CLUBSPEAK

Even with most part of the country being in the grip of severe summer heat and the tensions school board results, VIPNETians have stuck to their responsibility of carrying out the activities. They have been sincere to the task and have been particular in sending their reports as well. Some clubs send their reports regularly. They have been consistent in reporting. But some send occasionally. It is almost certain that clubs keep doing their work rather dedicatedly. But sometimes reporting is not proper. We would like to remind all clubs that doing their work is important and sending the report of their work is equally important. So do be regular in informing us about your activities.

In a first effort of its kind two science clubs of different towns coordinated and carried out a joint activity. This they did this in the form of Night Sky Observations wherein the members of the two clubs assembled at the school premises in Gurgaon in the evening and with the help of experts watched some planets [Venus, Jupiter (Moons of Jupiter) and the Moon] and some constelations. There were animated discussions amidst probing queries. On the whole all enjoyed the activity. After the observation was over the members got together and had dinner in the moonlit night on the lush green lawns. The clubs that participated were the **Eureka Science Club** of **Rabea Girls Public School, Delhi** and the science club of **Salwan Public School, Gurgaon (Haryana)**. The venue of this joint venture was the green environs of Salwan Public School, Gurgaon.

The next report in line is from **Uttar Pradesh.** It is by the science club of **City Public School, Kanpur.** The report is of the celebrations of the National Science Day (28 Febuary). On the occasion, the young scientists of the club displayed some attractive models for the local people. The attraction of the exhibition were models of the Missile, Solar & Lunar Eclipse and the model of the incident that took place at the World Trade Center, New York, (USA), on 11th September 2001.

From **Madhya Pradesh, Yuva Vigyan Parishad** of **Lashkar Gwalior** has sent a report of their annual event Gyanda Vigyan Pradarshini and Science Activity Corner. The programme had been designed keeping in mind the interest factor of different age groups of the visitors. There was opportunity for children to participate in various activities which suited their interest and curiosity. There was enough for grown ups too to see and do. For those primarily interested in buying things there were stalls to buy their items/books of interest etc. This event/fair was of a month long duration. The number of visitor who visited the fair is estimated to be several lakhs. The event was very well covered by the local press and received appreciation from one and all.

One of the most active and effective members of VIPNET is the **Unique Society For All** of **Ratlam, Madhya Pradesh.** It is indeed a unique society considering the vast variety and quality of work it has been carrying out. The team that leads this society is dynamic and dedicated. It is a combination of leadership and creative approach, which is the bottom line to their success. We wish them further success. This society has sent us a report about their celebrations of the National Science Day this year. The occasion was celebrated with children splashing colour in a painting competition, writing essays with competitive enthusiasm and delivery passionate speeches to drive home their points of view in speech competitions. The event had attracted clubs from nearby villages who themselves have been active performers. Then on March 20 the society again put up an educative demonstration. On this day they conducted tests to show how food adulteration can be checked. With the help of local VIPNET clubs they educated a large number of people of the region on their rights as consumers.

Bihar this time leads all other states in terms of the number of reports sent from there. The first report is from the **Nature Club of India (Patna)**. The club organised a five day National workshop to train Master Resource Persons on Hydroponics (growing plants in water or soil-less cultivation). It was an activity with plants for fun and hobby. The objective was to popularize Hydroponics as a classroom activity amongst children. This was done to creating curiosity about different life forms around them and to develop in them, the ability to find means of maintenance of the ecological balance.

The next report is from the Science Club of **Orient Public School, Bihat, Begusarai.** They conducted a seminar on the "Condition of women in society". The objective was to emphasis on how women's role in society could be made more positive and productive. There were views shared on means by which to empower the women with education and skills for economic improvement.

Vigyan Kranti Club of **Khagaria Dist.** has taken a few steps in the right direction. They have chalked out a strategy for plantation drives keeping in mind the on coming favourable weather conditions (monsoons) for plantation. They plan to undertake massive plantation drives in their entire region. The other positive step they took was to support the Pulse Polio Drive. This they did by making people aware of the need to have their infants immunized against the dreaded disease Polio. The awareness was done through lively Nukkad Nataks (Street Plays). The next step was an important health hygiene and cleanliness awareness drive.

The next report is from **Bichauta Vigyan Club.** On the occasion of the National Science Day the members of the club held a series of public meetings to drive home the importance of science and the development of scientific temperament. Then they conducted a four-day awareness rally in support of Pulse Polio Drive in March. In April on the World Health Day they held public meetings to educate people on the ways and means of a healthy existence.

The **Yuva Vikas Anusandhan Parishad, Purvi Champaran (Motihari)** too took up some interesting activities. To start with they helped 125 women through a six month long training in acquiring skills for economic independence. In this programme these women in batches of 30 individuals were trained at different centres. For the youth of the region they conducted a one day

programme for personality development. A one day blood donation camp was also organised.

The **Science For Society (SPS), Begusarai** conducted a number of activities. They have been active in creating science related awareness and making plans for joint ventures for all the clubs of the region.

From **Jharkhand** the **Red Rose Children's Academy** have sent us an exciting report of the World Space Radio programmes broadcast by Vigyan Prasar. The children of the club assembled and listened to the programmes with great interest. Such was the excitement that they would like to be told about all the programmes in advance. The second activity of the club is an on going activity in the form of Nukkad Natak (Street Play). They have also conducted a one act play competition in which children of local school participated. The club has also chalked out an activity calendar for the local clubs and is in the process of sharing the calendar with other clubs.

From **West Bengal** we have a series of reports from the **Midnapore Dist.** The reports are about celebrations of the National Science Day, Seminars on Health related topics and some activities to promote National Integration. What is exclusive about these activities is that they are done by a cluster of clubs under the umbrella of the Midnapore VIPNET Science Club Forum operating from Baruipur Totanlada, Midnapore. The club who participated are:

(1) Debra VIPNET Science Club Forum, Nalageria

(2) Sabang VIPNET Science Club Forum, Rambhadrapur

(3) Bhutnath Midya Gram Bikash Kendra, Rambhadrapur

(4) Midnapore Netaji Rural Women Development Society, Akandabari

(5) Midnapore Vidyasagar Rural Welfare Association, Chakarjun

(6) Nalageria Gram Bikash Kendra, Baruipur

And now reports from **Assam.** The **Science Fan Club** has reported elaborate plans of launching a massive plantation drive in their region. They have been undergoing training and identifying members who can take up various responsibilities for the programmes, which they would be carrying out over a period of three to four months. Along with the plantation will be carried out awareness drives for tree/forest protection and promoting involvement of the local people, especially women, to protect these plants. They hope to achieve good results by educating people about pollution and conservation of forests.

The **K. K. Memorial Science Club** participated in the regional science drama competition held at Khanapara. The club put up a play (drama) and named it "Robot-Boon to Science and Technology". The theme was about a Robot conducting an operation on a heart patient. The Robot was shown being remote controlled with the help of video-telephone. It was shown that the success rate of such operations was nearly 98%. They further report about their participation in art and in quiz competitions in which their member won accolades.

Its last but not the least. **Child Science Forum** have involved themselves in some cultural and socially productive activities. To start with they initiated a Bihu Festival in their Forum. They have constructed a room, which they would convert into a library. They conducted a quiz on environment for the children of local schools.

❑ ***Editor***

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Indian Scientist (5)

Prasanta Chandra Mahalanobis

The Founder of the Indian Statistical Institute

Prasanta Chandra Mahalanobis (PCM) was a visionary. He "was the brain that gave life to Nehru's grand vision of modern India. He was a great scientist, a promoter of scientific research and a great institution builder. He set the Nation on the road to public sector-led planned development — the Second Five-Year Plan was based on the Mahalanobis model". PCM was the chief architect of the post-independence statistical systems in India. He was the founder of the Indian Statistical Institute (ISI). He was instrumental in establishing the Central Statistical Organisation (CSO), the National Sample Survey (NSS), State Statistical Bureaus and the Perspective Planning Division of the Planning Commission. It was PCM who brought the concept of statistical quality control in industry to India.

PCM was a man of varied interests and he held many distinguished posts and at times some of them simultaneously. He wrote many articles and essays on Tagore and his writings. He explored the ancient Jaina Dialectics of **Syvadvada** and showed `certain interesting resemblances of that science to the probabilistic and statistical view of reality sparked by recent developments in quantum physics.' He developed a deep interest in architecture. He started a small printing press, the Eka Press in his house, which later developed into one of the best scientific presses of the region. He was an indomitable fighter and worked against all odds. He had a deep concern for the common man and love and sense of pride for his country.

Prasanta Chandra Mahalanobis was born on 29 June 1893 in Calcutta. His grandfather Guru Charan Mahalanobis (1833-1916) was an active member of the **Brahmo Samaj**. Guru Charan married a widow in March 1864. In those days, it was a rare act of courage, particularly when we consider the social taboo that existed against widow marriage in those days. He had to face a great deal of hostility even from some **Brahmos**. PCM's uncle Subodh Chandra Mahalanobis (1867-1953) was a teacher and educationist. Subodh Chandra became the Professor and Head of the Department of Physiology, Presidency College, and was raised to the Indian Education Service (IES). PCM's father, Probodh Chandra Mahalanobis (1869-1942) was a businessman. His mother Nirodbashini was the youngest sister of Dr. Nilratan Sarkar (1861-1943), the doyen of medical profession of his time, educationist and industrialist.

PCM studied in Brahmo Boys' School. This school was founded by his grandfather. After passing the Entrance Examination he joined Presidency College, Calcutta, in 1908 and graduated in 1912 with Honours in Physics. He went to England in 1913 and joined Cambridge University, where he took Part I of the Mathematical Tripos and Part II of the Natural Sciences Tripos in 1915. While he secured only a Third class in the Tripos Part I examination but he did very well in the Part II examination. He not only got a first class but was also awarded a senior research scholarship for standing first. After the Tripos he had plans for doing research in physics in the Cavendish Laboratory. But that did not happen. The same year he returned to India. At Cambridge PCM met Srinivasa Ramanujan, the great Indian mathematician, and the two became good friends.

PCM was a close associate of Rabindranath Tagore (1861-1941), the Indian poet, philosopher and Nobel Laureate. Rabindranath Tagore greatly influenced PCM's thinking and activities. PCM's association with Tagore started in 1910 when the young PCM came to Santiniketan during his college vacation. Tagore was 32 years older than PCM. Tagore got the Nobel Prize (1913) when PCM was just 20 years old. However, Tagore held PCM in high respect and had great faith in him. Once Tagore wrote to PCM : "I have always noticed how you are always capable to maintain objectivity in your judgement about people and I have always recognised that to be a great quality in you." PCM played a crucial role in shaping Tagore's vision of Visva-Bharati. He was an office-bearer of Visva-Bharati from its formal inception on 23 December 1921, being its Joint-Secretary alongwith the Poet's son Rathindranath Tagore. Tagore frequently consulted PCM on important affairs of Visva-Bharati. How much the poet depended on PCM is evident from the following extract from a letter he wrote to PCM : "Shantiniketan is facing most terrible crisis. I do not know we have the strength to overcome this ... You must certainly come here by the afternoon of Friday and help in solving the problem within week. We will also decide where it would be good for anybody else to come ... We have to take merciless decisions about what to drop and what to retain. I entreat you not to make any delay ... Come and free me from these problems."

We will not go into details of PCM's contributions to statistics. For PCM statistics was not just another scientific discipline. He viewed statistics as 'new technology for increasing the efficiency of human efforts in the widest sense.' PCM's contributions to statistical theory, methodology and applications have had universal impact. PCM's work in anthropology, flood control, meteorology, crop estimation etc. were not only innovative and pioneering but also led to the development of new theoretical concepts in statistics. PCM's innovative techniques and methodology for large scale sample surveys have been internationally acclaimed.

The Indian Statistical Institute (ISI) was formally established on 17th December 1931 and it was registered under the Societies Registration Act in April 1932. However, its origin can be traced back to the time when PCM started working after the first World War alongwith some young talented recruits. A Statistical Laboratory was established in the room of PCM in the Physics Department of the Presidency College. The ISI was also initially located in the Physics Department of the Presidency College. PCM had to struggle against all odds. In those days, when PCM was trying to advance the case of statistics in India, statistics was not recognised by the academic bodies or research institutes as a separate discipline. Fortunately three individuals viz. Brojendranath Seal (1864-1938), Nilratan Sarkar and Rabindranath Tagore, who had influenced PCM's personality and/or career, had realised the importance of statistics and provided the much needed moral support and encouragement to PCM to take up the study of statistics with the seriousness that it deserved.

The ISI received its first grant in 1936 (Rs. 5000 from the Government of West Bengal). Though the institute had a modest beginning its growth was phenomenal. To quote Calyampudi Radhakrishna Rao one of the most outstanding students of PCM, Fellow of the Royal Society and who later became the Director of ISI : "The Institute was located in the Physics Department of the

Presidency College in the beginning. There was only one part-time computer in the Institute in the first year, the total expenditure being Rs. 238/- (about £12). During the fifties the present premises of the Institute on Barrackpore Trunk Road was built and the office at Presidency College was vacated. At the time of the Professor's death the Institute at Calcutta and its branches at Bangalore, Baroda, Bombay, Delhi, Ernakulam, Giridih, Madras and Trivandrum had a total staff of over 2000, and the annual budget was about twenty million rupees (£1000000). The phenomenal development of the Institute within a period of forty years was mainly due to the individual efforts and imaginative planning by Mahalanobis".

PCM did not view statistics as a narrow scientific discipline and this was very much reflected in the kind of activities undertaken by the ISI. This unique institute attracted famous scientists and outstanding personalities for short and long visits. This list includes R A Fisher, A N Kolmogorov, Yu V Linnik, J L Doob, W Shewart, W E Deming, A Wald, J Neyman, N Bohr, M Curie and N Wiener. Among the visiting scientists JBS Haldane occupied the most important place. He alongwith his wife, Helen Spurway, joined the institute as full-time members of the staff in July 1957 and stayed there till the beginning of 1961.

PCM was one of the first persons in India to recognise the importance of calculation technologies in scientific research and development work, especially statistical theory and practice. He kept himself abreast, till the end of his life, of the latest developments in calculation technologies; statisticians working under his leadership at the ISI were using desk calculators of the Facit variety and sorters and verifiers of the Hollerith variety as early as in the 1940s. PCM managed to have a large number of electromechanical data processing machines of different companies of the west viz. the IBM, the Hollerith and the Power Samas installed at the ISI. These machines were used to process NSS data. The ISI was among the very few institutes to take lead in starting computing activities in the country. The other institutions were " Tata Institute of Fundamental Research (TIFR), the Indian Institutes of Technology (IITs) and some Defence Laboratories. The ISI was the first institute in the country to acquire fully electronic computer - Hollerith Electronics Computer type a 2 M, or HEC - 2M and got it installed by its own engineers. HEC-2M was a modestly priced small-programme-controlled computer produced by the British Tabulating Machines Co. A large computer URAL was commissioned in 1959. This was obtained as aid from the erstwhile USSR through the United Nations. Thus during 1959-60, with the visionary initiatives of PCM, the ISI could meet the computational requirements of many important organisations in the country. The ISI rented an IBM 1401 system in 1964. This was done without any loan or assistance from the Government or from other quarters. The rental to IBM was paid to IBM by selling 50% of the computation time to governmnet agencies and industry. The remaining 50% time was used by the Institute for its own scientific work, research and training. This kind of bold and risky step could be taken only by a person like PCM. The ISI's computer research was not confined to data processing. Research in the area of pattern recognition and machine learning undertaken by the scientists at the ISI was internationally recognised.

PCM viewed science and science education as prerequisites for national development. He believed that science alone could bring about social transformation. This way PCM viewed the role of science in social transformation can be gauged from his following observations : "It is also necessary to develop the outlook of science and the experimental attitude of mind in order to acquire knowledge of natural and social forces and to invent new techniques for initiating material and social changes. This is the only way in which decisions can be made increasingly in a rational manner, in accordance with principles of objective or scientific validity based on relevant data and correct reasoning, instead of on the sanction of authority based on status and power or custom and conventional or revealed rules and laws. This may be called the scientific revolution." Further he observed : "The transformation of all the advanced or rapidly advancing countries has been brought about by the acceptance, slowly at first, and now in increasing measure of a scientific and rational view of life and nature. This view has also permeated in a large measure the administrative bodies of the more advanced countries, tempering the outlook of individual executives, and increasing their ability to make responsible decisions, especially within the lower levels of the hierarchy of authority. This is the foundation of the modern age." PCM was not happy with the states of science in India. He remarked : "The tradition of science is not yet strong in India. There is no critical appraisal of scientific research. Most of the work is essentially imitative. Some competent work is being done but not much research of high quality. Less than 10 per cent of the R and D expenditure is being incurred in industrial enterprises in India in comparison with about 75 per cent in USA and 65 per cent in UK and Japan. A very large part of the research and development work, which is done in Government agencies or under direct government, control has little connection with production." It is pertinent to note PCM's observations on the state of Indian science which are still very much relevant.

Throughout his life PCM helped his friends with money. He donated to institutions. The Brahmo Boys School was saved from financial crisis through his generosity. While making donations, PCM usually did not take receipts. According to the late Nikhil Chakravartty, the well-known journalist (as stated in Ashok Rudra's biography of PCM), PCM donated money to political parties. Incidentally Nikhil Chakravartty acted as a contact person between PCM and the Communist Party of India. Here it may be interesting to note that PCM lent some money to Meghnad Saha, the well-known physicist, against hand-notes. PCM was very fond of his pets — cats and dogs and he was also attached to his three cows.

Most of the people who worked with PCM were mortally afraid of him and many who know him will not hesitate to term him an autocrat. He had an acid tongue. His decisions often times were arbitrary. He had no tolerance for stupidity. He never liked people who tried to flatter him. But he was certainly an inspiring leader. This is evident from the fact that he could attract a large-number of talented individuals who later became outstanding statisticians. The best quality in him was the ability to work under the most adverse circumstances. He was a man of indomitable courage and displayed immense tenacity in fighting for a good cause. To quote C. R. Rao,"Everybody knows him as the founder of the Indian Statistical Institute, the architect of the Second Five Year Plan, a close associate of Rabindranath Tagore and as one who had richly contributed to the social, cultural and intellectual life in Bengal. All those in the statistical profession were aware of his deep contributions to statistical theory, his efforts in providing a sound database to the Indian economy, and the part he played in placing India not far from the centre of the statistical map of the world. Those who have been closely associated with him have witnessed the indomitable courage and tenacity in fighting opposition for a good cause and clearing obstacles for propagating right principles."

Prasanta Chandra Mahalanobis died on 28 June 1972.

In 1993 the Government of India released a postage stamp bearing his picture and the Institute he founded. The building of the National Sample Survey Organisation at its Calcutta headquarters as Mahalanobis Bhavan'.

❑ ***Dr. Subodh Mahanti***

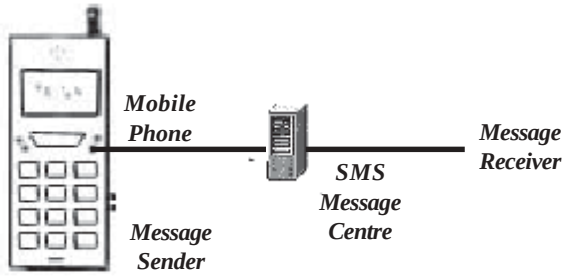
Story of Computers (Part-28)
Short Message Service (SMS)

Going ahead with what we wrote last time i.e. about "WAP (Wireless Application Protocol)" we now move a step further in the field of Wireless Technologies. This time round we are going to speak about one of the popular Services SMS **(Short Message Service).**

SMS is yet another dimension in this fast growing field of Wireless technologies. Though it has been around for quite many years now, it is catching on as a relatively low cost and easy to use solution for instant connectivity. The first short message is believed to have been sent in December 1992 from a Personal Computer (PC) to a mobile phone on the Vodafone GSM network in the UK

What is SMS

SMS, Short Messages Service, is a technology used in cellular phones to send and receive text messages to and from cellular or mobile phones. The text can be words, numbers or an alphanumeric combination. Newer applications allow for the transmission of images and other forms of information. It is based on a "stored and forward" concept. Short Messaging Service, otherwise known as text messaging, mobile messaging, or alphanumeric paging, is a digital cellular network feature. It lets you send short text and numeric messages to and from digital cell phones, cell phones and e-mail addresses, as well as cell phones and public SMS messaging gateways on the Internet.



A Simple diagram showing transfer of an SMS message from one mobile phone to another

SMS is convenient and cost effective for a number of reasons. When you compare it with the cost of airtime for voice calls or wireless Web access, SMS is a real bargain. Messages can be received while making voice calls, and there are no busy signals to contend with. Plus, if you should you find yourself in a situation where talking on a cell phone is inappropriate, SMS is silent and discreet. Messages generated by SMS are immediately delivered directly to your phone. There is no need to call an access number, as is the case with voice-mail. Also, most carriers offer SMS alerts (information packets, such as stock quotes, sports scores, and news) that can be delivered to your phone at regularly scheduled intervals.

SMS is taking off in a big way in India. It is one of the quickest and cheapest mode of person-to-person communication. There are over 6 million people using mobile phones in India and more than one million SMS messages are traversing every day in the text messages over cell phones. These messages can be sent and received in all major languages of the world. Very soon, SMS facility will be available in Hindi also.

How it works

SMS is the ability to send and receive short messages of upto 160 characters in a mobile phone. SMS was conceived as part of the Global System for Mobile communications (GSM) digital standard, originally only at 900 MHz but later also at 1800 MHZ.

SMS messages are transferred between mobile phones via a Short Message Service Center(SMSC). The SMSC address is normally stored on the phone and / or SIM card. The SMSC is software that resides in the operators network and manages the processes including queuing the messages, billing the sender and returning receipts if necessary. Many operators now offer web-based interfaces to their SMSC so you can send short messages to any mobile phone from the web (Some websites now offer free SMS for example – Lycos.)

Once a message is sent, it is received by a Short Message Service Center (SMSC), which must then get it to the appropriate mobile device. To do this, the SMSC sends a SMS Request to the home location register (HLR) to find the roaming customer. Once the HLR receives the request, it will respond to the SMSC with the subscriber's status: **(1)** inactive or active; **(2)** where subscriber is roaming. If the response is "inactive", then the SMSC will hold onto the message for a period of time. When the subscriber accesses his device, the HLR sends a SMS Notification to the SMSC, and the SMSC will attempt delivery. The SMSC transfers the message in a Short Message Delivery Point to Point format to the serving system. The system pages the device, and if it responds, the message gets delivered. The SMSC receives verification that the message was received by the end user, then categorizes the message as "sent" and will not attempt to send again.

Besides messaging between mobile phones SMS can be incorporated into web and traditional applications to alert users of events such as a new email arriving or a any another current event.

SMS Vs Other Messaging Services – How do they differ?

The Short Message Service is a **store and forward service,** in other words, short messages are not sent directly from sender to recipient, but always via an SMS Center instead. Each mobile telephone network that

supports SMS has one or more messaging centers to handle and manage the short messages.

E-mail is by far the most popular messaging service currently in use. Although both e-mail and SMS are "store and forward" systems that utilize a gateway to pass messages from senders to recipients, the most obvious difference between the two are the length and complexity of the messages. SMS messages are limited to between 80 to 500 characters depending on the service provider. A typical SMS message weighs in at about 160 characters.

While e-mail lets you attach files, imbed images, and make use of HTML, SMS messages are limited to text and numeral display.

On the other hand, Instant Messengers like Yahoo, ICQ etc allows you to have virtual real-time text conversations (or chat) with people who are simultaneously connected to the Internet. SMS messages are immediate, but not simultaneous. SMS messages are sent to and processed by a Short Message Service Center, which then delivers the message to the intended recipient's cell phone.

The Short Message Service features **confirmation of message delivery.** This means that unlike paging, users do not simply send a short message and trust and hope that it gets delivered. Instead the sender of the short message can receive a return message back notifying them whether the short message has been delivered or not.

Another emerging SMS-based application is the downloading of ring tones, logos, icons or picture messages. Ring tones are tunes that a mobile phone plays when it receives a call or short message.

Clearly, the effectiveness of using SMS as a communication media is high as both senders and recipients find it easy to compose, send, read and reply short messages.

Once users have familiarized themselves with reading and sending short messages, they often find that SMS is a useful way of exchanging information and keeping in touch with friends and family members. This is particularly so when the recipient is also able to reply to messages, thus effecting a two-way communication via SMS.

❑ ***Kinkini Dasgupta Misra***

* * * * *

Do You Know?

How do airconditioners cool?

An airconditioner draws air from the room, cools it and throws it back into the room. The cooling is achieved by the sudden expansion and evaporation of a compressed coolant in the cooling tubes of the machine over which air is the blown into the room. The gaseous coolant is pumped to the compressor which subjects it to high pressure thereby heating it in the process. This compressed coolant is forced through capillary tubes into the condenser, where the gas gives off heat and changes into a liquid. The condenser fan disperses this heat to the outdoors.

The unit consists of a compressor, evaporating coils, a condenser, and fans. When the liquid coolant goes into the evaporator coils by a fan, the air gets cooled and cool air enters the room.

How do cordless phones work?

Cordless telephone is a wireless version of a conventional telephone. It is made up of two units - a mains-powered base unit which is connected to the telephone line, and a battery-powered wireless hand set which is used for talk-in low-power radio transmitters and receivers for two-way communication, which operate at a preset frequency. When an incoming call arrives it is received by the base unit, which passes it on to the handset via coded radio signals. The handset antenna picks up the signals and gets linked to the calling line. Similarly when the person called talks into the handset, his or her voice is transmitted to the base unit via radio waves and on to the telephone line. The two parties can now talk as on a conventional phone. Most cordless phones operate only within a range of a few hundred metres.

❑ ***Kapil Kr. Tripathi***

The Butterflies and the Moths

Whenever the word insect comes to our mind only a picture of ugly looking creatures like Cockroaches and multi-legged centipede comes to our mind. At these moments, we do not realize that there are many insects which are very beautiful and have been a source of inspiration to many poets and painters when it comes to describing and depicting the beauty of nature. Can you think of one such beautiful insect? Yes, you are right. Butterflies are some such beautiful creatures of nature.

India is a land of beautiful butterflies that add charm and colour to our garden during the autumn season when these beautiful “fairy” looking creatures fly from flower to flower in search of nectar. Our wealth of butterflies is really great and quite diversified. The majority of them are harmless but also indispensable part of nature. They are the main agents to bring about cross-pollination for most of our flowers.

The butterflies are distinguished from other insects by their large and colourful wings and long coil like structure called proboscis. The proboscis is used to suck the nectar from the flower. The colour of their body and wings is due to the arrangement of flat, thin, delegate structure called scales in different pattern.

The butterfly lays eggs on some plant leaf and larvae feed on the leaves and grow rapidly. The larvae of butterflies are called caterpillars, which are many legged smooth/hairy and green, brown or black in colour. The caterpillar grows very fast and to keep pace with its growth, it moulds its skin a number of times. When it is fully-grown it becomes lazy and stops feeding and finds a sheltered spot for itself and then spins a cocoon of silken thread around itself. This silk is nothing but a solidified saliva of the caterpillar. When the cocoon is ready, the caterpillar once again moulds it’s skin inside the cocoon and then transforms into a smooth, motionless stage called pupae. Pupae does not feed and on the surface of Pupae we may notice indication of legs, wings etc. of the future butterfly. One day, suddenly the skin of Pupa bursts open and the adult butterfly crawls out slowly, spreads its gorgeous wings and flies-off to a nearby flower. It is indeed marvelous to see the transformation of the creepy caterpillar into a beautiful butterfly.

In India we have about 1500 species of butterflies. The most beautiful butterfly is Bird Wing which has a wing span of 190 mm. The smallest butterfly in India has a wing span of 12 mm.

A unique thing about a butterfly is the affect of climate, food and age on its physical appearance. The butterfly of the same species looks different in appearance not only in shape but also in colour and marks. It is interesting to note that monsoon and wet season forms of some butterflies of same species look different from the dry season forms. The Leaf food on which Larvae feed also play an important role in deciding the colour shades of butterfly.

Like birds and fishes butterflies also migrate in swarms over long distances. In India some species habitually migrate from the planes to hills during summer and come back to plane in winter. The search for abundance of larval food is assumed to be one of the reasons for the migration but the actual factors and the significance of their migration are still a mystery.

There is one more insect which is very similar to butterfly and often confuse with it, i.e. moth. A moth is often mistaken by many of us for a butterfly. For a common man, a moth is dull coloured night flying insect with fat furry bodies whereas butterflies are brightly coloured day flying insects. Infact there are many bright coloured day flying moths also. But to a scientist the real difference lies in the shape of their antennae and the linkages between the forewings and the hindwings.

The difference between them is as follows:

(1) The antennae of the butterflies are usually long and cylinderical often knobbed at tip. But moth’s antennae are short, thin and sometimes branched, but never knobbed.

(2) At rest most butterflies fold their wings over their body revealing their underside pattern. While moths hold

their wings either spread out flat or at an angle to each other over their body. Moths look rather aircrafts like with swept back wings.

(3) In most butterflies the base of the hindwings is expended to fit tightly under the forewings during flight. In moths the hindwings and the forewings are coupled together in flight by means of stiff bristles or bars.

Activity : To separate the butterflies and moths from the collected samples of flying insects.

Material Required : Butterfly trapper, hand lens, notebook, pen, pencil, crayons etc.

Procedure :

(1) Collect some flying insects with butterfly trapper in a garden during early morning, in the afternoon, evening and in night. (In night a lighted bulb in the garden attract lot of flying insects)

(2) Store all the insect in a two litre transparent plastic jar and cover its mouth with a cotton net and put a rubber band to hold the net, provide proper oxygen.

(3) Now observe carefully each insect and collect information as per the table.

S. No.	*Sample No. 1*	*Place & time of collection*	*Shape of wings in resting stage*	*Type of Antennae*	*Diagram*	*Conclusion*
1. 2. 3.						

Results & Conclusions :

Find out how many numbers of butterflies and moths you have collected. (In most of the cases the difference between the butterfly and moth would be quite obvious but in some cases where difference is not much the shape of the wings and types of antennae may provide a clue for the distinction.

Additional activities :

(1) Collect some caterpillars and observe the process of transformation of caterpillar into a butterfly or a moth. (the citrus plant's leaves are good sites to search for caterpillars)

(2) Draw the design pattern observed on the wings of butterflies and moths and find out the difference between them.

❑ ***Contributed by : B. K. Tyagi***

Ref : Insects, M. S. Mani (NBT)
Encyclopedia of Questions and Answers, Kingfisher

The Essence of Ham Radio

The term 'ham radio' is very often misinterpreted by the common people due to the lack of a proper understanding about this wonderful mode of communication. Sometimes it is considered as a privilege enjoyed by people who are extra-ordinarily skilled in radio communication. Sometimes it is assumed that 'ham radio' is a radio communication system far superior to the other communication systems, which can do miracles in the event of an emergency situation. Some people believe that a ham radio operator can even 'spy' for the enemies with the help of his radio communication equipment! These notions about ham radio are quite needless and are out of place of times.

It is true that ham radio is one of the superior modes of communication, which employs radio frequencies. A radio transmitter or receiver can be used from anywhere in the world because it is not connected through wires to any other terrestrial installation. Whether you are in the deep sea on a ship, on a boat in the midst of a river, inside a jungle far away from your home, you can always hope to get in touch with your beloved ones if you have a two-way radio communication system available with you. But it would be wrong to say that 'ham radio' can achieve miracles just at the press of a button!

In the days of landline telephones when the mobile telephones were not commonplace, a walkie-talkie type radio transmitting and receiving device was considered an instrument privileged to be used by the law enforcing agencies (e.g. Police) only. So, a person with a walkie-talkie in his hand and who was not a policeman was looked upon with certain degree of awe! This perception has changed very little even today. However, for people living in industrial cities, it is not very uncommon to see the use of such walkie-talkies by the employees of the industries. So, the notion that a wireless device is restricted to be used by the police only has changed in recent times. To use a mobile telephone (which is nothing but a combined unit of a wireless transmitter and receiver only) or to use a walkie-talkie you need not learn much about the technicalities behind their operation. Similarly the policeman carrying his walkie-talkie need not bother how his message reaches its destination. This is because of the fact that there are professional engineers and technicians to look after the government run wireless networks. It is quite intriguing to see that a wireless device like the mobile telephone is no longer considered as a restricted instrument. Anybody can use a mobile telephone without any governmental approval and use it for whatever purpose he wants! One can communicate to anywhere in the world using such a device. Also, by law it is illegal to listen to the conversations of the mobile telephone network except by the people authorized to do so. Mobile telephone of course has its range limited within a particular radius of the place where its service is available.

On the contrary, ham radio communication is entirely different from the existing governmental communication network. People very often confuse the term 'ham radio' with some sort of a sophisticated 'wireless instrument'. Of course, this is not the fault of theirs, because a modern ham radio wireless device is no different in its look and use from that of a wireless device used by the police or the army! Though the term 'ham radio' is used in unison, if we look into any English dictionary, it would be found that it is a single word (ham) used to describe 'an amateur radio operator'. Definitely the word 'ham' (it was not probably an abbreviation) was incorporated into the English language dictionary at a point of time after the advent of wireless communication system. But, who is an amateur radio operator? Why is he interested to operate a radio transceiver (a combined unit of transmitter and receiver) of his own? In this series of articles we shall try to provide you information related to this wonderful scientific activity in which you can also try to take part.

Late Prof. D.R. Paranjape, VU2AU (1967)-an Indian amateur radio operator who was licensed in 1933. This rare photograph is reproduced from the inaugural issue of 'Radio'-Journal of Radio & Electronics Society of India (RESI), January 1967.

Ham radio is an entirely educational down to earth activity. While helping in unleashing the technical creativity in an ordinary human being, it has at the same time been helping an individual to associate in a wider social context, which is somehow different in dimension and has a very noble cause beneath it. The ham radio communication network is maintained by voluntary participation of people around the world who are interested in radio communication technology. It does not depend upon any governmental network. Therefore, the success of such a wireless network in a particular area in the event of a disaster depends largely upon the density of the population of ham radio operators and their dedicated involvement. The one who loves to learn how to overcome the various hurdles of a worldwide two- way radio communication can only adore this hobby.

Ham radio (or more appropriately 'amateur radio') emerged as a hobby (and later recognized as 'Amateur Radio Service') almost hundred years back, at a time when the radio communication technology was in its infancy. To establish a radio contact with the other parts of the world was considered a great challenge during those days. There were enthusiast people around the world who aspired to communicate with each other using their own radio transmitter and receivers. Construction of radio communication equipment itself was a great challenge. Inexpressible happiness accompanied successes for those who embarked such ventures and so as the thrill accompanied when one could talk to an unknown person located at a distant corner of the world! Thousands of such experimental radio stations came into existence irrespective of geographical boundaries! They are the non-professionals (radio communication is their hobby) who communicate through radio waves.

In the next issue we will discuss about the origin of the term 'ham radio' with reference to the history of radio communication. For more information on ham radio you can log onto the URL http://www.vigyanprasar.com/ham. For information on homemade circuits, which are useful for beginners, the following URL may be referred: http://www.qsl.net/vu2msy/homebrew/homebrewing_zone.htm.

❑ ***Sandeep Baruah***

(a ham radio hobbyist with the call-sign VU2MUE)

E-mail: sandeep@vigyanprasar.com

Homepage: http://www.qsl.net/vu2msy

Quiz on Mountains.....

In the 4.6 billion years of Earth's existence much has changed on Earth's surface. Of the major parts of earth i.e. crust, mental and core, crust has seen much of the change. The original earth may have looked very different. Today we have the seas, forests and mountains along with deserts and the polar regions as the main physical features of the earth. But many of these have developed on the earth's surface much later in its life. Let us see, through this quiz, the role, one of its prominent features i.e. mountains are playing in making our earth what it is, and what some of their main characteristics and contributions are and so on.

Do attempt this quiz and win prizes

Q : 1 70% of Earth surface is covered with water. 17% of it is forest. The remaining 13% constitute Deserts, Polar region and Mountains. How much is the earth surface covered with mountains:

(a) 46 million sq km; (b) 56 million sq km; (c) 66 million sq km; (d) 76 million sq km

Q : 2 Mt. Everest with 8850 m above sea level is the highest mountain peak in the world. Which of the following would be the longest mountain range in the world:

(a) Himalayas (Asia); (b) Rockies (North America); (c) Andes (South America); (d) ALPS (Europe)

Q : 3 Orogenesis is a term used for the process of mountain formation/deformation etc. In the case of Himalayas orogenesis is still on. What is the rate at which Himalayas are growing taller every year:

(a) 5 cm per year; (b) 10 cm per year; (c) 2 cm per year; (d) 1 cm per year

Q : 4 One important benefit of the mountain ranges like Alps and Himalayas is they block cold and freezing winds of Northern polar regions to come onto the plains of Africa and the Indian Subcontinent respectively. There is yet another wind current which the Himalayas block for the Indian Subcontinent's benefit. It is:

(a) The Westerlies; (b) The Easterlies; (c) The North-East Trade Winds; (d) The Monsoon

Q : 5 Himalayas are referred to as the Tallest Water Towers of the world because of the amount of rivers they feed with trapped snow and ofcourse rain . With the help of two mighty rivers, the Indus and the Ganges, the Himalayas have been feeding the Indo-Gangetic plains with another useful resource. What is it:

(a) Fish; (b) Fertile Soil; (c) Sand; (d) Rocks

Q : 6 Himalayas because of the rich biodiversity have been the most productive source for the ecological balance. Yet they also are a cause of destruction in many ways. Which of the following would you attribute to the Himalayas:

(a) Floods; (b) Drought; (c) Cyclones; (d) Tornadoes

Q : 7 Which of the following is a resource of the Himalayas, because of which they have been explored since 5000 BC by mankind:

(a) Medicinal Plants; (b) Rare Animals; (c) Timber for Industrial use; (d) Tourist Resorts

Q : 8 Which of the following accounts for the maximum damage to the flora in the mountains:

(a) Acid rain; (b) Forest fires; (c) Garbage created due to tourism; (d) Mining

Q : 9 Mountains can provide for everybody's need but not for a few people's greed. In which way is man destroying the productivity of the Himalayas most:

(a) Felling trees; (b) Making dams; (c) Promoting adventure games on the hills; (d) Creating resorts

Q : 10 Even though Himalayas are considered the youngest mountain ranges yet they have been a witness to oldest of which of the following:

(a) Trees; (b) Animals; (c) Rivers; (d) Civilization

❑ ***Editor***

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Vigyan Prasar
C-24, Qutab Institutional Area,
New Delhi - 110 016
(Regd.Office : Technology Bhawan, ND -16)

Phones : 656 9606, 656 9535, 696 5978
Fax : 696 5986
Email : vigyan@hub.nic.in
Internet : http://www.vigyanprasar.com

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