Illegal Wildlife Trade Victim – Million Dollar Gecko

If you are new to the north-east Indian states of Assam, Mizoram, Manipur, Tripura etc, or happen to be here for vacations, you must have been mesmerised by the enthralling beauty of the land. Dusk comes early here in comparison to western India.

The scenic summer evenings are filled with the piercing sound of “To-kay! To-kay! To-kay!” This call is strong and frequent you cannot help wondering what animal is making that sound. Well, get prepared to meet the Tokay Gecko.

Tokay gecko or Gekko gecko, a gecko found in north-east India, is common throughout south-east Asia. It lives in rainforests on trees but is also quite common in rural human houses, hiding in cervices during daytime and searching for insect prey or mates during night hours.

It is one of the largest geckos in the world, reaching up to 35-40 cm in length. Its body is cylindrical and flattened. Males are more brightly coloured than females.

However, the survival of the Tokay gecko is seriously threatened due to its huge trade because of its use in Traditional Chinese Medicine (TCM) for hundreds of years to treat cancer, asthma, diabetes, skin disorders and a range of ailments. Although, there is no scientific proof to support these claims, smuggling Tokay gecko to Myanmar and China has become a lucrative illegal trade for poachers.

A single matured gecko can fetch a price of Rs 20 lakh in the international market. The local smugglers here in north-east India get about Rs 50 thousand to Rs 2.5 lakh and then it is sold through various markets across the country. The price of a gecko is dependent upon its size and weight and therefore, sometimes, low weight geckos are injected with mercury to make them heavier so that they could be sold at higher rates. However, it can kill the animal in a few days.

Poaching of this endangered lizard is done by local tribals who further hand over to middle men who smuggle it to international buyers through the northeastern borders.

Tokay geckos are listed in Schedule III of the Wildlife Protection Act, 1972, as a ‘highly endangered animal’.

While the volume of the gecko trade has not been clearly assessed, global wildlife trade monitoring network (TRAFFIC) in their report of 2013 estimated that Indonesia alone had been exporting 1.2 million dried Tokay geckos annually and that in recent years Taiwan has imported 15 million geckos from different countries.

TRAFFIC also warned that the wild population of the Tokay gecko in Southeast Asia was in grave danger, as it is hunted to meet demands in China, Hong Kong, Taiwan, Vietnam and other Asian countries.

Now, to meet international demand, gecko smugglers from India, Nepal and Bangladesh have joined the trafficking chain. According to wildlife experts, the poachers are active in the Indian states of Manipur, Mizoram, Assam, West Bengal, Bihar, Jharkhand and Odisha, among others.

Dried Tokay gecko for sale as medicine in China.

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Serendipitous Discovery Promises Plastic Bio-remediation

Billions of tones of plastic and its derivatives are produced daily and recklessly dumped as waste after use. These plastic wastes are ultimately found in land-fill or in rivers/seas posing a colossal threat to the ecosystem especially the marine ecosystems. Not only the marine-life is endangered but also livelihood of the population depending upon seafood is severely affected.

Plastics are polymers of synthetic/semi-synthetic compounds and are non-degradable and take centuries to naturally break-down. Thus, researchers have been focusing their efforts to find ways and means to hasten the plastic degradation or bio-remediation in the environment. In this regard, microbes have been pivotal as they produce enzymes capable of degrading plastic polymers.

One such microbe Ideonella sakaiensis – a bacterium – identified form soils of plastic recycling plants in Japan seems very promising.

Researchers found that these bacteria are eating soda bottles made up of Poly-Ethylene Terephthalate (PET). Ideonella sakaiensis was found to have adapted to produce an enzyme that is able to partially degrade the plastic polymer to individual monomers and use that as a source of energy. PET degrading enzyme (PETase) produced by this microbe breaks down highly sturdy PET polymer.

Recently, Dr. McGeehan and his team at the University of Portsmouth, UK and US Department of Energy’s
Bollywood Flick and Facebook Inspire Indian Scientist to Build Army of e-astronomers

If anybody can become a dancer as depicted in the 2013 Bollywood dance drama, Anybody Can Dance (ABCD), why can’t anybody become an astronomer and make new discoveries?

Yes, says Dr. Ananda Hota, radio astronomer at the Centre for Excellence in Basic Sciences (University of Mumbai-Department of Atomic Energy) in Mumbai, and he has shown how. He is the founder of a unique citizen science project, RAD@home Astronomy Collaboratory, which trains lay citizens to analyse radio astronomy data from professional telescopes so that they can make discoveries.

Members of this project have made discoveries using data from radio telescopes in India and abroad. These discoveries have been announced at scientific meetings of astronomers and even published in peer-reviewed scientific journals.

Any undergraduate science or engineering student or lay person can join the group to get basic training which is provided over Facebook. Face-to-face training camps are also held in different cities. The group’s activities go under the hashtag #ABCDresearch – anybody can do research – and are widely followed. Since 2013, Hota has trained over 100 e-astronomers.

Recently, members of this group presented their findings at the 36th meeting of the Astronomical Society of India in Hyderabad on “three intriguing cases of jet-galaxy interaction as laboratory for AGN (Active Galactic Nuclei) feedback in galaxy merger”. Past discoveries from this group include new Specalike galaxies, episodic radio galaxies, relic-lobe radio galaxies, a few Z- and X-shaped radio galaxies, intriguing cases of jet-galaxy interaction, bent-lobe radio galaxies tracing cosmic accretion onto clusters through filaments.

Radio telescopes gather enormous amount of data and it could take professional astronomers decades to analyse every bit collected. At the same time, this data may contain clues to important objects and events in the cosmos. Therefore, observatories make this data available for use to anyone interested. The primary data for the citizen-science project comes from sky surveys done by the Giant Metrewave Radio Telescope (GMRT) of the Tata Institute of Fundamental Research.

“Ours is a unique, zero-infra-structure, zero-funded collaboratory of trained e-astronomers, which has made several new discoveries by analyzing GMRT data using open access tools such as NASA Skyview,” Hota explained while speaking to India Science Wire.

“This model possibly can convert the Big Data problem in astronomy into a prospect. Since it is based on internet, it can provide an equal opportunity of academic growth to people in underdeveloped regions where our optical and radio telescopes are located,” he pointed out.

Unlike conventional education programmes, those who get involved with RAD@home not only learn but also directly contribute to astronomy research from the initial one-week face-to-face interaction. “Citizen science can be particularly useful in discovering certain events where features are fuzzy which can be detected more efficiently by the human eye than a machine. Radio interferometry images are more complicated than optical and need citizen-scientists to be trained to read them,” pointed out Hota.

Dinesh C. Sharma, India Science Wire, Vigyan Prasar.

National Renewable Energy Laboratory (NREL) while studying this enzyme serendipitously created a mutant PETase that out-performed the naturally occurring PETase enzyme activity by being 20% more efficient, thus degrading the plastic completely. These findings give hope that decimating the plastic menace in the environment will be realizable in the near future.

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(From left) Scanning Electron Microscope image of plastic degrading bacteria Ideonella sakainensis and magnitude of plastic degradation by naturally occurring PETase and mutant PETase enzyme (C) on plastic. (Source: Science News and PNAS, USA)

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Frugal, yet high tech, innovations that can change your lives

A multipurpose and low-cost biological air purifier, a smartphone-based system for detection of cardiac biomarkers, a window solar cooker, a rolling water carrier-cum-purifier, buzzing bands for speech and hearing impaired, an augmented rehabilitation system for stroke patients, an eco-friendly water retention natural polymer, a rapid cervix cancer detection system and a social search engine.

These are among the winners of the Gandhian Young Technological Innovation (GYTI) Awards for 2018. The innovations and prototypes were on display at the Festival of Innovation and Entrepreneurship inaugurated by the President of India at Rashtrapati Bhawan recently.

GYTI awards recognise technological excellence imbued with social relevance among students from all over the country. Out of over 2900 entries in 54 technology domains received from over 300 universities and institutions, 51 have been awarded this year. And 15 of them have got a research grant of Rs 15 lakh each to pursue their projects. The award winners come from IITs, Indian Institute of Science, central and state universities and research institutions.

A team led by Divya Beri at the Indian Institute of Science, Bangalore has developed a new strategy to block transmission of malaria, while Brince Paul and team from IIT Hyderabad has come up with a low-cost, disposable microfluidic chip diagnosis of malaria.

Debasmita Mondal and Sourabh Agarwal from IIT Bombay have developed a smartphone-based system for detection of two common cardiac biomarkers – myoglobin and myeloperoxidase. Technological innovations in agriculture sector include a novel technique to replenish micronutrients in soil using iron-capped nanomaterials. It has been developed by Pallabi Das and Kasturib Sarmah of Tezpur University. Ravi Prakash of National Dairy Research Institute, Karnal, has designed a low-cost milking and cooling plant based on Phase Change Material.

A few years back, a grassroots innovation of hippo roller – a rolling drum to transport water in rural area – had caught wide attention. Now Ramesh Kumar and Swathy Ravindran of IIT Madras have gone a step further – they have made the roller into a water purification system also. This means as the water is transported in the roller, it also gets purified. The rolling water purifier has an outer body to deal with mechanical forces and a polybag to store filled water which makes sure that even if the barrel of the body is broken or cracked, there are no water leakages. It purifies water as it is transported, using novel nanomaterials without any power requirement.

Neeta Ganesh Waghle and Priti Prabhakar Yewale from D Y Patil Vidyapeeth, Pune, have designed a biological air purifier which has a compact carriage assembly containing replaceable adsorbent packed in biodegradable pouches or wrappers. The natural biomaterials used as solid porous material act like an adsorbent. Since the material is recyclable, it reduces the cost. The purifier, according to the students, can be installed at the mouth of automobile exhausts. In tests done by them, it has been found that it considerably reduces levels of carbon monoxide, nitric oxide and nitrogen dioxide.

The window solar cooker designed by Avinash Prabhune of IIT Bombay looks pretty much like a microwave oven and it can be fitted into a window like an air conditioner. Unlike old fashioned, box-type solar cooker, this one has a cylindrical chamber that makes sure that it absorbs sunlight all through the day. It has a higher efficiency compared to box-type cookers and cooks faster. Prabhune says it can be ideal for those living in multistoried buildings and those with a taste for ‘slow food’.

The team of Narayan Lal Gurjar, Shashi Pratap Shekhawat and Ankit Jain of Maharana Pratap University of Agriculture Technology, Udaipur, has identified a natural polymer for water retention. While superabsorbent polymers that can absorb and carry water about 300 times their weights are commercially available, they are very costly and are not biodegradable. The team has developed a superabsorbent material using orange and avocado peels. The material can retain large amounts of water and keep soil moisture high for crop.

Dinesh C. Sharma, India Science Wire, Vigyan Prasar.
Deep look into eyes can tell if you are diabetic or not

Deep look into eyes can tell if you are diabetic or not

Eyes that help us see marvels of the outside world can also reveal secrets about our inner health. Doctors often examine eyes to look for signs of jaundice, hyperthyroidism, anemia and even high cholesterol.

In an emerging field of medicine called iridology, practitioners use iris patterns, colours, tissue weakness, breakage and other characteristics for early diagnosis of underlying health conditions.

Now researchers are exploring the use of machine learning techniques where iris images of people are used to identify subtle changes in their iris as an effect of a particular health condition. Researchers from the Thapar University have applied a similar methodology for diagnosing diabetes. Piyush Samant and Dr. Ravinder Agarwal have described their work in their recent paper in the journal Computer Methods and Programs in Biomedicine.

For this study, the scientists captured and compared infrared images of eyes from a total of 338 individuals of whom 180 were type II diabetic and the rest were non-diabetic patients. In these iris images, the region that corresponds to the health of pancreas (causal gland for diabetes) was cropped and its features were analysed computationally. Among the features and patterns that emerged, scientists found that a combination of the top 50 ranked features could accurately diagnose diabetes. The accuracy of this diagnostic method is 89.63% and its specificity and sensitivity is 0.9687 and 0.988 respectively.

“Diabetes is a chronic, progressive disease caused by increased levels of blood glucose and can lead to serious damage to the heart, blood vessels, eyes, kidneys and increases the risk of heart disease and stroke. An early diagnosis of diabetes and pre-diabetes can help people potentially prevent or delay serious complications,” said Dr. Ravinder Agarwal.

Speaking to India Science Wire, he said: “We are thinking of developing a portable device that could detect diabetes non-invasively utilising artificial intelligence which can be used by a non-medical practitioner effectively.”

As per the estimates of the International Diabetes Federation (IDF), 381.8 million people are affected by diabetes and about 591.9 million people will be affected by this disease by the year 2030. A portable device that is not painful, cheap, infection-free, and accurate can help in the effective diagnosis of this disease specifically in rural areas where establishing a diagnostic laboratory is particularly expensive.

Dr. Aditi Jain, India Science Wire, Vigyan Prasar.

London Buses to Run on Biofuels Extracted from Ground Coffee Waste

After consuming tea or coffee, the used tea leaves or waste coffee grounds are generally thrown away. However, a British start-up company, Bio-Bean, has recently been able to convert coffee grounds into coffee oil that could be mixed with diesel in suitable proportion along with other fuels to run London buses.

According to Bio-Bean, roughly 2,00,000 tonnes of mineral-rich coffee waste over the course of a year is left after consumption of coffee by the people of London, who consume an average of 2.3 cups of coffee a day. This coffee waste, on reaching the landfill, degrades releasing greenhouse gases like carbon dioxide and methane.

The green energy company Bio-Bean collects unwanted coffee grounds, predominantly from London-based coffee shops, and processes it at its factory in nearby Cambridgeshire to turn it into coffee oil. This oil can then be mixed with diesel and some other fuels to run buses.

Arthur Kay, the founder of Bio-Bean says, “We collect the wasted coffee grounds, recycle it and turn it into a renewable fuel which is then used to replace further conventional fuels – so it’s a double saving.”

Bio-Bean sends the coffee oil extracted from coffee grounds to UK’s largest biofuels producer, Argent Energy, where they mix it with the fuels obtained from fats and plants. The final mix is made up of 80% traditional diesel and 20% biofuel.

According to Bio-Bean, replacing traditional fuel with this mixture can reduce carbon emissions from bus journeys by 10 to 15% without the need to modify engines or spend more. The coffee-enhanced mixture can also be used by taxis, cars and trucks, says the company founder Arthur Kay.

Bio-Bean has set out further plans to market coffee oil based biofuel to continental Europe, in particular France, where some 38 billion cups of coffee are consumed every year.

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(Courtesy: westminsterworld.com)