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From the Editor's Desk

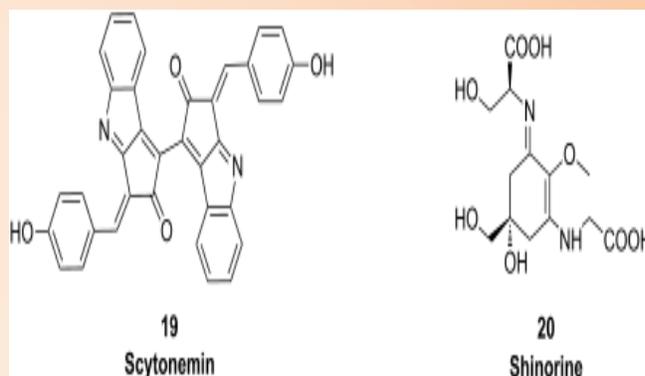
I am very happy for your constant support and encouragement for news letter. Our second issue is a call to take a breath and remember what it is that we're doing, and why. You won't find any New Year's resolutions, but you will encounter many different angles on the idea of first principles: the ideas and positions on which everything else is built. We don't often have time to consider all the underlying *stuff* that gives our work shape, character, and meaning, and that time won't ever appear on its own. But we can choose it. Even in the crazy spells and may be especially then, when we're making so many important decisions. For this, our second issue, we'd especially like to invite you to consider and document your own first principles: as blog posts, comments on our articles, tweets, or something else entirely.

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Cyanobacteria: The future of sunscreen

The cosmetic and skin care products industry is a enormous and promptly expanding business in all over the world. In the USA, where there are more than 2000 companies related to manufacturing and distributing cosmetics, these products are integral to daily grooming. A study in the UK revealed that over the course of a year, 23% of women and 13.8% of men experience some kind of adverse reactions to personal care products. Cosmetics may have side effects such as contact sensitivity, oestrogenicity and even tumorigenic effects on human skin. In addition, widespread use of cosmetics has led to a ubiquitous presence of some ingredients in the aquatic environment which can cause hormonal effects on aquatic organisms and insects.



The use of biological compounds has many potential advantages for the cosmetics industry, one of which is the organism's ability to self-renew and reproduce, ensuring that supplies are sustainable. This is especially true for photosynthetic organisms that require only light energy, carbon dioxide and basic nutrients. One group of such organisms, cyanobacteria, could have great potential as a source of cosmetic products for sunscreens and moisturizers because some of its species live in extremely arid habitats and thus produce compounds that give them the ability to cope with both high UV radiation and extreme desiccation.

These compounds include mycosporine-like amino acids (MAAs) and scytonemin, which provide strong screening protection from longwave and shortwave UV radiation respectively. Such natural photoprotectants could be good candidates as alternatives to synthetic UV filters. In addition, extracellular polymeric substances (EPS) derived from cyanobacteria appear to be much more effective at retaining moisture than EPS from conventional moisture preserving materials, such as urea, glycerin and propylene glycol, currently used in cosmetics. Cyanobacteria have higher photosynthetic and growth rates than more complex plants, simple nutritional requirements, and the ability to grow under closed cultivation systems that do not compete with agriculture. However, economic and sustainable production of these bio-compounds at the large scales required by the cosmetic industry is a key challenge.

Reference: Peyman Derikvand, Carole A. Llewellyn, Saul Purton. Cyanobacterial metabolites as a source of sunscreens and moisturizers: a comparison with current synthetic compounds. *European Journal of Phycology*, 2016; 1 DOI: [10.1080/09670262.2016.1214882](https://doi.org/10.1080/09670262.2016.1214882)

A. Ajilda, Ph. D Research Scholar

Was a researcher just served a world first CRISPR meal?

For (probably) the first time ever, plants modified with the "genetic scissors" CRISPR-Cas9 has been cultivated, harvested and cooked. D professor in Plant Cell and Molecular Biology served pasta with "CRISPRy" vegetable fry to a radio reporter. Although the meal only fed two people, it was still the first step towards a future where science can better provide farmers and consumers across the world with healthy, beautiful and hardy plants.

N. Rashiya,
Ph. D., Research Scholar



World's first CRISPR meal?

CRISPR (Clustered regularly interspaced short palindromic repeats)-Cas9 is a complicated name for an easy, but targeted, way of changing the genes of an organism. The decisive discovery was published in 2012 by researchers at Umeå University, and the "Swiss army knife of genetic engineering" has been predicted to change the world. With CRISPR-Cas9, researchers can either replace one of the billions of "letters" present in an organism's genome (i.e. the entire gene pool consisting of DNA) or remove short segments, similar to when you edit a written text in a word processor. The technology is called "gene editing" or "genome editing."

The first clinical applications are underway; maybe we can soon cure hereditary disease using this technology. However, the situation differs somewhat in the agricultural field. There, the issue is not IF researchers can create plants leading to a more sustainable land management, but rather if these will be allowed in farming. Swedish Board of Agriculture interpreted the law as if only a segment of DNA has been removed and no "foreign DNA" has been inserted, it is not to be regarded as a genetically modified organism - a GMO. That also means that the plant can be cultivated without prior permission. In spring 2016, American authorities stated that they agreed. The organism in question there was a mushroom who had lost the part of its DNA that made it go brown. This opens up for using the technology to develop plants of the future.

Summer has been the first time that plants that have been gene-edited using CRISPR-Cas9 -- in a way that does not classify the plant as GMO -- have been allowed to be cultivated outside of the lab. This is definitely the first time in Europe, and even if it been done before in other parts of the world, it has been kept secret. This time, it was a cabbage plant and the Radio Sweden gardening show "Odlä med P1" took part in the harvest leading to the probably first-ever meal of CRISPR-Cas9 genome-edited plants. The first CRISPR meal to have been enjoyed was "Tagliatelle with CRISPRy fried vegetables."

"The CRISPR-plants in question grew in a pallet collar in a garden outside of Umeå in the north of Sweden and were neither particularly different nor nicer looking than anything else," says plant scientist Stefan Jansson. But they represent both a new phase of agriculture where scientific advances will be implemented in new plant species and that to a small or large extent will be made available to farmers across the world. In other words: a meal for the future.

MOTIVATE YOURSELF POSITIVELY

We wish to have a more positive life experience. To have a positive experience we must positively motivate ourselves first. We must be convinced that any change we make will bring about the gratification of a particular need or desire.

To make a constructive change in life, we must evaluate the potential benefits for any given action. Then we must convince ourselves that the benefits will justify or outweigh the price we have to pay for them. Others may inspire or threaten us to make such a change, but it is 'You' who must motivate yourself by means of 'Profit and Loss' comparison. To some degree, you have seen doing this all in your life. Now you can make certain that the process will work for instead of against you.

The criminal or addicts, all have gone through the same process and based on their levels of awareness, usually under tragic circumstances, realized that their wish is to escape from reality.

You will find it most helpful to cultivate the use of two familiar but often neglected words "Wise and Unwise". All actions should be labelled "Good" or "Bad", "Fair" or "Unfair", "Light" or "Wrong" because these are only moral judgements based on your present awareness or the collective awareness of the society.

The terms "Wise" and "Unwise" do not impose value judgements. They allow you to observe your actions or the actions of another and, on the basis of awareness decide if they are "Wise" or "Unwise". At no time is the person being judged. This same understanding and courtesy must in turn be extended by you to everyone else.

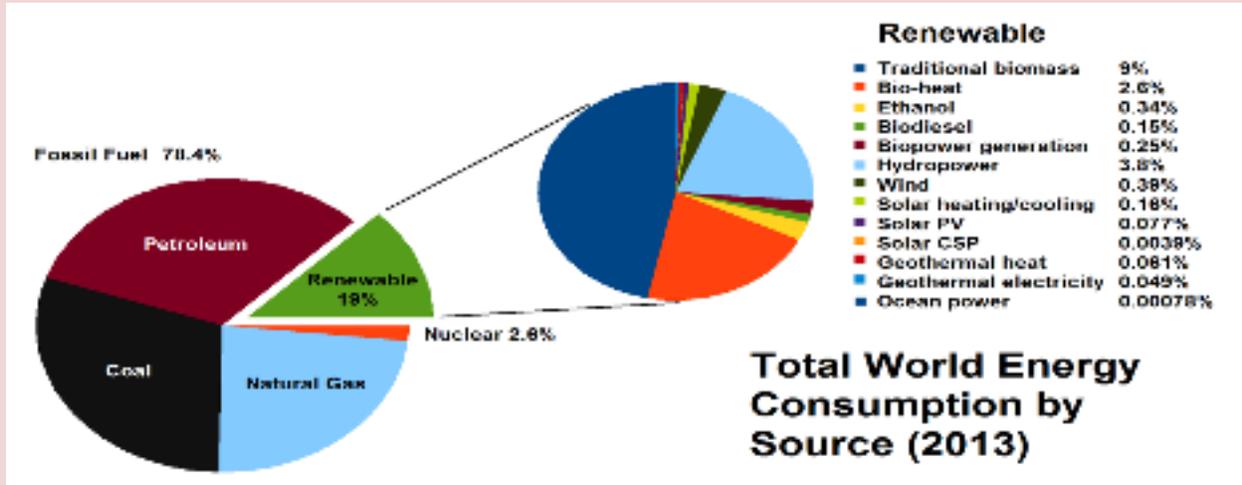
One small
POSITIVE THOUGHT
in the morning
can change your
whole day.

N.PAVITHRA, I-M.Sc Microbiology

Believe
in yourself
— & —
you will be
Unstoppable

Renewable energy source

Renewable energy is derivative from natural processes that are replenished frequently. In its various forms, it derives directly from the sun, or from heat generated deep within the earth. Included in the definition is electricity power and heat generated from solar, wind, ocean, hydropower, biomass, geothermal resources, and bio-fuels and hydrogen derived from renewable energy sources.



Bio energy

We have used biomass energy or bioenergy the energy from organic substance for thousands of years, ever since people started burning wood to cook food or to keep warm. And today, wood is still our major biomass energy resource. But many other sources of biomass can now be used, with plants, residues from agriculture or forestry, and the organic component of municipal and industrial wastes. Even the vapors from landfills can be used as a biomass energy source. The use of biomass energy has the potential to a great extent reduce our greenhouse gas emissions. Biomass generates about the same amount of carbon dioxide as fossil fuels, but every time a new plant grows, carbon dioxide is really removed from the environment the net emission of carbon dioxide will be zero as long as plants continue to be replenished for biomass energy purposes. These energy crops, such as quick growing trees and grasses, are called biomass feed stocks. The use of biomass feed stocks can also help increase income for the agricultural industry.

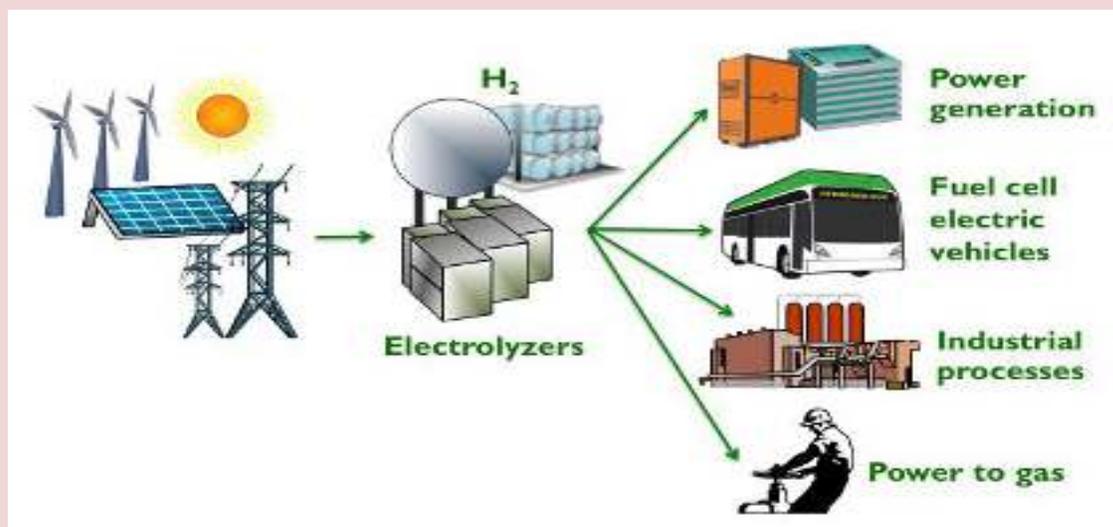
Hydrogen Energy

Hydrogen is the simplest chemical element. An atom of hydrogen consists of only one proton and one electron. It's also the most plentiful element in the universe. Despite its simplicity and large quantity hydrogen doesn't occur naturally as a gas on the Earth it's always collective with other elements. Hydrogen is also found in many other organic compounds particularly the hydrocarbons that make up many of our fuels, such as gasoline, natural gas, ethanol, methanol, and propane.

Hydrogen can be divided from hydrocarbons through the application of heat a process known as reforming. Presently, the hydrogen is made this way from natural gas. An electrical current power can also be used to separate water into its mechanism of oxygen and hydrogen. This process is known as electrolysis. Some algae and bacteria, using sunlight as their energy source, even give off hydrogen under positive conditions

Hydrogen is high in energy source, yet an engine that burns pure hydrogen produces almost no pollution in environment. NASA has used liquid hydrogen ever since the 1970 to propel the space shuttle and other rockets into orbit. Hydrogen fuel cells power the shuttle's electrical systems, producing fresh byproduct clean water, which the crew drinks. A fuel cell combines hydrogen and oxygen to produce electricity power, heat, and water. Fuel cells are often compared to battery. Both convert the energy produced by a chemical reaction into method of the electric power. However, the fuel cell will produce electricity as long as fuel (hydrogen) is supplied, never losing its charge. Fuel cells are a promising technology for use as a source of heat and electricity for building, and as an electrical power source for electric motors propelling vehicles. Fuel cells function best on pure hydrogen. But fuels like natural gas, methanol, or even gasoline can be transformed to produce the hydrogen necessary for fuel cells. Some fuel cells even can be fueled directly with methanol, without using a reformer.

In the future, hydrogen could also join electricity source as an important energy carrier. Energy carriers moves and deliver energy in a usable form to consumers. Renewable energy sources, like the sunlight and wind energy, can't produce energy all the time. But they could, for example, generate electric energy and hydrogen, which can be stored until it's needed. Hydrogen can also be transported (like electricity) to locations where it is needed.

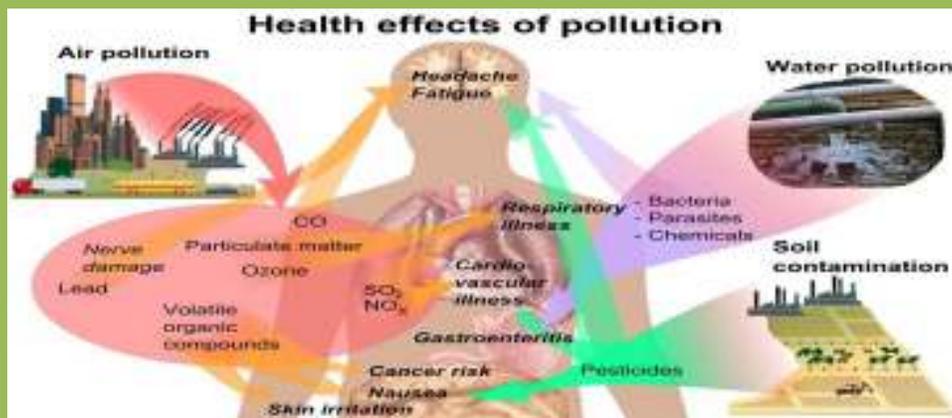


R. Sateesh Murugan, Ph.D Research Scholar

Health Hazardous Air Pollution

Air pollution got aggravated with the development and industrialization in the country. Growing cities, increasing traffic, the high influx of population to urban areas, increase in consumption patterns, higher levels of energy consumption, unplanned & rapid urban, industrial & economic development has led to a higher rate of increase of air pollution in urban areas. The burning of fuels for industrial activities and transportation leads to a plethora of combustion products, which contribute towards air pollution including toxic trace organics. Exposure to these toxic air pollutants can cause serious health effects, including damage to the **immune system, respiratory, neurological, and reproductive** and other health problems.

Air toxics, hazardous air pollutant (HAPs) are present in the environment at low concentration (other than criteria pollutants) that are known, or suspected to be as toxic and persistent. Trace organics belong to the category of air toxics. Most air toxics originate from human made sources, including mobile sources (vehicles etc) and stationary sources like refineries, petrochemical industries, pharmaceuticals, dye & dye intermediate, paint & varnish, incineration, power plants, coke ovens, steel & other metallurgical plants besides indoor & non-point sources like pesticides & cleaning solvents. HAPs include volatile organic compounds such as benzene, toluene, polycyclic aromatic hydrocarbons (PAHs) like benzo(a)pyrene, persistent organic pollutants like PCBs, dioxins & furans and pesticides and heavy metals including arsenic, lead, mercury. The initiatives taken for controlling air pollution from different sources, particularly automobiles and fuel quality, the increasing trend of toxic organic pollutants in Delhi has reduced. Polycyclic Aromatic Hydrocarbons content has been restricted to 10% in diesel to be supplied and Benzene content has been restricted to 1% in gasoline all over India from 2005. The initiative taken for improvement of fuel quality, introduction of compressed natural gas (CNG) and tightening of emission norms for vehicles have monitored unabated increase of pollution.



Air pollution comes from many different sources such as factories, power plants, dry cleaners, cars, buses, trucks and even windblown dust and wildfires. It can threaten the health of human beings, trees, lakes, crops, and animals, as well as damage the ozone layer and buildings. Air pollution also can cause haze, reducing visibility. The WHO (1999) has defined "Air pollutants" as "substances" put into air by the activities of mankind, in such concentrations, which are sufficient to cause harmful effect to human health, vegetation, property or to interfere with the enjoyment of property. Air pollutants change the composition of the atmosphere and affect the biotic environment. Some of the pollutants of concern are particulate matter (smoke, fumes etc); oxides of carbon, nitrogen and sulphur; hydrocarbons; metals; oxygenated compounds (alcohols, aldehydes, acids, etc.); ozone and other oxidants; etc.

Emission standards have been fixed to facilitate effective air pollution control. These standard permissible limits are formulated by the Central Pollution Control Board, Ministry of Environment & Forests; Bureau of Indian Standards (BIS) and the World Health Organisation (WHO). A large number of substances used in manufacturing and commerce have been recognized officially as hazards to industrial workers, and maximum limits of acceptable concentration for 8 hr exposure have been established.

Natural sources

Volatilization is an important way by which some organic air pollutants are added to the atmosphere naturally. For example, in heavily forested areas, terpenes (volatile chemicals emitted from pines and other tree species) can account for a large proportion of total organic air pollution. In addition to exposure from breathing air toxics, people are exposed to toxic air pollutants in many ways such as:

- *Breathing contaminated air.*
- *Eating contaminated food products, such as fish from contaminated waters; meat, milk, or eggs from animals that fed on contaminated plants; fruits and vegetables grown in contaminated soil on which air toxics have been deposited.*
- *Drinking water contaminated by toxic air pollutants.*
- *Ingesting contaminated soil*.*
- *Touching (making skin contact with) contaminated soil, dust, or water (for example, during recreational use of contaminated water bodies).*

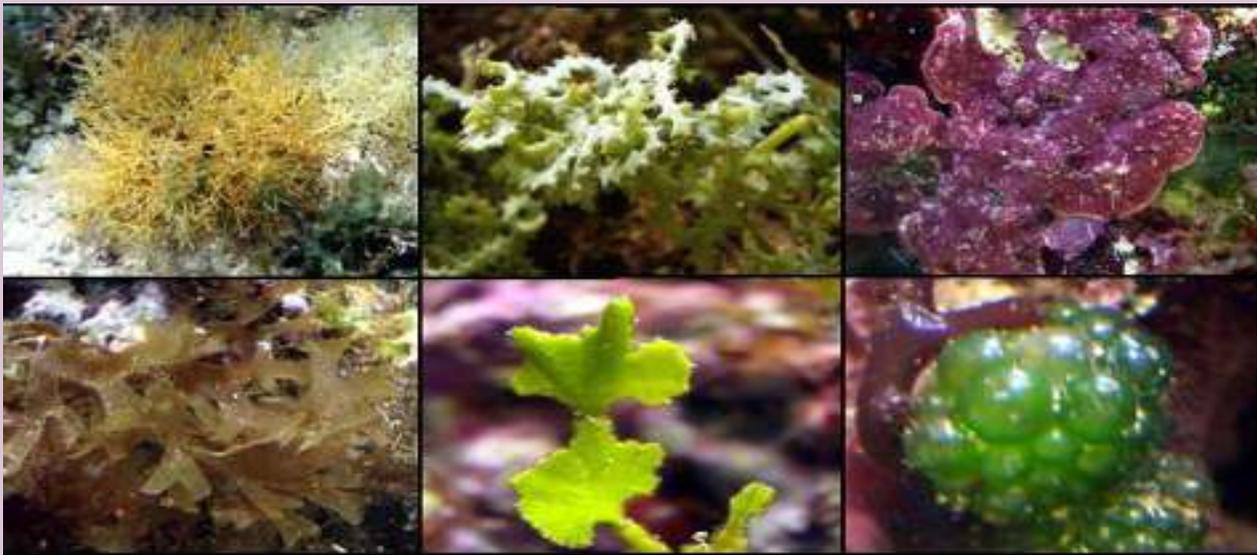
**Some toxic air pollutants such as mercury can deposit onto soils or surface waters, where they are taken up by plants and ingested by animals and are eventually magnified up through the food chain.*

Reference: website: www.cpcb.nic.in

*T. Boobalan,
Ph. D., Research Scholar*

Blue Green Algae Benefits

The blue-green algae are often referred to as Cyanobacteria or Cyanophyta which is a phylum of Bacteria that obtain their energy through photosynthesis. The name "cyanobacteria" comes from the colour of the bacteria, cyan (blue); the bacteria do not use or produce cyanide. Blue-green algae are present in almost all aquatic ecosystems, including creeks, rivers, lakes and wetlands. Individual cells are quite small, so blue green algae can be present in a water body without being visible. However, as environmental conditions become just right, algae numbers can start to increase rapidly and blooms or scum's, become easily visible across the water surface. The blooms range in color from dark green to yellowish–brown and develop paint like consistency as they dry out around the water's edge.



A blue pigment may also be seen as they dry. Blue-green algae contain small amounts of protein, vitamins (including C, E, and folate), β -carotene, and some minerals. Like green plants, they are rich in chlorophyll, a pigment that enables them to turn sunlight into energy. Blue green algae have been used for weight loss and as a nutritional supplement. It has also been used for boosting the immune system and for controlling cholesterol levels. Some herbal/diet supplement products have been found to contain possibly harmful impurities/additives. Its supporters claim health benefits, including increased energy, improved memory, greater mental clarity and focus, improved digestion, control of appetite and cravings, heightened immune function, and relief from fatigue, hypoglycemia, PMS, anxiety and depression. It's even recently been called a cure for Attention Deficit Disorder. The best way to really find out about how the algae can benefit you is for you to try it yourself. Clinical data shows that blue green algae is useful for

- Easing life transitions and transformations , Understanding and accepting life experiences, Listening to inner voices of guidance, Rebuilding self-esteem, Nourishing and creating joy in our lives

*Dr. P. Prabhakaran,
National Post Doctoral Fellow*

Antimicrobial activity in pus samples

Antimicrobial resistance is not only increasing the healthcare costs but also the severity and death rates from certain infections that could have been avoided by prudent and rational use of the existing and newer antimicrobial agents. Emerging multidrug resistant strains and changing antimicrobial resistance pose challenge in treating pyogenic infections. This study will guide the clinician in choosing appropriate antimicrobials which not only contribute to better treatment but their judicious use will also help in preventing emergence of resistance to the drugs which are still sensitive.

Varied antibiotic resistance patterns were observed in the drug-resistant isolates, with resistance to ampicillin, amoxicillin and trimethoprim-sulfamethoxazole being predominant. *Escherichia coli*, *Klebsiella pneumonia*, *Staphylococcus saprophyticus*, *Proteus mirabilis*, *Staphylococcus aureus*, *Pseudomonas aeruginosa* and *Enterococcus faecalis* as the most prevalent isolate, showed the high resistant to ampicillin (98%) which was in agreement with other works presented the similar findings. The isolates were highly sensitive to ciprofloxacin 90.15 %, Chloramphenicol 78.15%, Gentamicin 87.63% and Co-Trimoxazole 62.36%. It showed excellent antimicrobial susceptibility to all the pus pathogens founded. These results were mostly in concurrence with other studies. The study showed high level of ampicillin resistance. This revealed that ciprofloxacin, chloramphenicol, gentamicin and cefotaximeamikacin, ciprofloxacin, cefuroxime and cefotaxime were very effective against pus samples isolates.



***The pure culture is the
foundation for all research
on infectious diseases.
– Robert Koch***

**Dr. T. Sathiamoorthi
Assistant Professor**

