

Samvit

Knowledge beyond time



A Quarterly Student Journal

visit us @ www.amrita.edu/samvit

January 2013

Sanskriti, Amrita Vishwa Vidyapeetham, Amritapuri Campus



“ Woman is not weak and should never be considered so, but her natural compassion and sympathy have too often been misinterpreted as weaknesses. If a woman draws on her power within, she can be even manlier than a man. Male society should sincerely help her realize and acknowledge her latent strength. If we align ourselves with that inner strength, this world can become a heaven. War, strife and terrorism will come to an end. Needless to say, love and compassion will become part and parcel of life. “



“*Autobiography of a Yogi* was one book in particular stayed with Apple CEO Steve Jobs entire life... This guide to meditation and spirituality that he had first read as a teenager, then re-read in India, and had read once a year ever since.”

Walter Isaacson's Biography, Steve Jobs

Editorial

As Indians, it is our obligation to learn about the contributions of our ancestors in evolving our way of life and development of our country. In the earlier editions of Samvit, we read about the systems and principles on which society function.

In this edition you'll learn about how Ayurveda had effective therapy for slowing down the ageing process. You'll also learn about lesser known universities like The Nadia University which was also known for quality education. As always you'll find stories, experiences, travelogues and lesser known facts about India. You'll learn about Kathak, one of the classical dance forms which is losing popularity due to lack of knowledgeable people and patronage. Our past achievements in the field of Chemistry, relationship between India and Cambodia, trade and commerce systems in general and some interesting facts about the ecological traditions of Tamil Nadu. We have also included in this edition, success stories of modern India, Varaprasad Reddy and his venture Santha Biotech that aimed at eradicating Hepatitis B from India. Future editions will also include such success stories which all Indians are proud of.

We are also presenting a new section in which Amma will answer some doubts that pop up in our mind from time to time. Hope you'll enjoy this issue.

CHEMISTRY IN ANCIENT INDIA

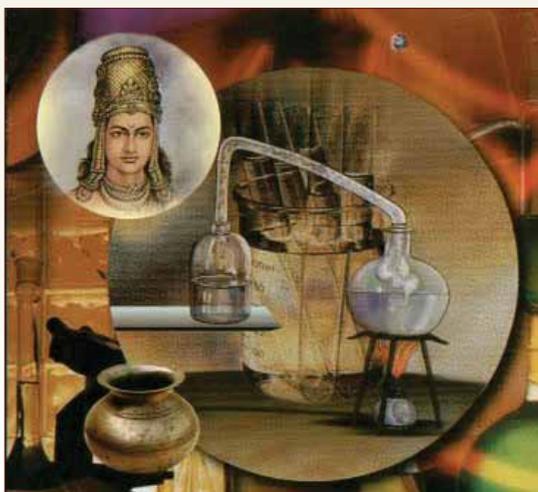
By Deepthi C. Warriar & Sharath Kandoth
S4EEE-A

The Indian civilisation, one of the oldest and ancient civilisations in the world, was also one of the most technically advanced civilisations of its time. India's scientific and technological accomplishments are among the oldest in the world and have been influential in the development of human civilisation. The level of sophistication in various scientific and practical fields was astounding. The decimal number system and the number zero are also major contributions to the world by the ancient Indians. Atomism was arguably conceptualised in India long before Dalton's atomic theory was proposed. Science was a part of daily life in ancient India, especially chemistry as it directly affected life like no other.

Though knowledge in India was traditionally transmitted orally rather than by the written word, there are numerous texts and manuscripts that record their advances in science. The Rig-Veda, believed to be written down at least 5000 years ago, has records of the fact that the people who lived then had the knowledge of various metals and made use of them on a daily basis. They were extremely accomplished at various metallurgical processes. A thorough examination of the Rig-Veda reveals how technically advanced the early Indians were. We can arrive at certain conclusions about their scientific ideas and practices of the time. Detailed descriptions of the use of "ayas" - the Sanskrit word for metal - for vessels, coins and weapons used at the time exist in these texts. Ayas, was thought to refer to iron only initially but in the Brahmanas and the Upanishads, there are mentions of "lohitayas" and "krishnayas", which essentially mean red metal and black metal, possibly suggesting the fact that there were at least more than one metal known to them. In later scripts we also find that gold, silver, lead and tin were in large scale use from approximately the 3rd millennium B.C.E. Metal-workers in the Harappan culture undoubtedly knew the art of using copper, bronze, lead, silver, gold and electrum - an alloy of gold and silver. Gold was predominantly used for ornaments and jewellery. Though copper and bronze were in common use, there are indications that an alloy of copper and arsenic was also used in place of low-grade bronze. By about 1000-800 B.C.E iron smelting operations were in vogue in India and, in the next four to five centuries, the Indian iron and steel objects earned the admiration of the western world. The accounts of

Greek historian, Herodotus (5th century B.C.E), mentions that Indian soldiers in the Persian army used cane arrows tipped with iron. Later it has been recorded by Quintus Curtius that the gifts which Alexander the Great received from Porus of Taxila- or Taksashila - (326 B.C.E) were several 'talents' of steel. These facts illustrate beyond doubt that by the fifth or fourth century B.C.E the Indian metal workers had attained a high degree of perfection in the techniques of producing iron and steel. Pliny refers to swords of good quality made of Indian steel. The Romans were fascinated by the Indian steel which they used to produce fancy cutleries and armour. The process for extracting iron, as indicated in the Rig-Veda, makes it reasonable to suppose that the small furnaces employed for the extraction of iron might have been of an open hearth type. There are detailed mentions about various ores and mines present in the Mauryan Empire in Kautilya's Arthashastra written in the 4th century B.C.E. In the Arthashastra, the section on mines and factories deals elaborately with the occurrence and nature of the ores of gold, silver, copper, lead, tin and iron. It is stated that in the case of all ores, when there is increase in heaviness there is increase in metal content. There are also descriptions of extraction of metals from an ore using cow dung, water, vegetable juices and other chemical substances known to them. Excerpts from the text suggest the extensive knowledge they had about the chemical properties of substances present around them in nature. It states, 'Ore from rocks or a region of the earth, which is heavy, unctuous and soft, green, reddish or red, is copper ore.' Lead is 'crow black or of the colour of dove or yellow pigment or studded with white lines smelling like raw flesh.' Iron ore is 'grey like saline earth or of the colour of a baked lump of earth.' Obviously, the physical characteristics of the ores were well known.

The post-Vedic period and later the Classical Age of India (600 B.C.E - C.E 740) afford substantial evidence which testifies to the Indian chemical knowledge and practices of far greater importance. Discernibly, the chemical knowledge became refined and practices culminated in notable feats of excellence during this period. Medical Science was a field the ancient Indians excelled in. In fact, the development in knowledge of chemistry can be attributed to the evolution of medical science in the Vedic period. Ayurveda, practiced from at least 4000-5000 years ago, is an unparalleled example of chemistry being applied in daily life. Atharvaveda has listed and described cures for various common diseases and treatments for ailments. There are accounts of a drink which is supposedly said to have the ability to prolong life called "Soma". Apart from the Vedas themselves, there are a number of literary sources belonging to this period giving information of value on various chemical practices. Particular mention may be made of the Ayurvedic classics, like the Charaka Samhita, and the Sushruta Samhita. The Charaka Samhita, thought to be written in the 2nd century AD is loosely based on the doctrines of the Samkhya system, combined with a methodology derived from the Nyaya-Vaishishka system. Charaka Samhita closely follows the authority of the Vedas. Charaka Samhita



shows 341 plant-substances, 177 drugs of animal origin and 64 mineral substances, metals etc. Charaka's text, however, was not the first medical text; his text itself was based on Agnivesa's work. Agnivesa was a student of medicine at the University of Takshasila, one of the world's first universities offering courses and degrees in various fields. Sushruta, an eminent physician, who is also considered to be

the father of surgery, also has also mentioned various medicines and chemicals used as cures for various diseases. There was classification of drugs based on the different methods. Charaka Samhita also mentions gold, silver, copper, lead, tin and iron as being used for treatments. It also mentions chemical compounds and minerals like sulphate of copper, iron, real gar, orpiment and sulphur in combination with vegetable, being used as drugs for external application, mainly skin diseases. There are accounts of preparation of alkali potash carbonate, which was used in combination with other substances. Rust of iron and pyrites were also being prescribed for use as constituents of pills. Ashes of conch shell, coral, lapis lazuli, calces of iron and copper and sulphide of antimony where used in various drugs. This suggests that they knew the chemicals present in them and their effects on the human body. Metals were roasted with sulphur, the process was known as killing of metals, to be used as drugs. Alkalis were used as drugs for skin and flesh diseases. Iron, silver and gold in hot solution of salt were used for the same. Alkalis as drugs were classified as for external application and for internal consumption, and further, based on their strength: as weak, moderate and strong. Basic chemical reactions like combination and neutralization of an alkali by an acid has been described by Sushruta in his text. He suggests the use of "kanjika" or fermented rice water to eliminate burning caused by alkali of caustic. Besides these, substances like alum-earth, red ochre were also used as medicines. Compounds like oxide and oxychlorides were used to cure various diseases. Properties of oxidants and antioxidants and how their imbalance could affect the human body was known to them.

continued on page 5

RASAYANA – Transmutation Of Life - An Ayurveda Approach Or Adding Life To Life

By Dr. Ananth Ram Sharma & Dr Prathibha Sharma, MD Panchakarma
Amrita School of Ayurveda

“Within the next five years, for the first time in history, the population of people aged 65 and older will outnumber children under the age of five”

Dr Margaret Chan, Director-General of the World Health Organization
The Philosophy of Ayurveda is to establish “Good Health” rather than “Curing” the disease. Ayurveda does not simply believe in adding the number of years to life but it is to add life to each year of life. It is obvious from the fact that the first aim of Ayurveda is to preserve and promote the health of healthy persons. To fulfill this aim Ayurveda maintains two separate branches viz. Rasayana and Vajikarana. Out of these, Rasayana deals with promotion of physical and mental health and Vajikarana is for promotion of sexual health.

Rasayana is a unique concept of Ayurveda that promotes the defense mechanism of the body and helps in the prevention of disease as well as earlier cure.

Rasayana Therapy – Advantages

It is mentioned in Charaka Samhitha (Oldest text of Ayurveda) that whoever makes proper use of Rasayana attains longevity in earth and after death, follows the path of sages to attain immutable. Rasayana drugs will definitely have an importance in the coming scientific era as the application of genome code theory can eliminate several species of diseases. Whatever it may be, it is certain that the scientific usage of Rasayanas is bound to provide a graceful ageing.

The properly and timely use of Rasayana drugs promotes youthfulness, provides longevity, memory, intelligence etc. All these actions of Rasayana indicate the fact that by undergoing the Rasayana therapy one can live a longer life, full of vigor and free from diseases and the adverse effects of ageing. Living such a span of life is possible only when one is having strong resistance and general immunity against diseases. Therefore, it can be postulated that Rasayana drugs improve immunity.

Nowadays prevention of diseases is achieved by immunization specifically against the respective diseases. The number of diseases is in myriad these days and that it is not practically possible to immunize a person against all the diseases. But, Rasayana increases the general immunity so that one can live a longer span of youthful life. It provides an umbrella against the diseases in general and aging by promoting physical and mental health.

Classification Of Rasayana

Rasayana is of two types – “Kutipraveshika Rasayana” and “Vatatapika Rasayana”. Kutipraveshika is one in which Rasayana is given to person staying inside a closed Kuti or shelter whereas Vatatapika is that in which Rasayana is administered to patient exposed to normal atmosphere without compromising one's life style. In other words, Kutipraveshika is an indoor administration while Vatatapika is an outdoor administration of Rasayana. So the former is not a widely practiced treatment method as the process is very laborious.

Kaya Kalpa Chikitsa

Kaya Kalpa Chikitsa is a progeny of Ayurveda, a holistic approach to the science of healing. Kaya Kalpa has derived its name from the Sanskrit terms ‘Kaya’ means ‘body’ and ‘Kalpa’ means ‘transformation’ or ‘transmutation’. Kayakalpa is the terminology used in the colloquial language for Kutipraveshika Rasayana.

This secret healing technique has been used in India for thousands of years by religious healers to rejuvenate and give longevity to royalty and holy sages. Kaya Kalpa treatments reverse the effects of time and regenerate the entire body, mind and spirit. When the body is not in harmony, it causes distress, disease and discomfort. Kaya Kalpa Therapy focuses on curing degenerative diseases and prolonging life by harmonizing the mind, body and psyche.

This branch of treatment is often misinterpreted as Geriatrics or old-age care, but it is a process of rejuvenation --a technique for reversing age. Reversing is not a myth, but is a reality.

Kuti – A special construction

Rasayana drugs are administered inside a specially built shelter. The design and dimensions of the shelter are mentioned in various classical texts.

Construction of Kuti is to be made in a place well ruled and freed from disturbances. In that place there should be water streams which is flowing down towards the east or north direction. It can be constructed either in circular or square shape with three ‘Garbha grihas’ (Consecutive inner strata) following the rules of Vasthu. It should be constructed with sufficient height with single roof for three strata's with thick walls and small windows. The most important point to be noted in the construction is ‘Ritu Sukha’ that means heat, cold and light should be adequate. The seasonal changes outside should not affect the Kuti inside. The floor smeared with cow dung is preferable.

The Kuti should be surrounded by compound walls and a lot of trees and herbs are to be grown in the compound. The outer Griha should have its entrance in the East, the centre Griha should have the entrance in the West and the inner one should have the entrance in the North. It is designed so because North is the conceptual abode of the Lord of Medicinal herbs. Also one can easily enter the inner house clockwise.

Procedure Of Kutipraveshika Rasayana

Four and a half months are required to complete a Kutipraveshika. Prior to the main treatment purification of body should be done with the help of Panchakarma procedures. About two months will be required for these procedures. One month should be spent in the shelter with administration of Rasayana followed by one month's Pathya (discipline). It will take another fifteen days for the person to come back to a fitting healthy state.

Apart from the patient only the physician should be allowed to enter the shelter during the course of the treatment. Toilet and washing facilities should be there inside the shelter. Only warm water should be used for all needs. If needed, a very reliable attendant can be employed. The physician should either stay there or come and visit the patient quite often. The regimen decided by the physician should never be disobeyed.

Inside this Kuti after the proper purification various Rasayana drugs are administered according to the need and condition of the patient.

Somalata: A Celestial Plant

Somalata, is an excellent Rasayana having mystical effects. It is a rare plant species having many varieties. The original plant is said to be found in the Himalayan ranges and not available now a days. The plant has only 15 leaves which can be seen on a full moon day. From the next day onwards, the leaves start falling, one leaf each day, until the new moon, when the plant is shorn of all leaves. The cycle then starts again, with one leaf appearing on the plant each day. Its juice -- somarasa --is extracted with a gold needle and is used in rituals like Somayajnya and Rasayana treatment.

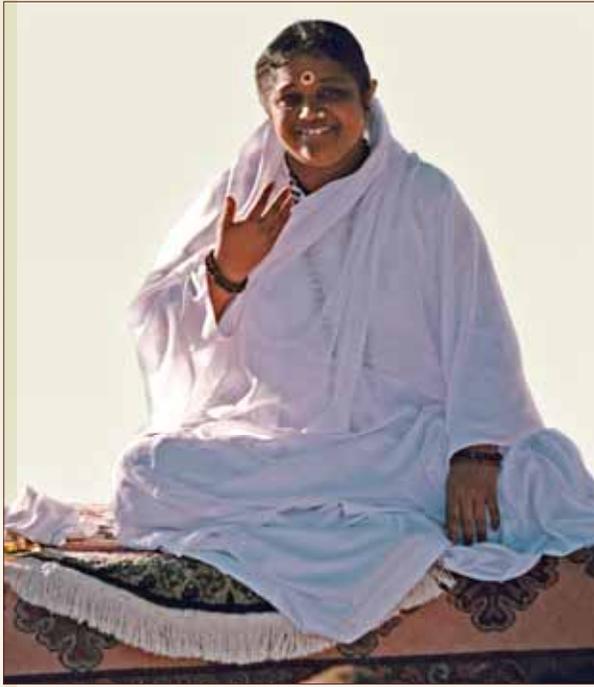
Method of Administration of Soma

Soma Juice is given in the morning in the dose of 160 ml

- First day patient gets vomiting and on completion of the vomiting, after completion of the vomiting on the same evening cooled milk after boiling is given.
- Third day loose bowels with worms occur
- Fourth day swelling of whole body occurs and worms come out of the body.
- During all these days individual should be only on milk diet.
- On seventh day the person becomes depleted of muscles and skin and only bones remain.
- During this Milk bath and milk is to be given to drink.
- On eighth day onward the cracks in skin occur & hairs and teeth fall off.
- Up to 16th day bath with decoction of Soma is given along with Anu Taila (Ayurveda oil preparation) massage.
- On 17th day new teeth start appearing.
- From this day onward up to 25th day Yavagu of milk (Milk Porridge) and rice is given.
- Thereafter new black and lustier hairs and reddish nails start arise.
- By the end of one month the skin becomes bright and full of luster.
- Thereafter the patient is brought gradually from inner to outer strata and then out of the shelter.

Benefits of Soma Therapy

- A person lives for ten thousands of years
- Obtains a new body
- Obtains a power like hundred elephants



AMMA'S ANSWERS

Q: If we suffer a downfall even after living with a master, will the master be there to save us in our next life?

Mother: Always follow the master's words. Dedicate yourself totally at his feet and therefore see everything as the master's will. As a disciple you shouldn't even think about the possibility of suffering a downfall. Thinking that way reveals a weakness; it means that you have no real faith in yourself. And if you don't have faith in yourself how can you have faith in the master? The master will not forsake the disciple who prays to the master sincerely. The disciple should take complete refuge in the master.

Q: Couldn't Lord Krishna have changed the mind of Duryodhana and avoided the war?

Mother: The Lord showed his divine form to both the Pandavas and Kauravas. Arjuna was able to perceive his greatness but Duryodhana was not. He committed a sin when he dismissed the vision as Krishna's magic. Whatever a mahatma does, it won't benefit those who refuse to surrender. Spiritual instructions are given only according to the seeker's qualifications and character. Only the realization of the body (whatever his body consciousness could give) was important to Duryodhana. He was not ready to hear any spiritual truths. He didn't understand that Lord Krishna spoke only for his own good; he thought the Lord always favored the Pandavas. War was the only way to destroy the ego of such adharmic individuals such as Duryodhana.

Q: What should be the role and status of women in the society?

Mother: women should have the same status as men and an equal share in running the society. When the position of women diminishes, society loses its harmony. Men and women have an equal place in god's creation. Just as one half of the body is as indispensable as the other, men and women have same importance. One half cannot claim to be superior to the other. When it is said that women is the left side of man, it goes without saying that man is the right side of woman. The difference between men and women is mainly at the body level.

Just like men, women have their own unique role in the society. Each person should understand his or her role and act accordingly. When women try to seize the role of men or when men control the role of women by force it causes discontentment and lack of peace in individuals and thereby in the society.

The left and right tires of a car are equally important. Only if the wheels on both sides move simultaneously can the passenger reach his goal. Similarly in family life only when the husband and wife live together in harmony will they really be able to reach the goal, to unite with the Self.

Women were given a highly respected position in the ancient Indian culture. "Matrudevo Bhava" (be one who looks upon the mother (women) as divine) was the ideal India gave to the world. Our culture teaches men to view all women as their mother. Every man spends nine months in the mother's womb before being born. Naturally then a sensible man will view his own mother with respect. All women should be treated with the same respect.

The women form the foundation of the family. She can play a greater role than man in maintaining the peace, harmony and prosperity of the family, because as a woman she is especially gifted with love, forgiveness and humility. These qualities in women hold the family together. Masculinity stands for a firm will power. But willpower alone is not enough to maintain a harmonious relationship among the family members. Internal conflicts arise in the family when a woman tries to adopt a masculine nature, or when a man attempts to force his ego on the women.

India is the land of renunciation, not of sensory indulgence. Our ancestors sought and found the fountain of eternal bliss. They did not fall prey to the modern error of wasting life and health in pursuit of fleeting pleasures. A person's actions, qualities and dharma determined his or her position in society. Every one's ultimate goal was self-realization. People were fully aware of that goal and path leading there. This brought contentment. But then, those who were not contented tried to seize the positions held by others. When there is inner dissatisfaction, conflict is born. The social order in India was fully capable of leading everyone to perfect happiness and self-realization. Equality between men and women and position of women in society were not issues in those days. A woman's true place in the society is in no way in the back rows. It is equal to that of men- she belongs to the front row. The important question is whether she is given that position today...

Q: Doesn't Manu say that a woman's father should protect her in child hood, her husband in her youth and her sons in the old age, and that a woman is not fit for independence?

Mother: The true meaning of the statement is that a woman deserves to be protected, not that she should be denied freedom. Manu points out that it is the responsibility of the men to protect women in all circumstances. This actually shows that at that time women held a high position in the society. A woman had no need "to be given freedom" by anyone; to enjoy as much freedom as any man is her birthright. But Manu says it is the duty of men in all circumstances to ensure her protection. A society that denies women their freedom or belittles her is courting its own destruction.

When mother hears people misinterpret this statement by Manu, she is reminded of the police protection given to ministers when they travel. Are the ministers not 'free' even when they are being protected? They enjoy full freedom and can travel anywhere. It is simply the duty of the policemen around them to ensure that freedom. In the same way, our society, which gave full freedom to women, made it the responsibility of men to ensure the women's protection and safety. Indian society bestowed this honorable position on women because women act as the guiding lights of the family and thus, ultimately, of the entire society.

"Indian students should value their religious culture and of course, the classical Indian culture bears importantly on the meaning of life and values. I would not separate the two. To separate science and Indian culture would be harmful. I don't think it is practical to keep scientific and spiritual culture separate".

Charles H James (Nobel Laureate, Physics)

SHANTA BIOTECH - A STORY OF ANGER, COMPASSION AND DETERMINATION

Extracts from the book "Making Breakthrough Innovations Happen" by Porus Munshi

By Lt. Col Krishnan Nair(Retd.)

In the early nineties, in India, almost 3 lakh people were dying each year from Hepatitis B. The vaccine that was available was imported for a cost of Rs. 750 for one dose and Rs 2250 for the full course. The 'am admī' or common man could not afford it. This situation made one man very angry. His name was Varaprasad Reddy. He wanted to do something about it; (pun not intended) but first he had to get angrier than he was!

Varaprasad had the opportunity of attending an International conference on health, in Geneva, where he heard discussions about Hepatitis B. There he saw the Indians, who needed vaccines, asking the Westerners for free or subsidized vaccines. He also saw how the Indians were treated with utter disdain. Snide remarks like, "Here come the South Asians with their begging bowl in hand. How long can the West carry the burden of their teeming millions?" were being made by the Western delegates. This made Varaprasad angrier and he vowed to make affordable vaccines in India.

Following his dream, Varaprasad visited one of the leading genetic engineering firms in California. There he was told that the technology he wanted was too expensive for India, and why did he want it anyway? There were so many people in India that a few thousand deaths didn't matter! Now, Varaprasad was furious.

Varaprasad next gathered as many Indians, who were working in biotechnology-based firms, as he could, for a meeting in New Jersey. He explained to them the pathetic situation in India and what he wanted to do about it. He wanted to eliminate Hepatitis B from India. They were moved by his passion but smiled skeptically when he announced his intention of producing a high tech recombinant DNA vaccine in India. Those humoring, indulgent smiles got Varaprasad hopping mad. He told them, 'What kind of Indians are you? You have been educated by India; even now you look to India for your cultural and spiritual needs. What are you giving back to your country? Is your involvement with the country, that has given you so much, limited to asking for pickles and gongura chutney from home?' This made the audience think. These scientists were so moved by Varaprasad's passion and dream of eliminating Hepatitis B from India that they offered to help by putting together a team of Indian scientists in the US who would work and train a team in India. They even contributed Rs 120 lakhs for the cause.

Varaprasad returned to Hyderabad. His next challenge was to find the right people to work with. How could he put together a team that shared his dream? Would they be prepared to do something that had never been done before? He was an electronics engineer and had no clue about biotechnology. It was a daunting task; but he was not giving up.

Faced with the task of putting together his team and finding a place to establish his lab, his efforts led him to Dr Malla Reddy, VC of Osmania University. Dr Reddy was thoroughly impressed by his cause and passion and offered him the use of the university's microbiology lab. Varaprasad would spend Rs. 5 lakhs to upgrade the lab for his work. What would have cost him Rs 20000 a month was settled for a one-time payment of Rs. 5 lakhs.

This was the beginning. Battling dwindling finances, an insensitive bureaucracy, production deadlines, unscrupulous competitors, corruption and marketing hassles, Varaprasad overcame every challenge and sold his product, 'Shanvac', the Hepatitis B vaccine for a mere Rs 50. By the end of 2009, Shanta Biotech achieved a turnover of Rs. 210 crores. Today Shanvac is a vaccine that is being used by WHO and is even being sold in the US. Has Varaprasad achieved his dream? 'Not until I have eradicated Hepatitis B from India', he says. If he has his way that day is not far away.

Currently, Shanta Biotechnics is one of the most admired companies in the biotech industry in India. They have a number of products on their inventory as well as in the pipeline of forthcoming products.

What can we imbibe from Varaprasad's story?

- Varaprasad was deeply hurt and angered by the Westerners' disparaging remarks about Indians. He took these jibes personally and decided to do something about it. Most of us would just not

bother. "What can we do? We are like that" would be the general reaction.

- He got people on his side by appealing to their emotions and aspirations.
- In a fast changing world, your organization will need to constantly reinvent itself. Do you have the people who can do that? If you don't have, what are you going to do about it? Varaprasad consistently dreamt the impossible and chose to go ahead without dilution.
- What does the Shanta Biotech experience tell us about innovation and pioneering? What is it that everyone in your industry/organization considers impossible? 'Impossible' tends to be more a figment of imagination than grounded in reality. Do any one thing today that is considered impossible. Find a way of making it happen. Start now. Pursue its implementation relentlessly. By the end of the month, do three more things that were considered impossible or were never done before in your organization. Experience what happens.

Varaprasad's success story stands like a lighthouse beckoning our youth to follow their dream and make a difference to society, particularly the poor and underprivileged. Do you have such a dream? If 'yes', what are you waiting for?

continuation of page 2 (Chemistry in Ancient India)

After the age of Charaka and Sushruta, there was a steady increase in the complement of inorganic substances in Ayurveda. Metallic salts required to prepare a medicine was prepared by them through a method known to them as "ayaskriti"- literally meaning creating metal. These salts were later combined with known organic drugs and medicines to enhance or improve their curative properties. The people were also aware of the fact that certain chemical substances like Arsenic were unacceptable or poisonous to the human body.

The ancient Indians applied their extensive knowledge in practical arts, apart from medical science, which include the making of glass and pottery, metal work, dyes, paints and perfumes. Archaeological evidences reveal that glass was used for utensils and windows. Coloured glass was discovered in many archaeological sites. They knew that adding certain chemical substances to glass gave them a distinct colour. Besides decorative purposes, coloured glass was also crafted to imitate precious stones. Extensive archaeological excavations in different sites of the Indus valley have brought to light more details relating to chemical knowledge and technological practices as far back as 4500 years. Chemical analyses of the samples collected from different places at Mohenjodaro indicate that mortars were generally made of gypsum, lime and sand. The Brahtasamhita gives an account of some adamantine compositions like vajra-lepa and vajra-samghata. The vajra-lepa consisted of extracts of various types of plants, fruits, seeds, barks (like unripe ebony fruit, wood apple), blossom of silk cotton and guggulu (fragrant gum). This glutinous paste was applied to roof tops and walls of temples. Its life has been stated to be ten million years. This explain how ancient structures in India have stood the test of time. These were only some of the many great contributions the Indian civilisation made to the world.

The ancient Indians were well-versed in different areas of science. Their ability to put into practise their extensive knowledge and their ability to unravel many complex theories like combination of atoms, properties of sub-atomic particles and the secrets of the universe, intrigue western scientists even today. This speaks volumes about the depth of understanding they had about nature's bounty. More important than that is to note that whatever knowledge they possessed, they channelized only for constructive purposes aiming at the welfare of humanity.

Reference: A *concise history of science in INDIA*

D M Bose, S N Sen, B V Subbarayappa, Indian National Science Academy
The History of Hindu Chemistry - Acharya P C Ray

“INDIAN” CAMBODIA

By Jayashree M.P, Preeti Das (S6 EEE)

India and Cambodia, two Asian countries: one really huge; another rather small. Their histories are however, linked from a very early time. Here is how their story unfolds:

It is said that Kambuja (Cambodia is the English version of this Sanskrit word), was the most ‘Indianised’ State in South-East Asia. There are plenty of inscriptions dated from 6th Century A.D onwards in Cambodia which confirm this fact.

Cambodia’s tryst with India started with the arrival of a Brahman (named Kaundinya) somewhere around the 1st Century A.D. It is said that this Brahman arrived on the Cambodian coast armed with a javelin presented to him by the son of Drona (Asvatthaman). He defeated the native queen of this kingdom, married her and thus founded the Kingdom of Fu-nan. The original name of the Kingdom was Srisaila and the successors of Kaundinya bore the title of Sailendras.

The religion, culture, literature, art and architectures of Cambodia, from that time onwards, were deeply influenced by those of India.

During the reign of the early successors of Kaundinya, Buddhism and Hinduism flourished together. This is confirmed by the fact that there are records of a certain Buddhist monk sent as his envoy to the Chinese capital by the then Fu-nan monarch Jayavarman. The Buddhist monk told the Chinese Emperor that the God Mahesvara was worshipped in Fu-nan. Having said that, he then proceeded to eulogize the Buddha!

The warlike Kambuja monarchs were fervent worshipper of Siva. Bhavavarman, who conquered Funan in the 6th century believed that “Victory to the ‘moon-crested god’, who on his head receives the Ganges, the waves of which, their impetuosity checked by the frowns of Uma, form a garland of Siva”.

Jayavarman II, who after centuries of dynastic rivalry, united Cambodia again, established a unique cult of Siva. He invited a Brahman from Janapada to teach the royal priest four Tantric texts and drew up a ritual for the worship of Devaraja (a Siva linga). Devaraja then became the tutelary deity of Kambuja from his time onwards. Whenever a religious cult became predominant in India, it made its appearance in Cambodia after a short interval.

Indian and Cambodian lifestyles of that time were very similar in aspects other than religion too. The kings, nobles and priests had Sanskrit names. The Pandits of the royal courts wrote inscriptions in elegant Sanskrit. The Princes were educated by their gurus in Siddhantas, Sanskrit grammar (by Panini), the Dharmashastras and the six systems of philosophy. Literary assemblies (Sastrotsvas) were held; in these assemblies sometimes Brahman ladies also joined in and won admiration for their learned discourses. References to daily recitations of the Ramayana, the Mahabharata and the Puranas can be found in the 6th century inscriptions!

The subject as such would be incomplete without the mention of some of the greatest examples of architectural conquests of India in Cambodia. Temples such as the Angkor Wat, the Bayon, Preah Khan, Ta Prohm portray very effectively the authenticity of the Indian culture in Kambuja (Cambodia). They exemplify the architectural, archeological and artistic values of the Khmer architecture, which was clearly influenced by the Indian sub-continent along with the neighboring countries. All these

temples comprise of many hydrological engineering systems like canals and hydraulic structures like basin, dykes and reservoirs. Therefore they prove to be an area of interest not only for Historians but also for township planners and Engineers of today!

It was under the rule of Suryavarman II that the construction of Angkor Wat started, temple being dedicated to Lord Vishnu. It is considered to be the greatest examples of Khmer architecture. It is surrounded by a moat and an exterior wall measuring 1300mX1500m. The temple itself is 1km Sq and consists of three levels surmounted by a central tower. The walls of the temple are covered inside and out by bas-reliefs and carvings. Nearly 2000 distinctively rendered apsara carvings adorn the inner walls of the temple. They represent some of the finest examples of apsara carvings in Angkor art. But it is the exterior walls, at the lower level that display the most extra-ordinary bas-reliefs, depicting characters from Hindu mythology and the historical wars of Suryavarman II. It is said that if you enter through the outer gate especially after 2.00 pm, at a glance it appears to be two dimensional. It is only when you go further that the temple



reveals its complexity. There are two significant imprints in Angkor Wat which establish the strong-hold of Hindu mythology in Kambuja- the battle of Kuru on the west wall and the ‘classic churning of Ocean milk’ on the east wall. The succession of Buddhism can also be recognized from the central tower on the third level as it sports four Buddha images, each facing a different central point.

Bayon another well-known, richly festooned Khmer temple, was built in the late 12th century or the early 13th century by the Mahayana Buddhist king Jayavarman VII as their official state temple. In Bayon there are many sculptures narrating the Hindu mythological stories. Each inscription exemplifies a story as well as a social circumstance which points towards the then sociopolitical environment. All the enclosures and galleries, have Brahmanic as well as Buddhist inscriptions.

After all these years, with the world changing so drastically, the Bayon, the Angkor Wat and many more temples in Angkor Thom remind our thoughts and emotions to an era of wonders and mysteries, conquests and belligerence and with ample lessons to be learned. Our journey continues and they still remain there as a memoir of many great legends...

Reference: *Kambuja Desha* by R C Majumdar, M.A, Ph.d, F.R.A.S.B *India’s contribution to world thought and culture* published by Vivekandanda Kendra Prakashan

TRADE AND COMMERCE IN ANCIENT INDIA (till 300 CE)

By Balagovind N K Kartha, S6 ME

A few years back, before internet and e-books became popular, many of us had a preconceived notion that India was a totally isolated country due to its geographic location and so never had any relationship with other countries on the globe. It is indeed true that India is guarded by the Himalayas and the seas and so is isolated. But, the studies and evidences revealed that India had a healthy relationship with the rest of the world in spiritual, technological and commercial aspects. The Indians made the best use of its natural resources and surroundings in order to intensify commercial activities with various countries.

Most of the Indian states were self-contained and self-sustained. Agriculture was the main economic activity that took place in the country. Apart from agriculture India was also sufficient with cotton, spices, silk and base metals.

Trade and other economic activities in Indian states initially started to flourish with the neighbouring states. Slowly trade routes started to develop. The trade routes in a country are a strong evidence of the extent of trade. Trade routes are basically logistical networks through which commercial transport of cargo takes place. The trade routes also meant improvising socioeconomic contacts among the various groups and sub groups.

There were several methods by which trade routes were established. For example, in 2500 BCE the people of Mohenjo-Daro and Harappa developed an effective system of water transport. It is said that the development of urban civilization in the Indus valley happened due to such water communications. This conclusion was made through a study which showed that those Harappa sites which were away from the Indus were comparatively

poor and backward while those near the Indus were culturally and economically more sound. Apart from the water route (which was cheaper and easier), research shows that there existed land routes between Mohenjo-Daro and Harappa. Model clay carts that were found in old Harappa sites establish this conclusion. Studies also show that there were coastal routes that were established between trade centres such as Kathiawar and places near the estuaries of Narmada and Tapti.

Apart from the domestic trade, India was a centre of attraction for many outside civilizations such as Rome, China, Persia and Arabia. Foreign trade was mainly possible through sea routes. India was one of the most successful maritime traders of the time.

The major challenge every trade group faced was the difficulty in transporting cargo. Many failed to successfully transport goods as they were looted by thieves and attacked by wild animals on the way. As a precaution, people used to offer oblation to Lord Indra for getting speed, energy and strength.

The trade routes were built by various classes of people and these people were also responsible for the construction of rest houses and 'night houses' which made the travel easy for the traders. Several classes of people like engineers, wood cutters, diggers, soil experts, carpenters, bamboo workers

etc were part of road making. Despite all the measures taken, the travel was sometimes through dense forests, uneven and rough terrain, deserts etc. People were assigned duties in dense forests to guide the traders and to help them get the right direction to make their journey easier. Kings also appointed army to protect the traders from robbers as theft free trade routes were essential for the development of the state. Local people were also involved in the 'safety' groups which collected a small fee for saving their wagons from getting attacked by the thieves and wild animals.

Similarly travel through deserts was also very difficult. The traders carried water, wood and essential commodities to help them cross the desert. Generally in order to be safe from the hot sun, they moved at night. But though the sun is down, they have to face another problem of sand storms which made it very difficult to proceed. For the traders, rest houses were built near the cities or in the borders. In such cases, where rest houses were not available, traders took shelter in local houses for pay or for free-according to the discretion of the master of the house.

Research shows that there was a toll system enforced on the traders for transporting the goods and for availing the facilities on the way. Charitable organizations also provided them with free food and shelter. Evidence

suggests that during Asoka's reign, wells were built in order to meet the water requirements of the traders along their trade routes.

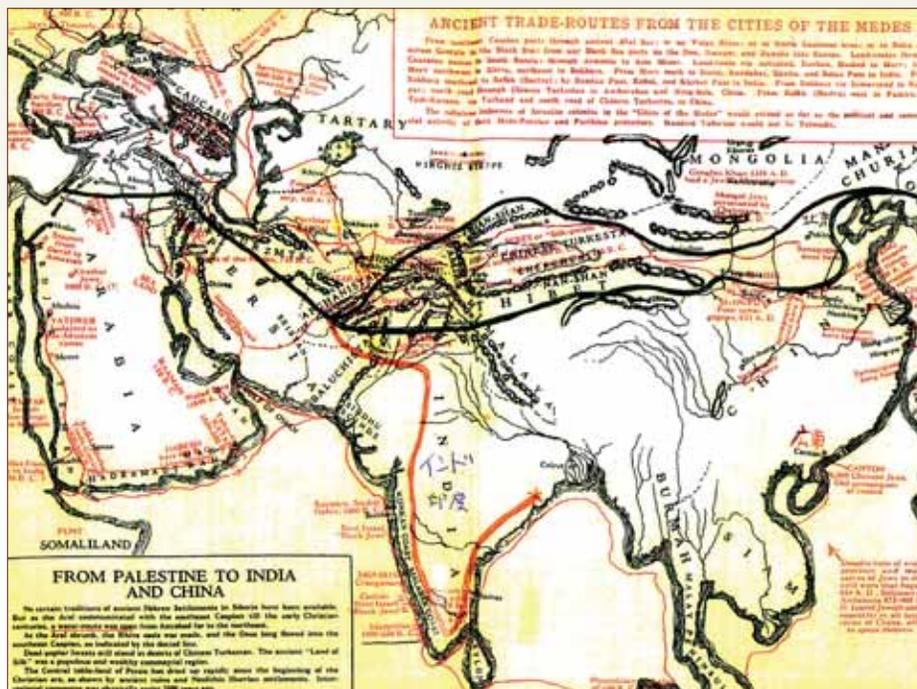
Sea traders also found their voyage difficult as in some cases long distance travel resulted in ship wrecks. Most of the traders did not possess a compass and they made use of the position of stars to find their directions. Ocean guides

were sometimes appointed to help the traders.

Medium of exchange

The medium of exchange initially started with the barter system where goods of equal value were exchanged. But soon it was found that such a system was not effective as there was no standard price for a product. The cost or the value of the product was dependent solely on the discretion of the seller. So in order to tackle this, coin system was brought into the scene.

Though evidence of coins such as 'satamans', 'pada' and 'niska' are found in the samhitas, these were of not much significance from the commercial point of view. These were actually gifts from the kings for excellence in various fields. Hence this definitely had a socio-economic point of view as it proved to be of intrinsic value. Later as time progressed, these coins started to be used as a medium of exchange. As coins started to be used as a medium of exchange, silver and copper along with gold found their place. People were appointed to mint standard coins and later in order to meet daily requirement of exchange, the king appointed private groups to take up the task. The king only monitored the minting of coins and ensured that coins were not made in very large numbers.



continued on page 10

Kathak...Exciting And Unique...

By Aswathy M S, S6 ME

Kathak has always been a mesmerizing feast for the dance lovers and enthusiasts, subtly throwing light on the etiquette and mores of contemporary Indian society. Tracing its roots to the story-tellers of Northern India called 'Kathakars' who conveyed the essence of the epics through poems and stories to the common man, Kathak's origin dates back to the Vedic times. The 'Kathakars' or story tellers interacted with the common man and evoked their interest by their embellished stories in which they used facial expressions and musical instruments.

Initially, Kathak was performed only in temples. It was more of an offering to God than an artform. Gradually, time took its toll. The Muslim kings invaded our country and this had a major influence in the 'style' of propagation of Kathak from then onwards. They brought their Persian style of dance and music with them and tried to have a 'mix' of the Indian and Persian styles. Kathak became an item of performance before the kings in their court 'darbars'. The common topics of dance were based on 'Radha and Krishna' and stories of Mahabharata. But, when the artists performed for the kings, the theme revolved around praising the kings and who enjoyed and encouraged this. The Sufi and Muslim cultures thus incorporated major changes in Kathak, one of which is the spin, which is a major characteristic of the Sufi dance. Kings who played a major role in the propagation of Kathak were Nawab of Oudh and Wajid Ali Shah. But the advent of the British rule decreased the popularity of Kathak to a great extent.

Kathak is one of the eight forms of Indian classical dances. It has basically two parts - the Nritya and the Nritya. A Kathak recital usually begins with an invocation to the elephant-headed God, Ganesha, symbolizing prosperity and good luck. After this, comes the offering to the stage, which is the 'rang manji ki puja' or the Muslim salutation called the 'salaami'. Either opening is permissible. Followed by the opening item is the 'amad' which means 'entry' or 'coming'. Always danced to a very slow tempo, it helps to establish the atmosphere. The amad blends itself into the decorative and graceful 'that'. The 'that' heralds the 'gaths' wherein the tempo of the music is increased. Followed by 'paramelu' and 'tatkar', the dance takes up higher tempos and comes to the climax. The musical instruments used are tabla, sitar etc.

The choices of costumes are yet another important characteristic of the dance. The costumes are a mixture of both Hindu and Muslim inspired styles. The oldest and the most generally used amongst the Hindu costumes is the 'ghaagra and orhni'. The bracelets, armlets and gold necklaces with the jeweled 'tika' makes the dancer look elegant. Sari is also a widely used costume these days. For men, a silk dhoti draped around the waist is the common costume used.

The Muslim-inspired costume has perhaps gained more popularity that people often associate Kathak with this costume. With this, they wear delicate and light jewellery which adds to the grace and beauty of the dancer.

Though Kathak had lost its popularity during the British rule, gradually, it is being revived and is being given due importance. Today, Kathak is one of the most entertaining dance forms of India. It is a culmination of the Hindu-Islamic-Persian styles and has flourished in its own way, setting a new trend. There are these major 'Gharanas' which implement different styles for the dance. They are as follows:

1. Lucknow Gharana with its origin in the court of Nawab Wajid Ali Shah
2. Jaipur Gharana with its origin in the courts of Jaipur in Rajasthan
3. Benares Gharana
4. Raigarh Gharana in the princely state of Raigarh in Chhattisgarh

Some of the eminent Kathak dancers and teachers in the present era are Pandit Birju Maharaj, Sithara Devi, Prathishta Sharma etc. These maestros continue to carry on the legacy of this art form and the grace and elegance of this unique dance for the future generations to enjoy.

Reference : *INDIA'S DANCES*, their History, Techniques & Repertoire by Reginald Massey

continuation of page (Chemistry in Ancient India)

AMALAKA RASAYANA

Properly ripe "Palaasa" tree is cut off leaving the bottom stay. The inner part of this is scraped off to about two feet length and is filled with ripe Amalaki (Indian Gooseberry). This is covered with a lid made of Palaasa itself. Then it is fully enveloped with Darbha grass from top to bottom. It is then smeared with mud of lotus pond. Cow dung cakes are put over it and are burnt. When the Amalaki is properly cooked it is taken out. From that, quantity equivalent to that of one time meal is taken; the seeds are removed, mixed with Ghee and honey in different proportions and administered. Milk should be taken as after drink.

A PRACTICAL STORY FROM KERALA

Amalaka Rasayana was administered to Poomulli Vasudevan Namboothirippad under the supervision of his brother Poomully Neelakandan Namboothirippadu (Aram Thamburan) and great Vaidyamadhom Valiya Acchan Namboodiri. One of Thamburan's disciples has narrated the story of Kutipravesika done to Poomulli Vasudevan Namboothirippad as follows, "For the Rasayana treatment given to Poomulli Vasudevan Namboodiripad shelter based on Vastu was not constructed. It was done in a similar kind of room at the entrance of their traditional bungalow. Namboodiripad who suffered from Prameha (diabetes) was administered with Amalaka Rasayana. After the Purification after he became strong enough he was taken to the shelter. I remember being told that Rasayana was given in the quantity of food twice a day. As after drink plenty of milk was also used. Milk is very important during administration of Rasayana. It enhances the effect of Rasayana. It is instructed in Amalaka Rasayana to take plenty of milk. The patient was not given any food. The reason must be that there is no mention about food in Amalaki Rasayana. Though the formulation is slightly different, Charaka instructs to avoid food in Amalaki Rasayana. This must be the reason for not giving food to him. Similarly Nagabala Rasayana is also advised to be taken avoiding food for one year. Only milk is recommended in Nagabala Rasayana. It is a law that while taking Amalaka Rasayana cold water should not be touched even with hands. Therefore, only warm water was used for all purposes. There was no bathing. Instead sponge bath was allowed. Five days after commencement of Rasayana the patient started vomiting excessively. There were blood stains. In faeces too, blood was found. Normally, everyone will vomit. It happens due to the non availability of accustomed Rasas (tastes) and serving the unaccustomed. Though the treatment became a controversy, treatment was continued. After four days the vomiting subsided and normal state was reached. Stool examination was done regularly every day. Early morning sample of stool should be examined. Correct details can be traced out only if the stool is kept in water. Otherwise due to reaction with air outside it becomes black and rough. It is then difficult to trace out. Initially, the samples were normal. Stool started loosening after fifth day. By the eleventh day, it was white in colour and was very much lubricated. It was continued for one month. The rest period was started next month. Rasayana was stopped and other regimens were continued. During resting period boiled Shashtika/Navara rice (special variety rice) was taken with milk. In the last fifteen days occasionally exposed to external atmosphere. Occasionally gazing through the window and at the mirror the regimens were attuned to that of Vata and Atapa (air and light). The suitable diet for that self was also gradually introduced. On the tenth day after treatment, an "Avadhuta" happened to come to the house. Standing at the entrance he stared at Namboodiripad, who was standing in the verandah at the entrance of the bungalow, without winking the lids. When asked the reason for staring he replied that he had never seen such a beautiful structure and the luster of the face till then that shines like sun. He who suffered from diabetes got relief from the disease and lived for a long time. At the time of death his age was more than seventy. Still he was not much affected by graying of hair or wrinkles.

REVITALIZATION

Kutipravesika is a treatment nobody has dared to do. If the teeth nail etc fall off as told in Amalaka Rasayana and do not come back what would be the plight. The physician should also foresee the dangers and the anti measures for that. He should also make the patient aware of the procedure and complications. Mistakes are likely to occur while deciding the Rasayana according to the individual and according to the patient. For that scientific knowledge is highly essential.

Kutipravesika is a treatment procedure that was erased from the practical field because of these factors. But here and there some efforts are made by many individuals. Hope such efforts may revitalize this science and bring to main stream.

to be continued

A TRIP TO THIRUVANNAMALAI

By Rahul B.Raj, Manjula S & Sunitha Suresh

Ist year Int.M.Sc.

It was a fascinating and thoroughly enjoyable three days tour. Surely everyone who was a part of the tour had the most memorable days of our life.

The journey started on the 13th of December. We planned it as a 2-day trip. We were a group of 32 students of Integrated MSc and 5 faculty members. An overnight stay at the Ettimadai campus of Amrita University was followed by our visit to the Indian Institute of Astrophysics on December 14. The Vainu Bappu observatory is an astronomical observatory owned by the Indian Institute of Astrophysics. This observatory boasts of having the largest telescope (of diameter 2.3 meters) in Asia. The significance of

with enough light to carry our body. The 16km long walk, in fact, never felt like one, given the serene atmosphere and the greenery that became visible with the break of dawn. Every now and then we came to see temples that adorned either side of the road. The view of the Arunachala hill enshrouded with puffy clouds at its top, on our right throughout our walk was an added charm. Signboards on the footpath indicating the distance to be covered never let our spirits go down. On our way we prayed at a Shiva's temple and had a five minute rest at the place. Finally we reached the Thiruvannamalai temple at half past six. A sense of deja vu filled us for we had mentally made a sketch of the temple.



The temple has four gopurams, one each in the four directions, within which there are three more, and these three enclose each other. The architecture of the temple is worth mentioning, for the sheer magnificence in symmetry in all the gopurams provides a glimpse to the vast expertise and knowledge of our ancestors. One cannot help but admire such a majestic artwork. Monkeys too made their presence felt showing off their prowess in climbing over such huge gopurams. The pond within the premises too attracted many. We had our darshan of Lord Arunachala and some of us offered garlands of jasmine flowers as our token of worship. Having a glance at all the deities and a short rest within the temple premises clearly made our minds calm and peaceful. To take some memory back home we bought ourselves some packets of ladoos, the Thiruvannamalai Pancharnamam as prasadam. It took us

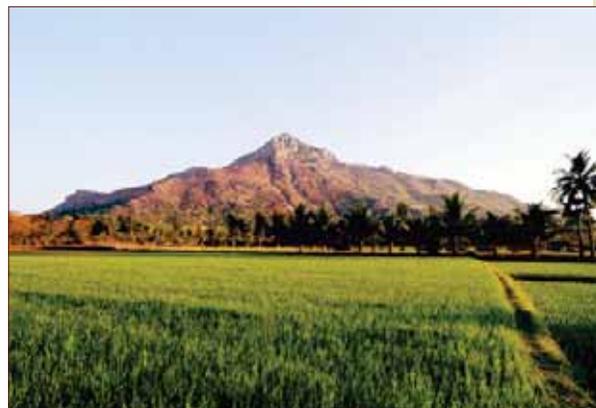
this observatory is enhanced by several discoveries about our solar system. We learnt about the basic principles and ideas behind the working of this telescope. We observed the sky the whole night and could spot Jupiter and some of its moons, some binary stars, etc. After getting a precise idea of the functioning of the various telescopes we left for Thiruvannamalai the same night. All of us were extremely excited, for except some of our teachers; it was our first visit to the temple.

Tiruvannamalai is a renowned temple town in Tamil Nadu which is synonymous with 'Deepam' (fire). This is because Shiva (Arunachaleswar) is worshipped in the form of fire. This temple city is located about 180 kilometres from Chennai. It is believed that this temple on the foot hill of Annamalai hill was built around 750 A.D. as per the details available from archaeological sculptures. It is the biggest temple in India dedicated to Lord Shiva. Tiruvannamalai can justifiably be called as 'Siddhasthalam' - Land of Siddhas and Saints. Ramana Maharshi, Seshadri Swamigal and many other great souls are from this holy land. It is said in the scriptures that mere contemplation on the Lord of Arunachala is enough to confer salvation on a person. Furthermore, another unique feature of this place is 'Girivalam' - circumventing the entire Arunachala hill at the foot of which is the temple. All these valuable information were provided by our guide at the Ramanashram, Brahmachari T Chandrashekar, and our beloved teacher Narayankutty Sir. After realising the cultural significance of the place of our visit, our excitement knew no bounds.

We reached the place at 3, early in the morning. Within an hour we were all ready and raring to go for the 'Girivalam', after getting refreshed at the accommodation near the Ramanashram. Having offered our prayers, we left for the 'Girivalam' on foot. The early morning chill did neither deter our enthusiasm nor reduce our speed. The street light and occasional movement of vehicles made the walking smooth by providing our eyes

more than an hour to look into every nook and cranny of the place, to make sure that we made full use of the visit. Later, we had our breakfast and then made a visit to the famous Ramanashram- the resting place of Saint Ramana Maharshi. It is said that the ashram gradually grew in its present location after Ramana Maharshi settled near the Samadhi shrine of his mother here. We paid our homage to the saint.

The same afternoon we started our return journey. With an eventful outing at Thiruvannamalai we had lots of pleasant memories to be carried back home. On behalf of all the students let me thank our teachers who took all the pains to make this tour possible and also for accompanying us. I also like to thank Br T Chandrashekar for his valuable guidance throughout our stay at Thiruvannamalai.



NADIA:A Lesser Known University Of Ancient India

By Aashritha.L.S & Aparna.Sreedhar
S2 ECE

Our Bharath is indeed "Mahan" in many ways. By the 11th Century, our ancestors had developed a system of education that was unparalleled in the world. They had understood the value of education and had established universities with all amenities. Besides famous universities like Nalanda and Takshila, there were other Universities such as Nadia, Vikramasila, Jagaddala and Odantapuri that imparted both religious and secular education. One of these universities, the Nadia University, fortunately survived the onslaught of the Muslim invaders and rose to be a great center of Hindu learning.

Patronized by the Pala kings, the Nadia University, also known as Navadvipa, arose as a seat of learning in Eastern Bengal about a thousand years ago. A relic of its old history has been traced in some old ruins and fragments of stone pillars found in a village called Suvarna-vihara, close to the modern town of Krishnagar. In this University, there were several renowned scholars in different subjects who built up the reputation of Nadia as an important seat of learning. There was the poet 'Jayadeva' – the author of the famous 'Gita-Govinda' and poet Umapati who made language sprout into luxuriant foliage. Even Law, a complex subject, was expounded by Sulapani in his work 'Smritiviveka'.

At Nadia, students were not allowed to take away any of its books or even notes of the lessons or lectures delivered there. Graduates were allowed only to leave with their diplomas. Several Chairs were instituted in the Nadia University, namely, the Chair of Logic, the Chair of Astronomy, the Chair of Smriti etc. There was also a school of tantric studies. The Nadia school of Nyaya is connected with the great scholar Vasudeva Sarva Bhauma. As the teachers did not permit the copying of the texts, Vasudeva memorized the whole of 'Tattva-Chintamani' and 'Kusumanjali'. The Nadia University outrivaled Mithila School which was also a center of Brahminical teaching, whose challenge was answered by Raghunatha Siromani who first began by instituting a Chair of Logic in Nadia and broke the monopoly of Mithila, which was the only authority in the teaching of that subject.

The Nadia University's method of making an appointment to a Chair or Professorship was quite unique! The teachers had to possess a doctorate! Yes! Apart from the original work to his credit, the teacher had to possess a special ability to communicate! Only a candidate, who could hold his ground against his opponents in an open debate at an Assembly of Scholars, acting as judges, was considered competent for holding a Chair at this University!

The University possessed three Chief Centers of learning at Navadvipa, Shantipura and Gopalpara patronized by the Maharaja of Nadia. At one time, there were close to 4000 students and 600 teachers. Generally, the Schools at Nadia were for advanced Post Graduate studies and some students even spent 20 years of learning at these schools! The students generally memorized the texts they studied. The schools were conducted like seminars - two teachers would start a debate on a topic which the students had to follow and they could supplement the discussion with their own questions. The advancement of knowledge was by means of such learned open debates and this had been India's indigenous traditional educational method long ago. Thus, the scholars trained in this University also distinguished themselves by their work in foreign countries like Tibet and China.

Spread of Indian Learning to Foreign Countries

The Alumni of these Universities worked in many foreign countries, particularly Tibet, China, and the islands of the Indian Archipelago. The work of these self-sacrificing scholars in spreading Indian Learning and Culture to foreign countries is one of the greatest achievements of our ancient scholars and the best testimony of this is the value and vitality of Indian thought fostered in these Indian Schools and Universities. The Buddhist civilization of China was the work of a succession of Indian Scholars that continued for several years. Dharmapala – a prominent Indian scholar who worked in China took with him a Sanskrit text from

Kapilavastu in A.D 207 and translated it into Chinese. Among these Indian monks working in China were some who were Tibetans but had settled in India, whence they came to China. Dharma Raksha was another scholar in A.D 381 who mastered Chinese in a short time, and 36 other languages. He had translated 111 works into Chinese.

The Nadia University survived for several hundred years imparting quality education, adding to the reputation of the education system of India.

Reference: *Ancient Indian Education* by Dr. Radhakumud Mookarji

continuation of page 7 (Trade and Commerce in Ancient India)



Under the rule of the Nandas, the standard weight of a coin, was determined and later the Mauryan government took control over coin-making. 'Laksanadhyaksa' was the officer in charge of coin minting and Rupadarsaka were officers appointed to detect counterfeit coins. Below mentioned is an example of the denominations and the standard value assigned to coins during the Maurya reign.

5 krsnalas = 1 musa or 1 suvarna musa
16 masas = 1 suvarna = 1 pudaniska
2 padaniskas or 2 suvarnas = 1 ardhaniska
4 suvarnas or 4 kursapanas or 2 ardhaniskas = 1 niska

Historical records such as The Arthashastra and The Vedic Samhitas there are mentions about the various types of coins that were used in different parts of the country. It also mentions the process of manufacturing these coins and the denominations. Archaeological evidences and old coins are still preserved by the Dept of Archaeology in India.

This system went on until the downfall of the Mauryan Empire. After that trade became less organised as the local kings under the Mauryan government took charge of the system. The rarity of Mauryan coins itself is a proof of the instability of the Mauryan Empire. However even in the post Mauryan period, monometallic coins were introduced and the weight system and values were similar to that of the Mauryan coins. Soon after the downfall of the Mauryan dynasty, the foreign kings started to mint coins of their style. The existing engravings of goddesses and Indian numerals were all removed and replaced with foreign engravings. Even the shape was changed at different places. They brought in their own weights and values. However the material i.e. copper, silver and gold were all taken from the Indian states only.

The existence of Roman and other foreign coins in India suggests that there existed trade between India and these countries. It is found that Romans had land trade with India. Sea routes also had a major part in foreign trade in India.

In places near Tamil Nadu, coins were made of base metal. It is said that Romans exchanged gold coins with the coins of Andhra which were not of precious metals. This also implies that the base metals had more purchasing power in Indian markets than Roman gold or silver coins of the same weights.

As the Indian currency which the Romans obtained through exchange had a limited use confined to the Indian markets only, they consumed all of it for purchasing goods in India. This is why Indian coins were not found in foreign countries. For Indians the value of foreign money that they obtained from Romans was in bullion and so they melted and made ornaments out of it or were hoarded as gold and silver bullion.

(To be continued)

Reference: *Trade and Commerce in Ancient India* by Balram Srivastava

THE ECOLOGICAL CONSCIOUSNESS IN TAMIL NADU

By Anand M
S4 ME

We Indians worshipped nature in all its manifestations. We lived in perfect harmony with nature as we considered ourselves to be a part of it. No other culture perhaps gave this much respect and emphasis on environmental ethics and ecological balance. We have always believed that divinity prevails in nature. This concept is beautifully visualised in 'tat-twam-asi'. Today the situation demands a return to our ancestors' attitude towards nature, if not for the same reasons, at least in the interest of our own survival.

Ecology is interwoven with the philosophy, culture, poetry, literature and traditions of Tamil Nadu since time unknown. The ecological tradition of Tamil Nadu foresees the prospective calamities and suggests remedies to them. Tamilians believe that the transgression of any of the existing taboo is inviting cataclysm. There is a popular maxim in Tamil Nadu: "No village should be without a temple and no temple without a tank".

Kovil-Kaadu

Kovil - Kaadu are small thickets of forest or green vegetation that lie around shrine of Amman (Devi), her male escorts and consorts. They may also be home to other local deities of obscure origin. It may be considered a mini biosphere reserve which holds local flora and fauna and veritable gene pool of animal-plant species. Vedic and Epic literature are replete with references to these woods where holy saints built their ashrams. They are a substantive part of local folklore and religion.

Sthala Vriksha

This is a single tree which is associated with the local temple and which represents a species which has or once had medical, environmental, economic or social status locally. It is entwined with the local temple or deity. The veneration of one tree is intended to ensure its conservation. Sthala Vrikshas are symbolic of single genetic resource and represent geo-climatic habitats. Almost 60 'Sthala Vrikshas' belonging to 39 families have been identified.

Thinai: describe the life of the people who tried to adapt and harmonise with different lands. As per the Tamil Sangam literature, there is a 5 fold classification of Tamil land. Each 'thinai' is named after the significant flower that is unique to that area. They are as given below:

- (a) Kurinji - represents hilly regions. The 'vedar' and 'kuravar' community lead life by hunting and indulging in seasonal cultivation practices. The presiding deity here is 'Velan' or 'Murugan'. The popular amusement was the rapturous dance 'veriyadal'. Unique flowers were 'kurinji', 'vengai' and 'kadambu'.
- (b) 'Mullai' - refers to forest-pasture inhabited by the cowherds namely 'Idaiyar'. The unique flower of the region is 'mullai' and the popular sports being 'kuravai dance' and bull-fighting. The presiding deity is Lord Krishna.
- (c) 'Marudhams' - are cultivated fields in the plains of rivers. The agriculturists called 'uzhavar' lived there by indulging in agricultural activities. The prominent flower was 'marudham'. The presiding deity was Lord Indra.
- (d) Neidhal - refers to the seacoast inhabited by 'meenavar', the fishing community. The staple food includes fish and marine products. The presiding deity was Lord 'Varuna'.
- (e) 'Palai' - refers to wasteland and sandy deserts. People there indulged in robbery. The robber community was called 'kalvar'. The unique flower was 'palai' flower. The vegetation was wild and the presiding deity was 'silapadikaram'.

Terracotta Tradition

Terracotta tradition is the custom of votive offerings made of clay. The making of this offering is a momentous occasion. They depict deity, its escorts, consorts and sacred animals. This practice has a vital lesson to digest. The clay represents a being. It slowly disintegrates and goes back to mother Earth. Now a new deity has to be created out of mother Earth. It depicts the cycle of life and death. In Tamil Nadu it is believed that if a vow of gifting a terracotta horse is made to the mother goddess and goes unkept, then she will come to the person in dream, sit on his chest and ask why the promise went unkept. If the reason is unacceptable, she

tears open his/her chest. The Terracotta tradition symbolises fertility. This tradition is interlaced with the 'Aswamedha yaga'.

Yeri and Sacred Tanks

Temple tanks were a brilliant innovation to harvest and store water voluntarily as religious duty, whereby people earned merit even as they contributed to society's welfare. But 'Yeri' system revolutionised water conservation tactics and customs. 'Yeri' refers to an artificial water reservoir with 3 sides built out of earthen bunds or embankments. Usually the middle portion of such a structure is the deepest. Each 'yeri' is designed to irrigate a certain extent of agricultural land namely 'Ayacut' through water channels called 'sluices'. 'Yeri' functions as flood control device, ecosystem, and water source. It prevents soil erosion and recharges the ground water. According to a British historian's record: "The extent to which the irrigation works has been carried throughout all the irrigated region of the Madras Presidency, is truly extraordinary".

Sacred Mountains: There are many sacred mountains in Tamil Nadu. Often, songs called 'Kurunjipattu' are composed and sung to laud these mountains. They give pen-pictures of mountains besides giving the formidable list of the variety of flora and fauna housed by that mountain. Some of the premier mountains are:

- (a) Thiruvannamalai: is a very sacred hillock that is believed to be the home of 'Annamalayaar' or Lord Siva. He is venerated in the form of 'Siva Lingam'. His consort is 'Unnamalaiyaal' (Parvati). This hillock is considered as one of the "panchabhootasthalams". It denotes fire. The myth behind this is that in the "Krita Yuga, Lord Shiva took the semblance of this mountain and stood as fire. People often circumambulate the mountain to pay respect to it and in worship of Lord Shiva.
- (b) Palani: a sacred hillock which is situated in "Dindigul" district of Tamil Nadu. It is the abode of "Dhandayathupani swami". The hill is one amongst the 'Arupaiveedu' (six sacred places) of the deity in 6 different forms to bless his devotees. It houses rare herbs "moolikai" or ingredients which are of high medicinal value and go into the preparation of several ayurvedic and homeopathic medicinal preparations even today.

Nandavanams:

'Nandavanams' were sacred gardens which are popularly defined as "the planned ecology of living beings that soothes the eyes". Medicinal herbs and plants were also grown, protected and properly nurtured in these gardens. The flowers from the 'nandavanams' were used to make 'Tirupallithamams', the garland offerings to temple deities. Kings encouraged this practice of maintaining sacred temple gardens by announcing rewards to promote such activities.

Sacred Animals: Tamil Nadu lauds many animals. The prominent ones amongst them are,

- (a) Peacock: It has the status as is as the 'Vahana' or vehicle of Kartikeya, son of Lord Siva. When gods had to choose the semblance of birds, Lord Indra chose peacock. This is signified by peacock dance during rain. According to legend, the killing of snake by peacock signifies the restoration of peace by destruction of the evil.
- (b) Crow: personifies the soul of dead ancestors and as the 'vahana' or the vehicle of God Sani-Eashwara.
- (c) Cow: She is 'Kamadhenu' or otherwise referred to as 'Gomatha'. The sanctity of cow is based on two reasons: the first being economic, "A person's wealth is counted in his cows"; the latter being that cow is considered as a substitute mother of all the living beings. Lord Krishna himself was a cowherd and appears in several pictures worshipped by devotees with cow and calf.

The customs and traditions of Tamil Nadu are an eye opener in the current global scenario where we face threats to our own existence. A retreat to our own past can undo all these unkept situations. We have to introspect, rectify and move forward.

References:

The Ecological traditions of Tamil Nadu - Nanditha Krishna

THE ULTIMATE LESSON OF EXISTENCE

By Gayathri A
S4 ECE

Srimad Bhagavadam is known as the “ripe fruit of the tree of Vedic literature”, so are the contents of it rich, complete from nature of the Self to the origin of universe. It explains all concepts and philosophies of life and incarnations of God and their life history beautifully with stories and incidents from daily life in a simple form of dialogues. Consisting of 18,000 verses this Purana was written by Sri Veda Vyasa.

Lord Krishna once explained to Uddhava how sacred and great human life is, as compared to all other life forms, as it is the fittest to realize Brahman, the Self or the Ultimate. The story of Dattathreya is one of the most interesting pieces from Bhagavadam that Lord Krishna uses to bring out this Truth. This excerpt contains a conversation between King Yadu and the Avadhootha (one who has shaken off of all worldly desires); Dattathreya himself. Dattathreya was a wandering hermit who possessed great wisdom. King Yadu, the first king of the Yadhava dynasty, meets this young and vibrant Brahmin and requests him to share the knowledge behind his state of bliss despite living amidst the people who are running behind their desires and passions out of greed. Dattathreya tells him that he met twenty four teachers during his wanderings, whom he apparently might not have seen otherwise, whom he considers as his gurus. It is through them, that he learned how to lead his life in this world. These twenty four gurus include the elements like the earth, sky, water, fire, air, and then the sea, the sun, the moon, the dove, the python, the moth, the honey-bee, the honey gatherer, the elephant, the deer, the fish, Pingala(a prostitute who lived in Mithila),the kite, the infant, the maiden, the arrow-hunter, the serpent, the spider and the wasp. The motive behind accepting the twenty four of them as his gurus is a deep philosophy derived from each of their actions.

The moon, remains unaffected despite the changes of its position making it appear to be waxing and waning, that represents similar changes of the body which do not affect the Soul or the Atman. As the sun absorbs water from the sea during summer and releases it out as rain during monsoon, a yogi should stay intact without any attachments to materials while using them and parting with them at the same time. The sun is reflected from any container of water when it is ever free in the sky, like the Atman or the Self. The Atman manifests as everything yet remains unmodified and free. A lesson on attachments is given by a male dove who falls into the same trap of a hunter who has caught its mate and children. A python lives on whatever is available around because it has a very heavy body which almost remains motionless, or starves if it does not get anything believing that as his will. So like the python one must be able to control one's senses. A sage should stay calm and peaceful whatever comes by in his life like a sea which does not overflow though several rivers flow into it. A moth gets attracted by the flame and fall into it and dies. In the same way a man having no control over his senses perishes influenced by Maya or the “illusion of life”.

A hermit should never cause nuisance to a householder while receiving food like how honey bees collect nectar from flowers without harming it. Misers accumulate wealth; they neither enjoy nor use it to serve others.

They would be looted by thieves who'll enjoy it. This can be compared to honeybees that collect the honey and dies in the hands of a honey gatherer to take honey. An ascetic should not get attracted to words of praise and fall for it like how a deer, fond of music is trapped by a hunter by playing music. One should never go for tastes. A fish gets trapped as they run for worms which are hooked. This way it perishes as they are slave to their sense of taste. Accumulating wealth is source for trouble. A kite having a piece of flesh is tortured by the rest of the kites until it drops the flesh after which it becomes free from this chase and harassment.

Dattathreya explained to King Yadu that he cares nothing for honor and dishonor and so he is clear of all worries and problems like a child who is free from all botherations and enjoys the great peace. A child is said to be beyond all the three gunas - Sattva Guna, Rajo Guna and Tamo Guna. A

maiden from a poor family taught him that living a secluded life is best way to live in peace. The family was searching for a groom for the maiden. It was during this time that some people came to see the girl. Her parents were away at that time so she had to pound the paddy herself in order to serve her guests with something. To keep her engagement unaware to the guests and others, she removed her bangles one by one to reduce the noise while pounding the paddy. She had to remove all until only one bangle was left. Living in Ekaantha lets one live away from quarrel and disputes.

A hunter aiming at a bird was approached by a king to know whether any animal had run away that way. But he didn't hear anything the king said as his mind was focused on his target. Same way one should concentrate on one's Self with dispassion as an aid. The Supreme is Aniketa, the one having no permanent rest place like snakes which live inside holes made by others. Aniketa also implies to the fact that no place is permanent for the soul. A sage should be able to live the same way.

A spider makes its web out of its saliva, lives on it and swallows it by itself. This is a metaphor to the ultimate fact that the whole universe is created out of the Supreme, by Himself, with Himself. An ascetic can become one with the Brahman by constant remembrance of this truth. It is like how a worm in a hole covered with mud constantly harassed by a wasp turns into a wasp.

After sharing this wisdom which he had learnt from these ‘Gurus’, Dattathreya describes to Yadu how divine human birth is and the importance to look up at all creations of God with humility and devotion. Dattathreya tells him that it is not easy to get a human birth and that one must strive to attain liberation in this birth. It is said that after this meeting King Yadu renounced all his possessions and chose to live a peaceful life.

This worldview of Dattathreya underlines the point that the material world is a sacred text whose essence is the Ultimate Truth. His 24 ‘gurus’ in the material world act as guides from the Supreme. The teachings of the 24 ‘gurus’ lend us a method for making sense of the ‘mystery’ of the world. Dattathreya's teachings encourage people to reinvent themselves as spiritual beings living on this sacred Earth.



The Editorial Board

Chief Advisor: Lt. Col. K. Krishnan Nair(Retd) (CIR)

Editorial Advisors: Dr. P.V Ramanathan(Dept. English),Br. Rupesh (ME), Br. Sivanandan (Dept of Physics), Mr. Arun S(Dept. of English), Gayathri N(ECE)

Managing Editor: Br Prasanth(Cultural education)

Chief Editor: Sandra K (S8 ECE)

Editor: Balagovind N K Kartha(S6 ME)

Associate Editors: Meera Viswanath(S8 ECE), Nihil Saboo (S4 ECE), Nithin Ajithkumar(S4 ECE)

Sub Editors: Minu Shyam Mohanan(S4 B.Sc. Microbiology), Aiswarya K.S. (2011 Batch, Ayurveda), Neelanjana Mukerji(S6 B.Com)

Designer: N S Ranjith(Graphics)