the thrombus (see box 3). Drugs that dissolve blood clots and reduce the stickiness of platelets (preventing further clots) are used in the treatment of heart attacks.

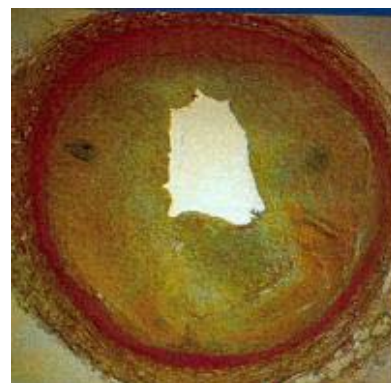


Figure 5 A cut section of an artery narrowed by atheroma

MEDICAL TERMS

- **Atheroma** - formation of fatty plaques on the inner lining of arteries
- **Atherosclerosis** – the process of formation of atheroma
- **Thrombus** – a blood clot inside an artery or a vein
- **Thrombosis** – formation of a thrombus
- **Myocardial infarction** – death of a part of the heart muscle as a result of its blood supply being cut off
- **Ischaemia** – reduction of blood supply to a tissue, often due to narrowing of the artery (often due to atherosclerosis)
- **Angina** – chest pain that occurs with exertion and relieved with rest, caused by ischaemia
- **Coronary heart disease (CHD)** – heart disease caused by narrowing or blockage of coronary arteries
- **Ischaemic heart disease (IHD)** – heart disease caused by reduction of blood supply to the heart muscle usually due to CHD
- **Cardiovascular disease** – diseases in the blood vessels and the heart; includes coronary vascular disease, cerebro vascular (brain arteries) disease and peripheral vascular (limb arteries) disease

Coronary heart diseases are a major cause of death worldwide. Even in Sri Lanka these are the number one killer⁵. In a community study done in 1994, Mendis and Ekanayake reported that 16 out of 1000 adults in Sri Lanka have definite evidence of ischaemic heart disease⁶. Most myocardial infarctions occur in people over 50 years. As in India we too in Sri Lanka are now seeing younger people (probably have smaller coronary arteries) and more women falling prey to heart attacks. Patients with coronary heart disease present not only as heart attacks but also as sudden death, angina, heart failure or irregularities of the heart rhythm.

Box 3

Atherosclerosis & thrombosis

The commonest cause of myocardial infarction is the blockage of a coronary artery (or one of its branches) by a blood clot. Inner lining of arteries is smooth and blood clots do not form normally. When fatty plaques form on the lining over several years, the

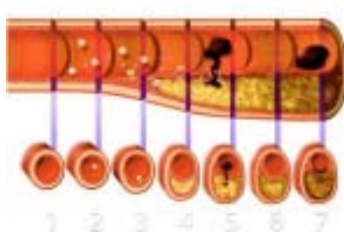


Figure 4 A schematic diagram of atherosclerosis narrowing the artery.

Risk factors for coronary heart diseases

Risk factors for coronary heart disease are almost as same as the risk factors for other cardiovascular disease because the underlying cause atherosclerosis and thrombosis are common to all. Some risk factors are fixed and cannot be modified, whereas prevention is aimed at detecting and modifying other risk factors.

Obesity

Many health problems are more common in obese or overweight people. Out of these, the most important are the increased risk of diabetes and coronary heart disease.

Preventable risk factors

- Cigarette smoking
- Hypertension
- Diabetes
- Obesity
- High cholesterol level in blood
- Lack of exercise
- Unhealthy diet
- Excess alcohol

Fixed risk factors

- Being a male!
- Getting old!
- A family member having a heart attack or a stroke

Box 4

Obesity in children is recognized as a forerunner of diabetes in adult life. Excessive indulgence in junk food, engaging in armchair games (eg. video and computer games) instead of physically active sports, and, parents adopting an attitude where 'being overweight' is considered healthier, are some of the reasons for increasing obesity seen among urban children.

Am I overweight?

The body mass index (BMI) is a good way to find out. It relates the weight to the height. BMI is calculated by dividing the weight (in kilograms) by the square of the height (in metres). For example, if a person weighing 70 kg is 1.75 metres tall, the BMI is $70 / (1.75 \times 1.75)$, which is 22.9. BMI tells you whether your weight is correct for your height (see box 5). A BMI of 25 or more is associated with increased health risks (box 6).

BMI	Classed As
Less than 18.5	Underweight
18.5 to 24.9	Ideal
25 to 29.9	Overweight
30 to 39.9	Obese
40 and over	Very obese

Box 5

Health problems in obesity

- diabetes
- hypertension (figure 6)
- coronary heart disease
- breathing problems
- sleep related problems
- stones in the gall bladder
- osteoarthritis of the knees
- back ache
- some types of cancer
- depression
- menstrual irregularities
- complications during pregnancy

Box 6

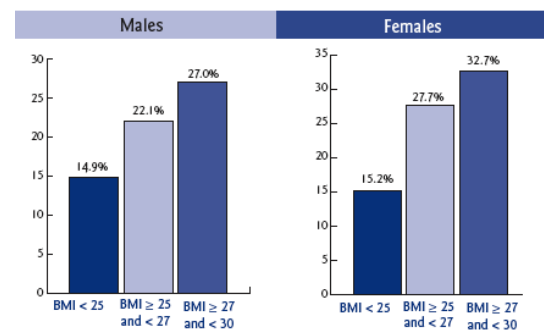


Figure 6 With increasing BMI, more and more people develop hypertension (US data)

Central obesity

Risk to health is greater if extra body fat is mainly around the waist. This can be detected by measuring the waist size. A waist measurement of 90 cm for Asian men and 80 cm for Asian women indicates central obesity which carries a significant health risk even though the BMI could be near normal.



In the United Kingdom, about 2 out of 5 adults are overweight, which is a three fold rise since 1980. Even in Sri Lanka (Figure 7), there is an alarming trend in increasing obesity among children and young adults. This 'obesity epidemic' is a root cause of the 'diabetic epidemic' and the 'heart attack epidemic' we are experiencing.

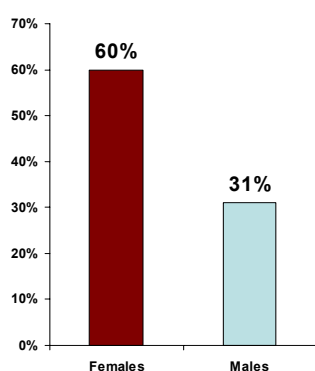


Figure 7 Prevalence of central obesity in a preliminary survey of about 1000 random households in urban Sri Lanka (*Mathews & Katulanda et al*)

Cholesterol

Cholesterol is an essential component of all animal cell membranes. The body needs cholesterol to turn out steroid hormones, sex hormones, vitamin D and bile salts. Cholesterol is not water soluble. Therefore, it is transported in blood as lipoproteins. There are two main types of lipoproteins. Low density lipoproteins (LDL) transport cholesterol into the

walls of arteries and promote atheroma formation. High blood levels of total cholesterol and LDL-cholesterol increase the risk of cardiovascular disease. In contrast, high density lipoproteins (HDL) transport cholesterol away from arteries to the liver to be metabolized. Having a high blood level of HDL-cholesterol is protective against cardiovascular disease.

Metabolic syndrome; a new concept?

There is a tendency for several cardiovascular risk factors to be present in the same individual. This clustering of risk factors is known as the metabolic syndrome (MetS). This is not a disease in itself, but, a concept that draws attention to the need to control all risk factors rather than focusing

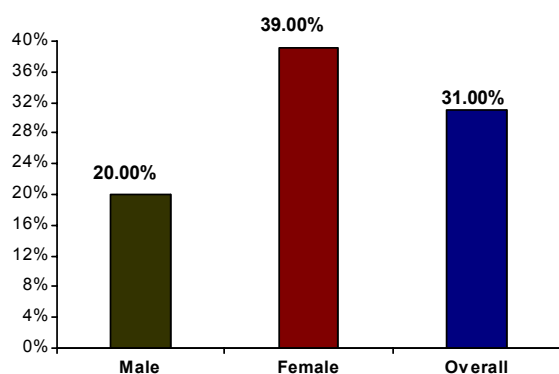


Figure 8 In urban Sri Lanka, almost one third of population has metabolic syndrome. From a survey of about 1000 random households in urban Sri Lanka (*Mathews & Katulanda et al*)

on individual risks. Recent reports from India (32%)⁷ and United States (39%) show that almost one in three people has metabolic syndrome. Preliminary data suggest that the situation in Sri Lanka is similar (figure 8)

Do I have metabolic syndrome?

If you have following criteria, you are considered to have metabolic syndrome and a higher risk of getting cardiovascular diseases!

Central obesity (Waist circumference; male > 90 cm and female > 80cm)	
Plus any TWO of the following	
Raised blood triglycerides	≥1.7mmol/l (150mg/dl)
Reduced HDL-cholesterol (good cholesterol)	<1.03 mmol/l (40mg/dl) males <1.29 mmol/l (50mg/dl) females
Raised blood pressure	Systolic ≥130mmHg or diastolic ≥ 85mmHg or previously diagnosed hypertension
Raised blood glucose	Blood glucose ≥5.6 mmol/l (100mg/dl) or previously diagnosed diabetes

Box 7

Preventing NCDs through healthy-living

Health is not merely a state of living without an illness! 'Health' encompasses physical, mental, social and spiritual wellbeing. Healthy-living focuses not only on healthy eating and physical activity, but also on aspects ranging from dental health, safety at work place, reproductive health and sexual health to mind-body interaction.

Large clinical trials involving hundreds of thousands of individuals, conducted across several countries have shown the value of quitting smoking, eating a healthy diet, controlling body weight and increasing physical activity in preventing cardiovascular disease. Measures aimed at reducing the risk factors are directed either at high risk individuals or on the population at large.

Preventing cardiovascular disease

The most important population goals for the prevention of CVD are as follows:

- **Tobacco smoking:** reduction of smoking by the community through education, legislation and taxation
- **Saturated fats and trans fats:** less than 10% of energy should come from saturated fats and less than 2% of energy from trans fats. High intakes of saturated fats (eg. animal fat, milk products) and trans fats (eg. in processed food like potato chips) raise cholesterol levels and significantly increase risk of CVD. High blood cholesterol levels in the population make the risk of smoking and high blood pressure for CVD even worse. Mono and polyunsaturated fats (eg. corn, olive oil) should replace these wherever possible. Daily cholesterol (main sources – meat, meat products, egg yolk, milk products) consumption should be kept below 300 mg.
- **Fruit and vegetables:** more than 400g/day is recommended. Fruit and vegetables contain a vast array of beneficial compounds which, acting together, appear to be responsible for their protective effect.
- **Salt:** should not exceed more than 6g/day. Reducing salt intakes lowers blood pressure and risk of CVD in people with normal blood pressure as well as in people with hypertension.
- **Body Mass Index:** to maintain a BMI of 23. Obesity and overweight increase the risk of CVD and type 2 diabetes.
- **Physical Activity:** at least 30 minutes a day of moderate physical exercise, 5 days a week. What is recommended is aerobic activity such as brisk walking, jogging, swimming and cycling.

In summary, non communicable diseases such as diabetes and cardiovascular disease are on the rise worldwide. Even in our country, these have become a major killer. Whereas developed countries are troubled only by NCDs, we in developing countries have to battle with both communicable (eg. dengue) and non communicable diseases; a double burden of diseases. Most of the NCDs can be prevented by adopting healthier life styles and well designed population strategies.

*Prof. Shyam Fernando
Faculty of Medicine
University of Colombo*

Phoenix to explore Mars



NASA in the United States has planned to launch a space shuttle named as “Phoenix” to Mars for exploring the life on Mars.

It is planned to launch the Space Shuttle on 04 August 2007 expecting landing on the red planet on 25 May 2008, after a long journey of 422 million miles.

Phoenix will be landed to the northern hemisphere of Mars and it is assumed by the scientists that the evidence of life can only be obtained in this area of the red planet.

‘Phoenix’ will use its robot arms to dig snow and soil and it will stay on the red planet for a period of three months testing the samples. ‘Phoenix’ will investigate the environment of the red planet for maintain life on Mars.

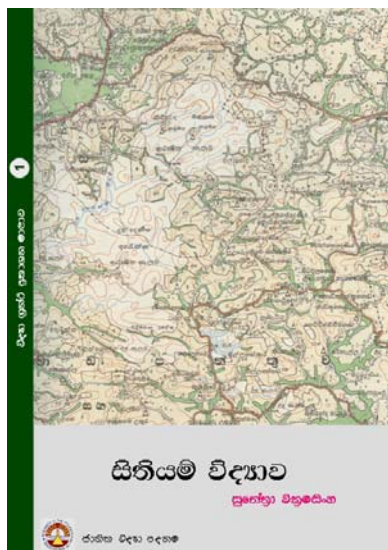
After the successful voyage to the moon with human beings, the next dream of the man is to land on Mars. Scientists say that more studies have to be done to achieve this goal.

Before sending human beings to the red planet, the leader of ‘Phoenix’ Research Group, Peter Smith says that it is necessary to investigate the life is ever existed on Mars and there is a suitable environment for living beings on the red planet. Photos obtained by Phoenix will be used to continue research on Mars.

-Thusitha-

Sithiyam Vidyava (Cartography)

Author: Sunethra Wickramasinghe
Published by : National Science Foundation
Price: Rs.300.00



National Science Foundation has started publishing a series of science books/booklets under the purview of the NSF Special Committee on Popularization of Science, and “Sithiyam Vidyava” (Cartography) is the first book published under this series. This book has been published in Sinhala and by publishing this book it is taken an attempt to nourish the pool of science books in the field of cartography especially in Sinhala language.

The author of this book, Ms Sunethra Wickramasinghe, who serves as a Lecturer in the Faculty of Geology of Sri Lanka Sabaragamuwa University, had also served in the Survey Department of Sri Lanka for about 20 years. She has used her valuable experience in writing this book.

This book consists of suitable chapters including the history and classification of mapping, computerized maps etc. and provides technical terms in English where they are necessary.

The Surveyor-General, Mr B.J.P. Mendis in his ‘Forward’ provided to the book has suggested this publication as a reference book to the university students as well as to the school children.

-Thusitha-

VIDURAVA - Next Issue

December, 2007

Food Technology

- Post Harvest Technology of Fruits and Vegetables
- Food Standards and Labelling
- Food Technology: past and present
- Food Additives
- Lessons on Food Safety

Gene that can turn you into a left-handed

Researchers from Oxford University has found that individuals with the LRRTM1 (Lencine Rich Repeat Transmembrane Neuronal Protein 1) were often left-handers.

This is the first gene that has ever been discovered to be linked with left or right handedness. The left hand side of the human brain controls speech and language while the right side handles emotions.

These Oxford University experts believe that LRRTM1 gene has an impact on the balance of the brain and due to these left-handers the sides are often swapped around.

They also think that people with LRRTM1 gene are more susceptible to schizophrenia. According to the leader of the study group, Dr Clyde Franks, they don't yet know the precise role of this gene.



-Thusitha-

School Science Society Programme at the NSF

1. Introduction

School Science Society Programme (SSSP) has been established to register School Science Societies (SSS) with the NSF with an objective of fostering students to acquire knowledge on latest developments in various fields of science and technology, to make them aware of scientific knowledge in day to day activities and to improve their standard of living.

2. Registration of School Science Societies

School Science Societies can be registered with the NSF by completing a simple application form, which could be obtained from the Science Popularization Division at NSF or through the web www/nsf.ac.lk. Application forms will be sent free of charge to the Principal of the school on request. Registration fee will be Rs.100/=.

The registration has to be renewed annually and a sum of Rs.50/= should be paid on renewal. Renewal forms could be obtained from the Science Popularization Division at NSF or through the web.

Registration would be cancelled if any SSS uses the name of the NSF for its activities without prior approval from the National Science Foundation.

3. Benefits to the School Science Society

- 1) NSF will assist to organize various activities related to science and may provide funds required for the activity (up to Rs.10,000/- per programme per school), based on the proposal submitted. NSF will also assist the School Science Society by providing resource persons (leading Sri Lankan Scientists from Universities and Research Institutions).
- 2) A copy of Vidurava Science Magazine will be sent to all the registered School Science Societies.
- 3) Members of SSS can participate in periodic seminars, workshops, field trips and various activities including the World Science Day Programme organized/conducted by the NSF.

4. Activities of the School Science Societies

- ◆ Registered SSS should organize one main activity to celebrate the World Science Day Programme, which is held on 10 November each year, and at least five (05) programmes to identify and scientifically solve problems in their localities.
- ◆ A separate proposal for each activity (forms could be obtained from the NSF) including a breakdown of the budget should be submitted for consideration of possible funding.
- ◆ The first proposal should be sent within the first three months of registration. If not, it would be taken in to consideration at the renewal of the registration for the next year.
- ◆ Proposals would be selected for funding by the NSF Special Committee on Popularization of Science. The decision of the Committee will be final.
- ◆ Funds will be issued on reimbursement basis. However, in special circumstances 50% of the total budget may be released on the recommendation of the Committee.

5. For any information

Science Popularization Division, National Science Foundation
47/5, Maitland Place, Colombo 07.

School Science Society (SSS) Programme of the National Science Foundation



Guidelines for Star Ratings

How to collect **stars** for your Science Society?

- ★ The Society should organize a Science Day Programme once a year to promote science among the students of the science stream and also the students of other streams. Major components of a science day could be lectures and presentations on various aspects related to Science & Technology, drama to promote science, science quiz programmes and debates on science related topics. (NSF can provide and sponsor the resource persons to conduct the lectures and presentations if required)
- ★ The Society should actively participate in the activities / competitions organized by the National Science foundation to commemorate the World Science Day on 10th November every year. (the guidelines for the competitions will be informed in due cause)
- ★ Active Participation at the workshops / seminars / programs / field visits organized by the NSF and other organizations to promote science.
- ★ The Society could identify problems (health, environmental, agricultural, technological waste management etc.) in the area and implement small projects to manage or overcome those

problems scientifically. (You can submit feasible project proposals to NSF to be consider for funding) Guidelines are attached herewith.

- ★ Conduct an exhibition on new innovations at school level and send suitable entries for National Award for Young Scientist (NAYS).
- ★ Maintain a wall newspaper / publish a newsletter to educate the school students on the latest developments in S & T.
- ★ Collaborative activities conducted between the school science societies in the region

The Society should produce the annual report with all the details of events / programmes conducted during the year with photographs and other supporting documents to prove the suitability to obtain stars. (This report should be submitted to us before 15 February each year including the details of the previous calendar year. Please submit the activity plan for the current year along with this.)

School Science Societies that obtain the highest number of *stars* will be rewarded at the WSD school programme. The contributions made by the teachers who were in charge of the society will also be recognized.



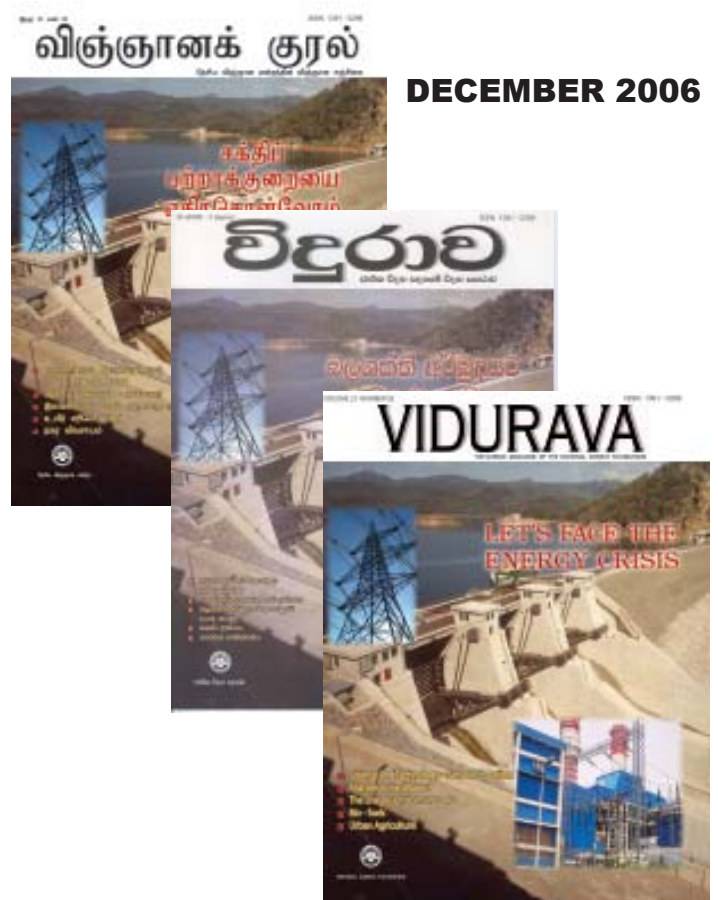
JUNE 2006

A revolution in Technology **Nanotechnology**

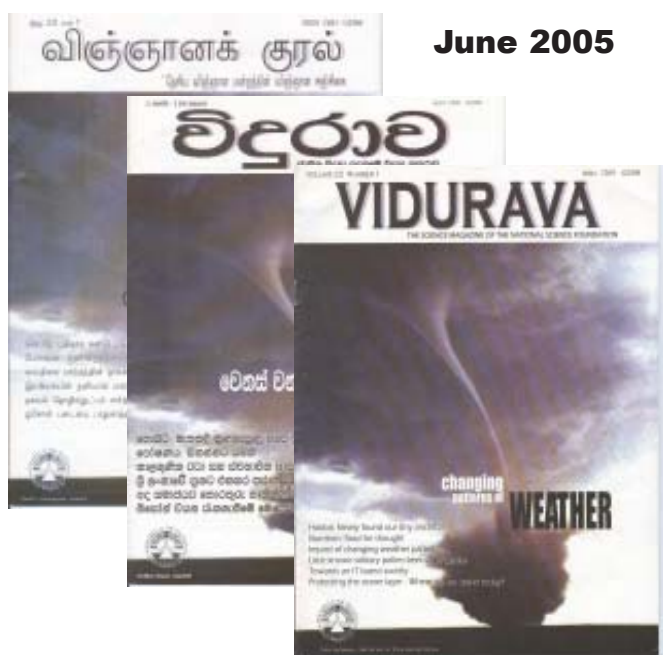
- ♦ Mud-Nest building Wasps of Sri Lanka
Thilini c. Weeraratne
- ♦ Nanotechnology - The Biology and Engineering Tomorrow
S. Ravi P. Silva
- ♦ Bio-Nanorobotics of Nanotechnology
Samitha Ekanayake and Piyumi Ponnampuruma
- ♦ Nanotechnology in Medical and Health Sciences
Suranjith L. Seneviratne
- ♦ Thalassaemia
Rathnayake M. Mudiyanse

LET'S FACE THE ENERGY CRISIS

- ♦ Science and Technology - School Education - restructuring scheme
Indira Lilamani Ginige
- ♦ Teacher or Facilitator? - learning and science culture
C.M.R. Anthony
- ♦ The Energy Crisis in Sri Lanka
Tilak Siyambalapitiya
- ♦ Bio-fuels - for biological fossil-fuels
C.S. Weeraratne
- ♦ Urban Agriculture - unlimited to any place
T.T. Ranasinghe



DECEMBER 2006



June 2005

changing patterns of WEATHER

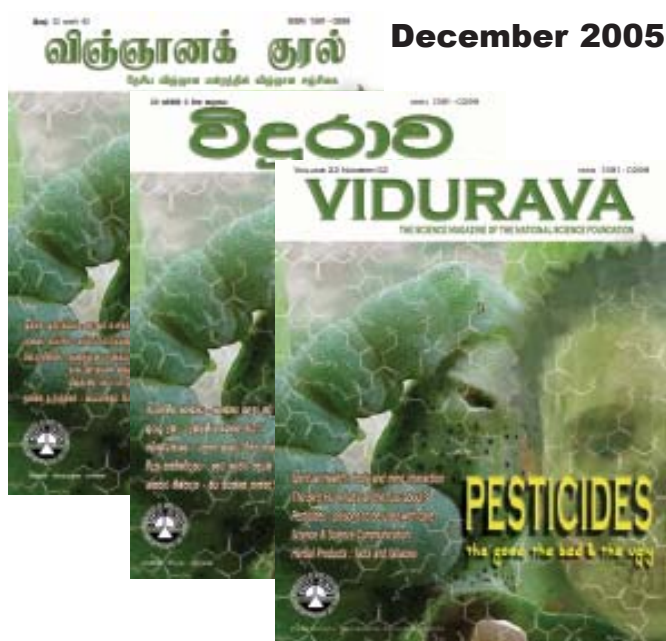
- ♦Hobbit: Newly found our tiny ancestor
Dr Jayantha Wattavidanage
- ♦Nutrition: food for thought
Dr Renuka Jayatissa
- ♦Impact of changing weather pattern
Mr G.H.P. Dharmaratne
- ♦Little known solitary pollen bees of Sri Lanka
Ms Inoka Karunaratne
- ♦Towards an IT based society
Mr S.T. Nandasara
- ♦Protecting the ozone layer - Where do we stand today?
Dr W.L. Sumathipala

November 2005
SPECIAL ISSUE



natural DISASTERS

- ♦Lightning: Basics, Safety, and Protection
Chandima Gomes
- ♦Landslides in Sri Lanka
R.M.S. Bandara
- ♦Tropical Cyclones and Tornadoes
S.M. Kariyawasam
- ♦Thunderstorms
K.R. Abhayasingha
- ♦Earthquakes and their Geological Basis
C.B. Dissanayake & Rohana Chandrajith
- ♦Psychosocial care for people affected by disasters
Neil Fernando



December 2005

PESTICIDES the good, the bad & the ugly

- ♦Spiritual Health: Body & Mind Interaction
Seneviratne Epa
- ♦The bird Flu - What's all the fuss about?
Panduka Karunanayake
- ♦Pesticides: Poisons to be used with care
Jeevani Marasinghe
- ♦Arthur c. clarke - Great Contributor to Global Communication
Chinthana Wijewardena
- ♦Science and Science Communication
Jayantha Wattavidanage
- ♦Herbal Products: Facts and Fallacies
Upali M. Senanayake

What have you learnt? Scan your own memory!

1. True? False?

- (a) Tarantulas belong to the Phylum Arthropoda, Class Arachnida, Order Aranea, and family Theraphosidae.
- (b) Tarantulas' sting is deadly and poisonous than snake or viper bite.
- (c) Like most spiders, tarantulas spin a web to catch their prey.
- (d) Tarantulas are nocturnal and shy. They live in tree holes, under bark, under stones and holes dug in the ground.
- (e) Usually a tarantula species lays about 50-2000 eggs at a time, and these eggs are deposited in a silk-like egg sack.

2. True? False?

- (a) Banana is the second major fruit crop grown in Sri Lanka with an extent about 60,000ha.
- (b) Banana is a staple food of millions across the world assuring a balanced diet more than any other fruit.
- (c) Polythene sheets, which are used to wrap meals take more than one year to undergo degradation.
- (d) the meals wrapped in treated banana leaves can be warn in a microwave oven without any changes.
- (e) Only banana leaves can be used as bio-wrappers.

3. True? False?

- (a) When the radius id doubled, then the volume is increased by eight times.
- (b) It is not important to have a solid mathematical background to understand the mathematics behind a formula.
- (c) To calculate insurance premium, it is used complex mathematics and this subject is called as Actuarial Science.
- (d) Constrained optimization problems can be solved using a technique known as Lagrange Multipliers.
- (e) Different investments carry a different return and a risk.

4. True? False?

- (a) Some of the cancers are related to life style changes.
- (b) Diabetes is the most common cause of non accidental amputations worldwide.
- (c) Risk of heart attacks in people with diabetes is 2-4 times lower than non-diabetics.
- (d) Hypertension is asymptomatic.
- (e) A waist measurement of 90 cm for Asian men and 80 cm for Asian women indicates central obesity.

Answers

1. (a) True (b) False (c) False (d) True (e) True
 2. (a) False (b) True (c) True (d) True (e) False
 3. (a) True (b) False (c) True (d) True (e) True
 4. (a) True (b) True (c) True (d) True (e) True

Guidelines for Contributors

1. Types of articles considered for publication

Articles written on the themes related to science and technology, which will help to enhance the scientific knowledge and their practical applications are accepted. Articles submitted will be reviewed and edited by the Editorial Committee. Submission of manuscripts in both languages in Sinhala/Tamil, and English will be appreciated. If the article is written in a particular language the Editorial Committee has the right to translate it to other languages (Sinhala/Tamil or English) as required.

2. Guide to preparation of manuscripts

Manuscript

Manuscripts of articles should be typewritten in double space on one side white A4 sheets. Adequate margins (4 cm) should be left with sufficient spacing at the top and bottom of each page. The typescript should be free of corrections and should be complete and in final form. It is preferable if the article could be sent together with the diskette on MS Word 98.

It is better if the illustrations/photographs/graphics too are included with the manuscript.

Length and style

Articles should be written to a given theme/topic related to science and science activities. They should be well focused, preferably organized, structured, and avoid the 'text book' style. Articles should be written clearly and concisely in simple language avoiding complex words as much as possible. The theme article (cover story) should not exceed 3000 words. Other articles should not exceed 2000 words.

Manuscript layout

- ◆ Title of the articles should be brief, and the author's name and affiliation should also be

mentioned preferably along with a recent passport size photograph.

- ◆ Tables and figures should be on separate sheets and should be fully labeled and captioned.
- ◆ Graphs and other line drawings should be clearly drawn.
- ◆ Photographs must have good contrast and should be in black and white.
- ◆ Use names of chemical compounds and not their formulae be given in the text. Scientific (Botanical and Zoological) names should be correctly spelled and typed in italics or underlined. In case of Sinhala or Tamil articles, scientific/technical terms should be given in English within brackets. Mathematical applications, such as statistical analysis should be avoided as far as possible.
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