ISSN 0972-1800

Quarterly Research Newsletter of A Biologists Confrerie

Vol. 18, No. 4 **Oct. — December, 2016**

India accounts for 25% of all the World's TB cases
About 4 million Cases Annually

India's tuberculosis nightmare could be much worse than feared. A new study analysing the scale of anti-TB medicines across India has estimated that there could be two times more drug sensitive TB patients than currently assumed.

While it was assumed that India's anuual burden of TB cases stands at roughly 2.2 million a year, the study published in *The Lancet Infectious Diseases* journal recently pegs this number at over 3.8 million in 2014. This excludes drug-resistant TB cases.

The study, jointly done by the Indian government, the Imperial College of London and the Bill & Melinda Gates Foundation (USA), confirmed what has long been suspected: more Indian TB patients seek treatment in the private sector than the public sector.

Dr Sunil Khaparde, who heads the Central TB Division and is an author of the *Lancet* study, said, " We realised the number of patients coming to the private sector were underestimated, but the new study looked at medicine sales and found that this number alone could be as high as 2.2 million as against the 8 lakh we had previously estimated".

It translates into a three times jump in the number of cases in the private sector.

The study's main author Dr Nimalan Arinaminpathy, who is from School of Public Health at Imperial College, said, "TB is a major global health issue, and India bears a large proportion of the World's TB burden". It is estimated that India accounts for a fourth of all TB cases.

Using data of drug sales collected by IMS Health, he found that India's TB burden in 2014 was 3.8 million instead of 2.2 million.

Santacruz-based private practitioner Dr Yatin Dholakia said the fact that India has a higher burden of TB is an "open secret". In a study published in the *Indian Journal of Tuberculosis* in 2004, Dr Dholakia had found that "in just one Mumbai ward of Andheri," for the 94 cases registered with the government programme, there were 363 cases in private laboratories and radiology centres.

Date of Publication : 1st December, 2016

A Biologists Confrerie

(Term 2015 – 2016)

President:
Dr. M. Zaka-ur-Rab,
Ex - Professor-cum-Chief Scientist,
Sher-e-Kashmir University of Agricultural Sciences & Technology,
Srinagar (J.& K.).

Secretary: Dr. R.K. Varshney.

A.M.U. Representative:
Dr. Hirdesh Kumar,
Department of Zoology,
Aligarh Muslim University,
Aligarh (U.P.) - 202 002.

Agra Representative:
Dr. Surendra Singh,
Department of Zoology,
Dr. B.R. Ambedkar University,
Agra (U.P.) - 282 002.

Patna Representative:
Prof. A.P. Verma,
C/o Department of Botany,
A.N. College,
Magadh University,
Patna (Bihar) - 800 013.

Kolkata Representative :
Dr. Bulganin Mitra,
Lepidoptera Section,
Zoological Survey of India,
M-Block, New Alipore,
Kolkata - 700 053.

Burdwan / Salt Lake Representative:
Dr. A.K. Hazra
(Ex-Additional Director, Z.S.I.)
AL-262, Near Tank No. 8,
Salt Lake, Kolkata - 700 091.

Pune Representative:
Dr. R.M. Sharma,
C/o Western Regional Centre,
Zoological Survey of India,
Rawet Road, P.O. PCNT,
Pune (Maharashtra) - 411 044.

Aurangabad Representative:
Dr. P.P. Kulkarni,
(Ex-Scientist, Western Reg. Stn., Z.S.I.)
31, Panna Lal Nagar, Aurangabad
(Maharashtra) - 431 005.

Jodhpur Representative:
Dr. I. C. Gupta
(Ex-Head of Division, C.A.Z.R.I.)
23/287, CHB, Pal Road,
Jodhpur (Rajasthan) - 342 008.

BIONOTES

A Quarterly Newsletter for Research Notes and News on Any Aspect Related with the Life Forms

Bionotes articles are abstracted/indexed/available in the ***Indian Science Abstracts,*** **INSDOC; NISCAIR;** ***Zoological Record*****; Thomson Reuters (U.S.A.); CAB International (U.K.); The Natural History Museum Library & Archives, London; Library Naturkundemuseum, Erfurt (Germany)** etc. and online databases.

Honorary Editors :
Dr. R.K. Varshney,
Ex - Additional Director,
Zoological Survey of India, Kolkata;
and
Prof. S.K. Saxena,
Ex - Head of the Department of Botany,
Aligarh Muslim University, Aligarh.

Publication Policy :
A Biologists Confrerie (ABC in short) and the BIONOTES cater to its members only. Information, statements or findings published are the views of its author / source only and the editors or publisher have neither verified them nor are responsible for them in any respect.

Manuscripts:
Please make manuscript in the format of research notes published in this issue. Author and coauthors must be members. Send a hard copy and a CD (not on e-mail). Only line drawing (not photo) can be considered. No proofs will be supplied. Please provide a contact phone no.

Page Charges:
First page or part: Rs 250/-. Subsequent pages or part: Rs 200/- each. Add Rs 50/- for handling & despatch of the reprints by Regd. Mail. 50 copies of reprints will be supplied in lieu of above charges.

Rates of Membership (per calendar year) :
India: Individuals : Rs. 150/-
Institutions : Rs. 600/-
Abroad : US $ 20/- (by sea mail).

Back Volumes :
All available. In India @ Rs. 750/- per volume, and abroad @ US $ 30/- per volume. Despatch free.

Payments :
Please send either a Bank Draft or a Multi City Cheque in favour of 'A BIOLOGISTS CONFRERIE' payable at ALIGARH. **OR** Money Order to Dr. R.K. Varshney, on the address given below. Please do write your full postal address on the M.O. coupon.

Payment in cash can also be made to any of the above named persons.

Address for Correspondence :
A Biologists Confrerie,
Raj Bhawan, Manik Chowk,
Aligarh - 202 001 (U.P.). INDIA.
Phone Nos.: 094104 25040, 09457 565659
E-mail : bionotes_india@yahoo.com

CONTENTS

(Vol. 18, No. 4)

Interview

'There's lot more Animal Species to be found'

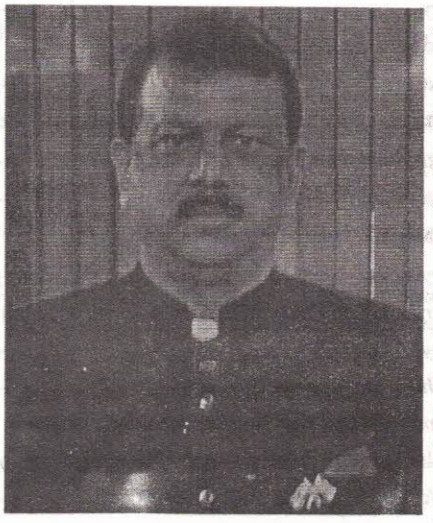
An Interview with Dr. Kailash Chandra

Director, Zoological Survey of India

Zoological Survey of India's Director Dr. Kailash Chandra dwells on the achievements and a century of discoveries made by the institution, in an interview to the *Hindustan Times*, Kolkata.

Q. What according to you is ZSI's biggest achievement over the past 100 years?

A. It is difficult to identify one particular achievement as the most remarkable. However, ZSI has identified several species new to science. Not many institutions across the world have identified as many new species as the ZSI. It has, through its surveys, also been intrumental in providing scientific support for biodiversity conservation efforts in India. The institution has also played a vital role in framing Wildlife Protection Act (1992) and other national conservation policy frameworks and legislation. We play an important role in identifying wildlife materials seized from poachers and smugglers. The identification has helped in prosecution. So, ZSI has also played its role in protecting India's biodiversity in a big way.



Q. Of all the new species discovered by the ZSI, what, in your opinion, would stand out as the most remarkable?

A. The discovery of golden langurs in Assam-Bhutan border and Namdapha flying squirrels in Arunachal Pradesh are remarkable.

Q. Besides continuing your work on discovering faunal species, where would your focus be in the coming days?

A. Digitisation of our entire archive and of the rare books in our library and creating the country's biodiversity database through DNA bar-coding technology is among our thrust areas. We'd also step up our efforts towards GPS tagging.

We are extracting DNA from specimens to identify indigenous species. We have already shared information on more than 500 genetic sequences with the US' National Centre for Biotechnology. DNA bar-coding of more than 1,000 species is complete. This would come to great help in curbing wildlife-related crimes. DNA bar-coding and GIS tagging will also help identify the exact habitat of the species discovered. The genetic sequence mapping will help differentiate between a tiger hailing from the Sunderbans and those from other parts of the country.

The DNA bar-coding also includes extinct species. This will help us know when an animal believed to have been extinct has been rediscovered.

Q. What are your plans with regard to discovering more faunal species?

A. We are building a nationwide network of taxonomy experts to identify species yet unknown to the world. There are plenty of those yet to be found. We are not even aware of their existence. No wonder, there is a general lack of awareness on how these species may come to mankind's help and the role they play in maintaining bio-diversity. The pan-India network of taxonomy experts is likely to lead us to more such species.

75 th Issue (Sept. 2017) will be the 'Platinum Jubilee Number'. Send your Subscription.

Hunger Worldwide

India is below Bangladesh and African Rwanda in the global hunger rankings

SUBODH VARMA
subodh.varma@timesgroup.com

India continues to have serious levels of widespread hunger forcing it to be ranked a lowly 97 among 118 developing countries, of which the Global Hunger Index (GHI) was calculated in 2016. Countries worse than India include extremely poor African countries such as Niger, Chad, Ethiopia, and Sierra Leone, besides two of India's neighbours: Afghanistan and Pakistan. Other neighbours Sri Lanka, Bangladesh, Nepal and China are all ranked above India.

The GHI is calculated by taking into account four key parameters : shares of undernourished population, wasted and stunted children aged under 5, and infant mortality rate of the same age group. Of the 131 countries studied, data was available for 118 countries. This year, for the first time, two measures of child hunger—wasting and stunting—have been used to give a more complete picture. Wasting refers to low weight in relation to a child's height, reflecting acute malnutrition. Stunting refers to the deficiency in height in realtion to age, reflecting chronic undernutrition.

The International Food Policy Research Institute (IFPRI) makes the annual calculation of GHI. Basing its readings on the most recent data, the 2016 GHI for India was derived from the fact that an estimated 15% population is undernourished—lacking in adequate food intake, both in quantity and quality.

The share of under-5 children who are 'wasted' is about 15% while the share of children who are 'stunted' is a staggering 39%. This reflects widespread and chronic lack of balanced food. The under-5 mortality rate is 4.8% in India, partially reflecting the fatal synergy of inadequate nutrition and unhealthy environments.

Endemic poverty, unemployment, lack of sanitation and safe drinking water, and lack of effective healthcare are main factors for the sorry state.

Compared with previous years, marked improvement has taken place in child stunting and under-5 mortality rates, but the proportion of undernourished people has declined only marginally from 17% in 2000 to the current 15%. The share of wasted children has inched down similarly.

India was ranked 83 in 2000 and 102 in 2008 with GHI scores of 38.2 and 36 respectively. This implies that, while hunger levels in India have diminished somewhat, the improvement has been outstripped by several other countries. Hence India's ranking is worse today than it was 15 years ago. In fact, Bangladesh was ranked 84 with a score of 38.5 in 2000, just below India. But in 2016, it has improved beyond India with a GHI score of 27.1 and a rank of 90 to India's 97.

Overall, global hunger levels are down by about 29% compared to 2000. Twenty countries, including Rwanda, Cambodia, and Myanmar, have reduced their GHI scores by over 50% each since 2000. And for the second year in a row, no developing country for which data was available featured in the "extremely alarming" category.

A Food Law is not enough

Hunger levels in developing countries may have fallen 29% since 2000, but unfortunately, India is still rated as a country with 'serious' hunger levels in 2016, says the *Global Hunger Index* (GHI), which was released in Oct. 2016. It also said that the country is slated to become the world's most populous nation in six years, and it's crucial that it meets this milestone with a record of ensuring that the expected 1.4 billion Indians have enough nutritious food to lead healthy and successful lives. Since 2000, the country has reduced its GHI score by a quarter and has a score in 2016 of 28.5 (rank 97 of 118 countries). Recent data show that almost 40% of Indian children under five years of age are stunted compared to over 60% in the early 1990s.

The report brings back the focus on the implementation of the National Food Security Act. To date, several States and Union Territories have implemented the food security law and the basic entitlements are being delivered. However, it will be entirely correct to say that only implementation of the Act will not solve the India's problem. This is because hunger and malnutrition are closely linked to sanitation issues. According to Johns Hopkins Bloomberg School of Public Health Professor Jean Humphrey, the stunting in children is not simply due to a lack of food. The constant ambush of germs and bacteria from their environmental forces "these children's bodies [to] divert energy and nutrients away from growth and brain development to prioritise infection-fighting survival," Dr Humphery told *The New York Times*.

India's health infrastructure is in a pitiable state and that has a direct impact on maternal health, which in turn impacts the health of children. Unless and until the full social infrastructure improves, India will not be able to get out of the hunger trap.

Sri Lanka is declared Free of Malaria by WHO

But India will take much longer

1. Sri Lanka brought down malaria from 264,549 cases in 1999 to zero in November 2012.

2. Currently, about 3.2 billion people are at risk of malaria globally.

3. In 2015, there were 214 million cases of malaria and over 4 lakh deaths worldwide.

4. This year till July 1, more than 47,000 malaria cases and 119 deaths have been recorded in India.

5. In 2015, 287 people died of malaria in India, less than half of 562 deaths recorded in 2014.

6. Government of India has identified 40 endemic dsitricts where 80% of malaria cases happen.

7. India is likely to eliminate malaria before 2030.

The spotlight has turned on India after successful elimination of malaria in Sri Lanka, which has certified by the World Health Organisation earlier this year during its 69th regional meet at Colombo. Despite a sharp reduction in its malaria statistics, India is still at risk of the disease and may take a few more years before achieving malaria-free status.

The good news is that India is on the right track with an effective surveillance system and vector control programme and is likely to achieve its malaria eradication target well before the 2030 deadline, the UN agency's assessment shows. Experts say India needs to maintain its focus and could consider borrowing some from Sri Lanka which helped in vanquishing the menace.

Though malaria burden is still high in India, data shows its incidence and mortality have declined significantly. In 2015, 287 people died of malaria, which is less than half of deaths recorded in 2014. "India is on the right track and is confident of achieving its deadline. The incidence is not very high but it needs to eliminate the vector and also treat the existing patients at the same time," Dr Ahmad Jamsheed Mohamed, WHO's regional adviser for neglected tropical disease control programme said. Experts say the demographics and the challenges in India are quite different from those in Sri Lanka and hence, it may take a few more years before India eradicates the disease caused by mosquito bites.

"We are aware of the inequities in access to health services and health outcomes. India's large and diverse population is a formidable challenge. We are grappling with shortage of health workforce," Health Minister J. P. Nadda said, adding the country has expedited its disease surveillance and it is being monitored at a regular basis now to ensure equity in data as well as services.

The government of India is trying to address this and has drawn up a national framework for eliminating malaria. The programme, launched in February this year, is targeted at the 11 endemic states including Andhra Pradesh, Chhattisgarh, Gujarat, Jharkhand, Karnataka, Madhya Pradesh, Maharashtra, Odisha, West Bengal, and the seven north eastern states. It includes free rapid diagonistic tests and distribution of anti-malarial drugs for treatment.

Sri Lanka, which is now the second country in the region, after Maldives, to be free of the parasitic infection, was considered the worst affected around 60 years ago. Sri Lanka opted for a well-calibrated and a responsive strategy and worked on it consistently. "Sri Lanka's achievement is truly remarkable. In the mid-20th century it was among the most malaria-affected countries, but now it is malaria-free. This is testament to the courage and vision of its leaders, and signifies the great leaps that can be made when targeted action is taken. It also demonstrates the importance of grassroots community engagement and a whole of society approach when it comes to making dramatic public health gains," said Poonam Khetrapal Singh, Regional Director for the southeast Asia regional office of WHO.

Sri Lanka ran an intense anti-malaria campaign which included a combination of traditional vector control measures like indoor residual spraying, regular inspection in endemic areas, monitoring of anti-insecticide resistance as well as deployment of mobile malaria clinics in high risk areas, community engagement and spread of awareness about health and sanitation. Case detection was increased through blood film testing. Sri Lanka saw its last locally transmitted case of malaria in October 2012. Apart from Maldivies and Sri Lanka, United Arab Emirates, Morocco, Turkmenistan and Armenia have also eliminated malaria.

—Sushmi Dey

Even as neighbour Sri Lanka became malaria free recently, India is in the midst of a raging storm of three mosquito borne diseases—malaria, dengue, and chikungunya. Latest figures put the number of cases for these three diseases at over five lakh. Why does this have to happen every year? What about preventing these vector borne diseases through measures like the ones our neighbours adopted?

Total funds allocated by the central and state governments seem to have increased in the past few years but that's deceptive. As a share of total money allocated for the whole

National Health Mission, funds for control of vector borne diseases have barely increased from about 1.8% to 2.5% in the past four years.

But the real shocker is that these funds largely remain unutilized. In 2015-16 of the Rs 620 crore allocated, just Rs 259 crore or 42% was spent.

This is rather weird because if you look at the detailed plans for spending under the National Health Mission (NHM) sent by state governments to bureaucrats in the Health Ministry, most states are asking much more than they are finally doled out.

Take the case of Delhi. In the current year, Delhi government had asked for Rs 6.7 crore from the health ministry for "fighting malaria and dengue". They got Rs 1.75 crore, with the fine print saying that Delhi could also use the Rs 7 crore left over from the previous fiscal year.

More revealing is that on many item heads, the state government was asking money but the central ministry was refusing, while on others the state government had not put in any request and central government was commenting that you haven't asked for this? It's all there in the Record of Proceedings for 2016-17, a publicly available document. Delhi wanted Rs 4 crore for social awareness and community mobilization but the centre gave them Rs 64 lakh.

On the other hand, Delhi made no request for anti malarial insecticides and requested dengue testing kits under a wrong head. The Centre remarked at these peculiarities. This also reveals a wide gap between how Delhi Govt. and the Centre are approaching prevention.

The story is that Delhi government allocates almost all of its dengue-malaria funds to the municipal corporations because it is they who are resposible for prevention and control of mosquitoes.

—Subodh Varma

How Sri Lanka won the battle

Sri Lanka was declared free of malaria recently by the World Health Organisation. It has been more than three years since the last case. "This is a big success story. It's an example for other countries," said Dr Pedro Alonso, the director of the WHO's malaria programme.

Sri Lanka almost succeeded in eliminating malaria 50 years ago. Through the 1940s, Sri Lanka routinely had a million cases of malaria a year. Then officials began an intensive public health campaign, relying on DDT to kill mosquitoes and chloroquine to cure the disease. By 1963, the annual caseload has fallen to a mere 17.

Then the drive ran out of money and faltered, and annual cases of malaria rose above 5,00,000 by 1969.

By then, mosquitoes had evolved resistance to DDT, and by 1992 to its successor, malathion. Malarial parasites first showed resistance to chloroquine in 1984.

But the failure also was political: The country's ethnic fabric disintegrated.

In 2002, outside the rebel controlled areas in the northeast, malaria cases began dropping as the government, with donor help, deployed a mix of indoor spraying, bed nets, rapid diagonistic kits and medicines that combined artemisinin, an effective treatment, with other drugs. The government also screened blood samples drawn—for any reason—in public clinics and hospitals for malaria infection, and officials established a nationwide electronic case-reporting system.

—Donald Meneil Jr.

Power from Husk in Bihar

Electrical engineer Gyanesh Pandey, has never met Shahrukh Khan. But, his story which won international accolade in May 2011, is remarkably similar to Khan's portrayal of a NRI engineer providing power to his native village in the film 'Swades'.

The 35 year-old has given cheap and clean electricity generated from waste rice husk to 380 poorest villages in West Champaran district of Bihar and his work is now one of the five most innovative green projects in the world.

Ashden Awards for sustainable energy in London said Pandey's company Husk Power Systems provides clean, reliable electricity supply.

"Husk Power's 65 plants gasify rice husks and other biomass waste to supply electricity to around 180,000 people and, by replacing kerosene, they cut greenhouse emmissions by over 8,000 tonnes of carbon dioxide a year," said a statement issued by the Ashden Awards.

Pandey quit his lucrative MNC job in Los Angeles, eight years after he had graduated from the BHU, and pursuing a dream career in the USA.

When an offical in the Ministry of New and Renewable Energy offered help to generate electricity from rice husk, Pandey took up. Later that year, he set up their first unit in village Tamkuha in Champaran district.

For a monthly rental of Rs. 1OO, 50 watt of power— enough to light two CFL and a mobile phone charger—is provided to each of the 32,500 households.

Paddy Crop Stubble Burning in North India
Crop Fires already On in Punjab & Haryana

AMIT BHATTACHARYA and JAYASHREE NANDI

Despite a ban and dire warnings from the Delhi high court, crop fires have started raging across Punjab and northern Haryana, data from NASA satellites reveal. In what could be further bad news for Delhi's air quality, the data indicates that the fires may have begun early this year, compared with 2015.

The burning of paddy stubble to clear the fields for winter sowing is a rampant practice in Punjab and Haryana, leading to severe air pollution across the region. It's one of the contributors to the sharp drop in air quality usually seen over Delhi-NCR in October-November.

An image from NASA's Earth Observing System Data and Information System (EOSDIS) website shows 'fire spots' dotting Punjab and northern Haryana. Each spot denotes thermal and fire anomalies detected by NASA's satellites.

The maps give an idea of the geographic spread of crop burning. The fire patterns have been similar from October 8 onwards.

Images from the same period last year show visibly fewer fire spots. Stubble burning usually peaks in early November.

On October 6, the Delhi high court had warned the Chief Secretaries of four states (Punjab, Haryana, U.P., and Rajasthan) that they would be held responsible if crop burning persisted in their states this year.

The fires may start impacting Delhi's air quality in the coming days.

All of this week, Delhi recorded "poor" air quality, according to Central Pollution Control Board's air quality index bulletein.

"The fires will not impact the capital's air quality immediately. The impact is dependent on meteorological factors such as wind direction, wind speed and temperature. It can take about 8-10 days to show up," said a scientist from System of Air Quality and Weather Forecasting and Research (SAFAR).

Some Delhi government officials also noticed the fires on satellite maps but said they had already written to the governments of Punjab, Haryana, and Rajasthan requesting them to strictly implement the ban on burning of agricultural waste.

Delhi government had also written to the Union environment minister on October 4, requesting the ministry to direct the three states to prevent farm fires.

"The government has already taken up the matter with them. Even the high court had directed these states to ensure there is no burning of paddy straw. Now I am not sure what else can be done," a senior environment department official said.

The Supreme Court-mandated Environment Pollution Control Authority (EPCA) had held a meeting on October 7 with chief secretaries and senior officials of Punjab and Haryana governments on crop stubble burning. Bhure Lal, head of EPCA, made a number of directions to ensure "zero crop stubble burning" this year.

"In order to ensure effective enforcement of the law, the states shall start imposing penalty and prosecution for all incidents of stubble burning through district level special teams," a note by EPCA read.

EPCA also directed state governments to launch awareness campaigns before the paddy harvesting period, and asked state remote sensing agencies to stay vigilant.

Farmers in northern Haryana said the state government had stepped up its campaign against stubble burning and had warned of imposing fines on errant farmers. However, they said there was still no viable alternative to stubble burning.

"I would have to buy equipment worth Rs 5 lakh to get rid of the paddy stubble. That's a lot of investment. The government had issued warning but I fear a lot of farmers will continue to burn their paddy residues," said Ruby Singh Sandhu, a farmer who owns around 60 acres of land in Mallekan village in northern Haryana.

Home minister of Delhi, Satyendra Jain had claimed that the higher levels of air pollution in the capital was not a local phenomenon.

"Western Uttar Pradesh, Haryana, and Punjab produce a lot of chemicals after burning the residue of crop cutting which is major source of air pollution here," he had said. He said that the odd-even traffic scheme would only be implemented in the "worst case scenario as it was needed last year."

Delhi to get the heat

Though crop burning seems to have started in Punjab and Haryana, direct impact on Delhi's air quality will take some time to show.

Experts say it will take at least three-four days for the capital to feel impact of this annual problem because of meteorological factors such as wind speed and temperature.

About 30% of the particulate matter—particles that form in the atmosphere from gaseous pollutants such as sulphur dioxide, nitogen oxides, ammonia, and volatile organic compounds—is believed be caused by stubble burning.

"The situation will deteriorate as the pollutants enter Delhi in the next three to four days. But again, that depends on wind direction and speed. The air quality has been fluctuating between poor and moderate levels but it will slowly turn poor with falling temperature," a senior weather scientist said.

"Lower wind speed leads to an increase in the concentration of pollutants while higher speed disperses the particles. A dip in temperature, too, increases concentration of particulate matters" he said.

According to pollution figures put out by monitoring agencies including the Central Pollution Control Board (CPCB), Delhi Pollution Control Committee and SAFAR, Delhi's air quality is slowly plunging from "moderate" to "poor".

Even *Skymet weather*, a private weather portal, claimed that the sudden chill in the air coupled with cool winds is increasing pollution in the city. "Due to establishment of the anti-cyclone over Rajasthan, dry and cool winds coming from the northwest direction are blowing over northwest and central India including Delhi and NCR.

These cool winds are being held responsible for the nippy conditions during early morning hours in the national capital.

"Minimum temperatures have been dropping continuously during the last few days. On Saturday morning it came down to 17.5^0 C. Such lower temperatures during morning hours and very light winds are leading to the formation of slight haze. In the absence of strong winds the dust particles are mixing with the haze, forming a blanket of smog near the surface levels. This could lead to breathing problems and other ailments," *a Skymet* release said.

A fortnight back, the CPCB convened a meeting of all member secretaries to devise an action plan to "effectively" and "strictly" monitor any incidence of burning of crop stubble in Haryana, Uttar Pradesh and Punjab. Delhi high court had warned the chief secretaries of Punjab, Haryana, Uttar Pradesh and Rajasthan that they would be held responsible if crop burning was done in their states this year.

75 th Issue (Sept. 2017) will be the 'Platinum Jubilee Number'. Send your Advertisement.

Indian Spices and Herbs

Pepper: The pepper plant grows best in a warm and humid climate. Berries mature and are ready for harvest in about 180 to 200 days.

Cardamom: A cardamom plant normally starts bearing capsules from the third year of planting. The harvested capsules are rubbed on wire mesh and polished before they are graded.

Nutmeg: The nutmeg tree bears fruit throughout the year, but peak harvest season is from December to May.

Ginger: Ginger is a herb that is native to Southeast Asia and has been used as a food additive for more than 4,000 years, and for medicinal purposes for more than 2,500 years.

Turmeric: It is commonly used in curries and other South Asian cuisine. Its active ingredient is curcumin. It is a significant ingredient in most commercial curry powders.

Cinnamon: It is principally employed in cookery as a condiment and flavoring material. It is used in the preparation of chocolate.

Clove: Clove trees begin to bear flowers 7-8 years after planting. Unopened flower buds are carefully picked when they turn from green to pink.

Coffee Plant: The main varieties of coffee cultivated today are Robusta and Arabica. The elliptical leaves of the coffee tree are shiny, dark, green and waxy.

Allspice: The name "allspice" was coined as early as 1621 by the English, who thought it combined the flavour of cinnamon, nutmeg and cloves.

Cocoa: Cocoa tree, is a small tall evergreen tree in the family Malvaceae, native to the deep tropical regions of Central and South America. Its seeds, cocoa beans, are used to make cocoa mass, cocoa powder, and chocolate.

Vanilla: A tropical orchid, this requires a warm climate with frequent rains. Vanilla grows best in uncleared jungle areas where it can get filtered sunlight.

Tulsi: The name "tulsi" means "the incomparable one". Tulsi is a venerated plant and devotees worship it in the morning and evening.

Curry Leaf: The leaves are highly valued as seasoning in South Indian and Sri Lankan cooking, much like bay leaves and especially in curries with fish or coconut milk.

Centella: This plant is good for the brain. *Centella asiatica* Urb. is the scientific name of the plant. It has been named Saraswati in Sanskrit, because of its relation to the brain.

Bird's Eye Chilli: Bird's eye chilli, or Thai chilli is a chilli pepper, a cultivar from the species *Capsicum annuum*, commonly found in Southeast Asia. Bird's eye chilli can also be found in India, in Meghalaya, Assam and Kerala. It is used in traditional dishes of the Kerala cuisine.

A Look in the Future: Parthenogenotes

Men may have babies using skin cells

ANDREW GRIFFIN

A new experiment defies nature and might one day let two males have babies with each other. The new study overthrows the idea that it is only possible to produce children using an egg, and fertilising it with sperm. Instead, the research suggests that it might be possible to conceive children usking skin cells.

In a new experiment, scientists have shown that it would be possible to conceive in mice using other kinds of cells. The study showed that it was possible to produce healthy offspring while bypassing the normal route of fertilising an egg with sperm. Thus, it would be possible to fuse sperm with ordinary cells like skin or other tissue, without using cloning, to produce babies.

As such , it could lead the way to human reproduction that completely cuts the female part of the process.

Scientists have called such a scenario "speculative and fanciful", but haven't ruled it out. If that happened, it would allow gay men to have children with each other. And it would allow a man to fertilise his own cells with his own sperm, producing offspring that would use only his genes and those inherited from his parents.

But the finding also suggests that women whose fertility has been wiped out by cancer drugs or other treatments can still have their own children, using another of their cells. At the moment, people in that situation can only have children of their own if their eggs were frozen before treatment.

And the same treatment could allow for the preservation of endangered species, since it allows scientists to get around the often complicated and difficult process of collecting eggs from those that they wish to help breed. Instead, they could just use sperm and somatic cells.

"Our work challenges the dogma, held since early embryologists first observed mammalian eggs around 1827 and observed fertilisation 50 years later, that only a egg cell fertilised with a sperm cell can result in live mammalian birth," said lead scientist Tony Perry, a molecular embryologist from the University of Bath, England.

But Perry also made it clear the tests on mice only prove that the technique would work in principle.

The experiment used "parthenogenote" mouse embryos —all-female embroys made without any sperm, created by tricking an egg into developing as if it was fertilised. Usually, those embryos die after a few days because they are not properly programmed. But in the new studies, scientists found that they could inject them with sperm and transform them into normal embryos.

The study produced 30 mouse pups with a success rate of 24%.

That finding matters, because parthenogenotes are similar to other ordinary cells, like skin cells. Both are mitotic, and if an offspring can be produced from one then it should be possible to create them from the other.

"The practical applications of this as the technology stands at the moment are not very broad. These embryos are mitotic cells—mitotic cells are the type of cell that almost every dividing cell in our body is. And therefore potentially one day we might be able to extend what we've sown in these mitotic cells to other mitotic cells," Perry said.

(From *The Independent*).

Top UK Botanist visits Nilgiris

A botanist at the Royal Botanic Garden at Edinburgh, Henry Noltie, who was on a visit to the Nilgiris, spoke of the tremendous threats faced by the forests in the Nilgiris and also of the destructive role played by invasive species, such as the omnipresent Eucalyptus trees that dot many parts of the landscape in the district.

Speaking to *The Hindu*, Mr. Noltie, who has been studying Indian plant species over the last 10 years, said that there needed to be better awareness among the forest departments in India about the importance of native species of plants and trees, and how their survival is linked to the well-being of the animals in the Nilgiris.

"Coincidentally, an Indian plant species, known as the Himalayan Balsam, has become an invasive species in many parts in UK," he said.

He added that in India too, afforestation practises should be geared towards the introdcution of local plant species. "Eucalyptus was initially introduced for fuel as they were fast-growing. Afforestation in places where such trees are cut down should focus on reintroducing local shola trees," he said.

Mr. Noltie also said that botanical gardens in India needed to play a greater role in raising awareness among the public about the importance of native species as well.

"There needs to be more work to be done to make people aware of local plant species," he said.

Japanese Biologist Yoshinori Ohsumi gets Nobel Prize

On the Autophagy and Cellular DNA Recycling

Stockholm: Japanese biologist Yoshinori Ohsumi won the Nobel Prize in medicine on 3rd Oct 2016, for discoveries on how cells break down and recycle content, a garbage disposal system that scientists hope to harness in the fight against cancer, Alzheimer's and other diseases.

The Karolinska Institute honoured Ohsumi for "brilliant experiments" in the 1990s on autophagy, a phenomenon that literally means "self-eating" and describes how cells gobble up damaged content and provide building blocks for renewal.

Disrupted autophagy has been linked to several diseases including Parkinson's, diabetes and cancer, the prize committee said.

"Intense research is now ongoing to develop drugs that can target autophagy in various diseases," it said in its citation.

Ohsumi, 71, from Fukuoka, Japan, is a Professor at the Tokyo Institute of Technology. In 2012 he won the Kyoto Prize, Japan's highest private award for global achievement. "As a scientist, I'm extremely honoured," Ohsumi said in a live telephone interview with Japanese broadcaster NHK.

Speaking in Japanese about his work, he said the "human body is always repeating the auto-decomposition process, or cannibalism, and there is a fine balance between formation and decomposition. That's what life is about."

Nobel committee secretary Thomas Perlmann said Ohsumi seemed surprised when he was informed he had won the Nobel Prize.

"The first thing he said was 'ahhh'. He was very very pleased," Perlmann said.

Nobel judges often award discoveries made decades ago, to make sure that they have stood the test of time.

Though scientists have known that autophagy exists for more than 50 years, its fundamental significance was only recognised after Ohsumi's "Paradigm-shifting research" on yeast in the 1990s, the committee said.

"Thanks to Ohsumi and others following in his foot steps, we now know that autophagy controls important physiological functions where cellular components need to be degraded and recycled," it said.

David Rubinsztein, deputy director of the Institute for Medical Research at the University of Cambridge, said Ohsumi's discoveries have provided critical tools to study the role of autophagy in infectious diseases, cancers and neurodegenerative diseases such as from Huntington's and Parkinson's.

"Indeed, autophagy manipulation may provide a key strategy for treating some of these conditions," Rubinsztein said.

"Autophagy helps explain how a cell conserves energy during times of starvation, using recycled material for survival. It can eliminate invading bacteria and viruses, contributes to embryo development and helps counteract the negative consequences of aging", the prize committee said.

"This system is a renewal station so that damaged or long-lived proteins can be recycled to be able to build new molecules, new proteins so that you can sustain your good life," Nobel committee member Juleen Zierath said.

It was the 107th award in the medicine category, since the first Nobel prizes were handed out in 1905. Last year's prize was shared by three scientists who developed treatments for malaria and other tropical diseases.

Indian Endangered Species List Doubles in 2 yrs

India's rapid water contamination has taken a toll on the fishes, with 45 new species added to the list for a total of 67 endangered species in 2012.

39 new species of Amphibians have been added to the list—up from 35 species in 2010 to 74 in 2012. The Anamalai Flying Frog, Gundia Indian Frog and Kerala Indian Frog figure on the list.

There are now 40 endangered reptiles—up from 14 in 2010—including Gharial, Hawksbill Turtle and the Red-crowned Roofed Turtle. The CAG said status surveys were caried out on three endangered species since 1993 by the Zoological Survey of India.

Updating the Red Data Book—the country's offical record of threatened species, is due. The book was last updated about 20 years ago.

75th Issue (Sept. 2017) will be the 'Platinum Jubilee Number'. Send your Manuscripts.

Paris Agreement on Climate Change
Came into force frm Nov. 4, 2016

At least 20 countries are expected to formally join the Paris agreement on climate change now, greatly improving the pact's chances of coming into force within a year after it was negotiated in the French capital, UN officials say.

That's considered a blistering pace in the world of international diplomacy, reflecting a sense of urgency in the fight against global warming and a desire to seal the deal before the Obama administration leaves office.

Brazil, Mexico, Argentina, and Morocco are expected to hand over documents at the UN in New York to formally complete the ratification process. At least half a dozen small island nations, including Papua New Guinea, Tonga and Kiribati will also follow suit.

"We are ready. We will announce it in New York," Moroccan environment minister Hakima el-Haite said.

After years of negotiations, governments agreed in Paris in December 2015 to curb the emissions of carbon dioxide and other greenhouse gases that scientists say are warming the planet. US President Barack Obama and Chinese President Xi Jinping ratified the Paris deal during the G20 meet in China in Sept. 2016.

More than 170 world leaders have signed the deal, but it won't take effect until 55 countries accounting for at least 55% of global emissions have ratified or accepted it through their domestic procedures. That was initially expected to take several years, but 28 countries accounting for 39% of emissions have already done, including China and the USA, the world's top greenhouse gas emitters.

US diplomats are now pushing other countries to accelerate their ratification efforts so that the deal can enter into force this year. The White House says President Barack Obama and secretary of state John Kerry plan to corner foreign leaders in the hallways during the UN gathering to personally pressure them to join.

"We're very anxious to have it move forward quickly", US climate envoy Jonathan Pershing said. "We are talking to everybody about the urgency." It's possible that more than 55 countries will have joined by the end of mid-Sept. It will likely take a bit longer to reach 55% of world's emissions. Pershing said the haste comes down to the fact that"this is a problem that can't wait."

Others say another factor is the potential of a shift in US climate policy depending on the outcome of the presidential election in November. Democratic party candidate Hillary Clinton has said the US must implement the Paris agreement, but Republican candidate Donald Trump has said he will cancel the deal. "The Obama administration clearly would like to see this done before they leave office," said Alden Meyer, a veteran observer of the UN climate talks at the Union of Concerned Scientists.

The Paris agreement asks both rich and poor countries to take action to curb the rise in the global temperatures that is melting glaciers, raising sea levels and shifting rainfall patterns across the globe. It requires governments to present national plans to reduce emissions, though the targets themselves aren't internationally binding.

The European Union, which considers itself as one of the architects of the Paris deal, is trying to fast-track its ratification process to avoid the embarassment of sitting on the sidelines when it comes into force. The EU, which accounts for 12% of emissions planned to wait for its 28 member states to approve the deal domestically, but now wants to ratify it on their behalf. "It's technically possible," said Anna-Kaisa Itkonen, a spokeswoman for EU climate commissioner Miguel Arias Canete.

With or without the EU, there's a chance that the deal can enter into force as early as the next UN climate conference, which starts November 7 in Morocco.

Police Jawans initiated Potato Farming in Himalaya

Some Police personnel, who were formally sent to protect the Kedarnath Shrine area, have grown potato at the height of 11,700 feet.

Their first harvest was celebrated and offered to Lord Kedarnath and Nandi on the Dussehra day, while rest were distributed as 'prasad' among all present.

Kedarnath is at the height of 11,700 feet above sea level in Himalaya. Only junipers and 'bugyali' grasses grow there. Growing potato was considered impossible.

Potato is grown up to the height of 7-8000 feet. Growing it at the height of Kedarnath is really the hard labour of police people. At this height the crop will be safe from insect pests and diseases, say agricultural experts.

Jawans first sowed potato seeds in two fields at their base camp at Brahma Vatika in June this year. It is at an height of approx. 11,500 feet. The yield of the first field itself came to about 30 kg., in October 2016.

A Revised Classification of the Indian Nymphalidae (Lepidoptera)

R.K. VARSHNEY

A Biologists Confrerie,
Raj Bhawan, Manik Chowk, Aligarh (U.P.) - 202 001.

Butterflies of family Nymphalidae are very attractive, comparatively bigger is size and adorned with beautiful colours and patterns on the wings. It was, therefore, a set back that Talbot (1939, 1947), who described butterfly species of several other families of the British India in detail, did not cover this family.

Over the period, Nymphalidae has become even larger family, with the inclusion of some other the then families in it, namley Danaidae, Satyridae, Amathusiidae, Acraeidae and Libytheidae. Its classification has undergone several changes and the placement of genera has also been affected in some cases.

In the recent years, Varshney (2010) has reported the classification and genera occurring within the Indian Region. In another compilation, Smith (2010) reported Nymphalidae of Nepal.

Five years later, Varshney & Smetacek (2015) have catalogued all butterfly taxa in India. Meanwhile, Eliot, who has revised the butterflies of Malay Peninsula (Corbet & Pendlebury—3rd & 4th Edn.; 1978, 1992), has prepared an update for this monograph and there he has commented widely on the classification of Nymphalidae (Eliot, 2006). Harvey (1991) and Wahlberg et al. (2003) have published important documents on the Nymphalid classification. As a result, it seems a revision has become necessary for the Indian region. The compiled account is presented here to report the current status of subfamilies of Nymphalidae and a probable hint of the placement of genera in each. This may hold good till further studies are made.

Classification in Varshney (2010)

Fam. NYMPHALIDAE
Subfam. DANAINAE
Tribe Danaini
Danaus, Ideopsis, Parantica, Tirumala.
Tribe Euploeini
Idea, Euploea.
Subfam. SATYRINAE
Tribe Satyrini
Subtribe Melanitini
Melanitis, Cyllogenes, Parantirrhoea.
Subtribe Elymniini
Elymnias.
Subtribe Lethini
Lethe, Nemetis, Neope, Patala, Zophoessa, Lasiommata, Chonala, Lopinga, Mandarinia, Rhaphicera, Orinoma.
Subtribe Zetherini
Penthema, Ethope, Neorina.
Subtribe Mycalesini
Mycalesis, Orsotriaena, Zipaetis.
Tribe Eritini
Erites, Coelites.
Subtribe Ragadini
Ragadia.
Subtribe Ypthimini
Ypthima, Callerebia, Dallacha, Hemadara.
Subtribe Coenonymphini
Coenonympha.
Subtribe Maniolini
Hyponephele, Maniola.
Subtribe Melanargini
Melanargia.
Subtribe Satyrini
Aulocera, Hipparchia, Karanasa, Paroeneis, Xanthotaenia.
Subfam. CALINAGINAE
Calinaga.
Subfam. AMATHUSIINAE
Tribe Faunidini
Faunis, Melanocyma, Aemona, Stichophthalma.
Tribe Amathusiini
Amathusia, Amathuxidia, Zeuxidia, Thaumantis, Thauria.
Tribe Discophorini
Discophora, Enispe.
Subfam. NYMPHALINAE
Tribe Biblidini
Ariadne, Laringa, Byblia.
Tribe Argynnini
Subtribe Argynnini
Argyreus, Childrena, Fabriciana, Pandoriana, Argyronome, Issoria, Mesoacidalia, Kuekenthaliella, Boloria, Clossiana.
Tribe Heliconiini
Phalanta, Cupha, Vagrans, Vindula, Paduca, Cirrochroa, Terinos.
Tribe Nymphalini
Subtribe Melitaeini
Melitaea.
Subtribe Nymphalini (Vanessini)

Symbrenthia, Araschnia, Nymphalis, Aglais, Kaniska, Polygonia, Vanessa, Cynthia, Precis, Junonia.
Subtribe Hypolimnini
Kallima, Doleschallia, Rhinopalpa, Yoma, Hypolimnas.
Tribe Marpesiini
Cyrestis, Chersonesia.
Tribe Limenitidini
Subtribe Neptini
Neptis, Phaedyma, Lasippa, Pantoporia.
Subtribe Limenitidini
Athyma, Limenitis, Moduza, Parasarpa, Sumalia, Auzakia, Bhagadatta.
Subtribe Parthenini
Lebadea, Parthenos, Neurosigma.
Subtribe Adoliadini (Euthaliini)
Abrota, Tanaecia, Dophla, Bassarona, Symphaedra, Euthalia, Lexias.
Tribe Pseudergolini
Pseudergolis, Stibochiona, Dichorragia.
Tribe Apaturini
Rohana, Chitoria, Apatura, Dilipa, Sephisa, Helcyra, Eulaceura, Herona, Euripus, Diagora, Hestina, Sasakia.
Subfam. CHARAXINAE
Tribe Prothoini
Prothoe, Agatasa.
Tribe Charaxini
Polyura, Charaxes.
Subfam. Acraeinae
Tribe Acraeini
Acraea, Pareba.
Tribe Cethosiini
Cethosia.
Subfam. LIBYTHEINAE
Libythea.

Classification in Smith (2010)

Family NYMPHALIDAE
Subfamily LIBYTHEINAE
Libythea.
Subfamily ACRAEINAE
Acraea.
Subfamily NYMPHALINAE
Tribe Heliconiini
Cethosia, Cupha, Vagrans, Vindula, Cirrochroa, Phalanta, Argyreus, Childrena, Fabriciana, Mesoacidalia, Issoria, Kuekenthaliella, Melitaea.
Tribe Nymphalini
Symbrenthia, Vanessa, Aglais, Nymphalis, Kaniska, Polygonia, Precis, Hypolimnas, Doleschallia.
Tribe Biblidini
Ariadne.
Tribe Limenitidini
Limenitis, Lebadea, Neurosigma, Abrota, Athyma, Pantoporia, Lasippa, Neptis, Phaedyma, Tanaecia, Euthalia, Symphaedra.
Tribe Pseudergolini
Pseudergolis, Dichorragia, Stibochiona.
Tribe Cyrestini (Marpesiini)
Cyrestis, Chersonesia.
Tribe Apaturini
Apatura, Rohana, Dilipa, Hestina, Diagora, Euripus, Herona, Sephisa.
Subfamily CHARAXINAE
Charaxes, Polyura.
Subfamily AMATHUSIINAE
Enispe, Discophora, Thaumantis, Stichophthalma.
Subfamily SATYRINAE
Melanitis, Lethe, Zophoessa, Nemetis, Neope, Patala, Lasiommata, Rhaphicera, Crebeta, Orinoma, Elymnias, Mycalesis, Orsotriaena, Ypthima, Dallacha, Callerebia, Paralasa, Coenonympha, Hyponephele, Aulocera, Hipparchia, Paroeneis.
Subfamily DANAINAE
Tribe Danaini
Danaus, Tirumala, Parantica.
Tribe Euploeini
Euploea.

Classification in Varshney & Smetacek (2015)

Fam. NYMPHALIDAE
Subfam. DANAINAE
Tribe Danaini
Danaus, Ideopsis, Parantica, Tirumala.
Tribe Euploeini
Idea, Euploea.
Subfam. CALINAGINAE
Calinaga.
Subfam. CHARAXINAE
Tribe Prothoini
Prothoe.
Tribe Charaxini
Polyura, Charaxes.
Subfam. MORPHINAE
Tribe Amathusiini
Faunis. Aemona. Stichophthalma. Amathusia. Amathuxidia, Thaumantis, Thauria, Discophora, Enispe.
Subfam. SATYRINAE
Tribe Elymniini
Elymnias.
Tribe Zetherini
Neorina, Penthema, Ethope.
Tribe Melanitini
Melanitis, Cyllogenes, Parantirrhoea.

Tribe Satyrini

Lethe, Neope, Lasiommata, Kirinia, Chonala, Rhaphicera, Orinoma, Heteropsis, Mycalesis, Orsotriaena, Zipaetis, Erites, Coelites, Ragadia, Hyponephele, Callerebia, Paralasa, Loxerebia, Ypthima, Oeneis, Paroeneis, Karanasa, Satyrus, Aulocera, Hipparchia, Chazara, Pseudochazara, Kanetisa.

Subfam. LIMENITIDINAE

Tribe Limenitidini

Neptis, Phaedyma, Lasippa, Pantoporia, Athyma, Limenitis, Moduza, Parasarpa, Sumalia, Auzakia, Bhagadatta, Lebadea, Parthenos, Neurosigma.

Tribe Adoliadini

Abrota, Cynitia, Tanaecia, Euthalia, Symphaedra, Lexias.

Subfam. HELICONIINAE

Tribe Argynnini

Argynnis, Issoria, Boloria.

Tribe Heliconiini

Phalanta, Cupha, Vagrans, Vindula, Algia, Cirrochroa.

Subfam. BIBLIDINAE

Tribe Biblidini

Ariadne, Laringa, Byblia.

Subfam. APATURINAE

Tribe Apaturini

Rohana, Eulaceura, Chitoria, Mimathyma, Dilipa, Sephisa, Helcyra, Herona, Euripus, Hestina, Hestinalis, Sasakia.

Subfam. CYRESTINAE

Tribe Cyrestini

Cyrestis, Chersonesia.

Tribe Pseudergolini

Pseudergolis, Stibochiona, Dichorragia.

Subfam. NYMPHALINAE

Tribe Melitaeini

Melitaea.

Tribe Nymphalini

Symbrenthia, Araschnia, Nymphalis, Aglais, Kaniska, Polygonia, Vanessa.

Tribe Junoniini

Junonia.

Tribe Kallimini

Hypolimnas, Kallima, Doleschallia, Rhinopalpa, Yoma.

Subfam. ACRAEINAE

Tribe Acraeini

Acraea.

Tribe Cethosiini

Cethosia.

Subfam. LIBYTHEINAE

Libythea.

Notes from Eliot (2006)

Harvey (1991) has divided fam. Nymphalidae into the following 13 subfamilies:

1. Danainae, 2. Ithomiinae, 3. Tellervinae, 4. Calinaginae, 5. Morphinae, 6. Brassolinae, 7. Satyrinae, 8. Heliconiinae, 9. Nymphalinae, 10. Limenitidinae, 11. Apaturinae, 12. Charaxinae, and 13. Libytheinae.

Out of these, sl. no. 2, 3 and 6 subfamilies are not found in the Indian Region.

Wahlberg et al. (2003) have further proposed to raise Cyrestini and Biblidini to the subspecies level, to which Eliot agrees.

For Satyrinae, while Varshney (2010) followed Miller (1968), its subfamilies have been downgraded to tribes by Harvey (1991). Amathusiinae has been treated now as a tribe under Morphinae. Eliot (2006) feels that it is a link between Satyrinae and Morphinae and so to be placed in between.

In Limenitidinae, Harvey (op. cit.) included four tribes: Limeitidini, Coloburini (Neotropical; not in Indian region), Biblidini and Cyrestini.

Penz & Peggie (2003) have removed *Cethosia* from Acraeini and placed it in Heliconiini. They subdivided Heliconiinae into four tribes; Acraeini, Heliconiini, Vagrantini and Argynnini.

Eliot (2006) suggested that a new dendogram be made in place of his earlier one given on page 101 in the Corbet & Pendlebury (1992). This new dendogram is prepared here (Fig. 1), on suggestions indicated by Eliot.

The arrangement of some genera (vide Eliot, 2006), within this revised classification may be reproduced as follows:

Family NYMPHALIDAE

Subfam. LIMENITIDINAE

Tribe Limenitidini

Moduza, Lebadea, Athyma, Sumalia. (Also Sundanian *Pandita).*

Tribe Neptini

Neptis, Phaedyma, Lasippa, Pantoporia.

Tribe Parthenini

Parthenos, Bhagadatta.

Tribe Adoliadini

Tanaecia, Euthalia, Dophla, Bassarona, Lexias.

Subfam. BIBLIDINAE

Tribe Biblidini

Ariadne, Laringa.

Subfam. CYRESTINAE

Tribe Cyrestini

Cyrestis, Chersonesia.

Tribe Pseudergolini

Amnosia, Stibochiona, Dichorragia.

Subfam. NYMPHALINAE

Tribe Nymphalini

Vanessa, Kaniska, Symbrenthia.

Tribe Kallimini

Rhinopalpa, Yoma, Hypolimnas, Doleschallia, Kallima, Junonia.

Subfam. HELICONIINAE

Tribe Acraeini

Acraea.

Tribe Heliconiini

Cethosia.

Tribe Vagrantini

Phalanta, Cupha, Vagrans, Vindula, Algia (=*Paduca*), *Cirrochroa, Terinos.*

Tribe Argynnini

Argyreus [see infra].

Subfam. APATURINAE

Rohana, Eulaceura, Herona, Euripus, Sephisa, Hestina, Hestinalis.

The rest of the genera in Indian Nymphalidae may remain on the places as shown in Varshney & Smetacek (loc. cit.).

However, instead of Eliot's use of *Argyreus*, I incline to follow Simonsen (2006), who suggests two subtribes for the Indian region in tribe Argynnini, namely (i) Yrameina, which includes *Boloria*, and (ii) Argynnina, which includes *Issoria* and *Argynnis*. He has reduced following genera [vide supra Varshney (1910); part Heliconiinae of Smith (1910) and Eliot (2006)] into subgenera of *Argynnis* : *Argyreus, Argyronome, Childrena, Pandoriana* and *Fabriciana*; *Mesoacidalia* is discarded; spp. *clara* and *aglaja* included in the subgenus *Speyeria* Scudder.

The subtribes are to be denoted with the suffix '-ina', as per the recent 4th Edn. of the *International Code of Zoological Nomenclature*.

Lastly, I may quote Eliot (2006) on this subject, "Finally I think it is unlikely that the last word has yet been said on nymphalid classification. But it can be said with certainty that the arrangement set out above is much preferable [to that used earlier]."

Acknowledgment : I thank Mr. Peter Smetacek, Bhimtal, for providing some of the literature.

References

Corbet, A. S. & Pendlebury, H. M. 1978, 1992. *The Butterflies of the Malay Peninsula*, 3rd and 4th Ed., revised by J. N. Eliot. Malayan Nature Society, Kuala Lumpur.

Eliot, J. N. 2006. Updating *The Butterflies of the Malay Peninsula. Malayan Nature J.*, 59(1): 1-49.

Harvey, D. 1991. Appendix B : Higher classification of the Nymphalidae. In : *The Development and Evolution of Butterfly Wing Patterns* (Ed. H. F. Nijhout). Smithsonian Institution Press, Washington : pp. 255-273.

Miller, L. D. 1968. The higher classification, phylogeny and zoogeography of the Satyridae (Lepidoptera). *Mem. Amer. Ent. Soc.*, 24 : vi+iii+174 pp.

Penz, C. M. & Peggie, D. 2003. Phylogenetic relationships among Heliconiinae genera based on morphology (Lepidoptera : Nymphalidae). *Syst. Ent.*, 28: 451-479.

Simonsen, T.J. 2006. Fritillary phylogeny, classification and larval host plants : reconstructed mainly on the basis of male and female genitalic morphology (Lepidoptera : Nymphalidae : Argynnini). *Biol. J. Linn. Soc.*, 89: 627-673.

Smith, Colin 2010. *Lepidoptera of Nepal*. Himalayan Nature, Kathmandu : iv+182 pp.

Talbot, G. 1939, 1947. *The Fauna of British India including Ceylon and Burma—Butterflies*, 2nd Ed., vol. 1 and vol. 2. Taylor & Francis, London.

Varshney, R. K. 2010. *Genera of Indian Butterflies*. Nature Books India, New Delhi & Kolkata : vi + 186 pp., 16 pl.

Varshney, R. K. & Smetacek, P. (Eds.) 2015. *A Synoptic Catalogue of the Butterflies of India*. Butterfly Research Centre, Bhimtal & Indinov Publishing, New Delhi: ii + 261pp., 8 pl.

Wahlberg, N., Weingartner, E. & Nylin, S. 2003. Towards a better understanding of the higher systematics of Nymphalidae (Lepidoptera : Papilionoidea). *Molecular Phylogen. & Evol.*, 28 : 473-484.

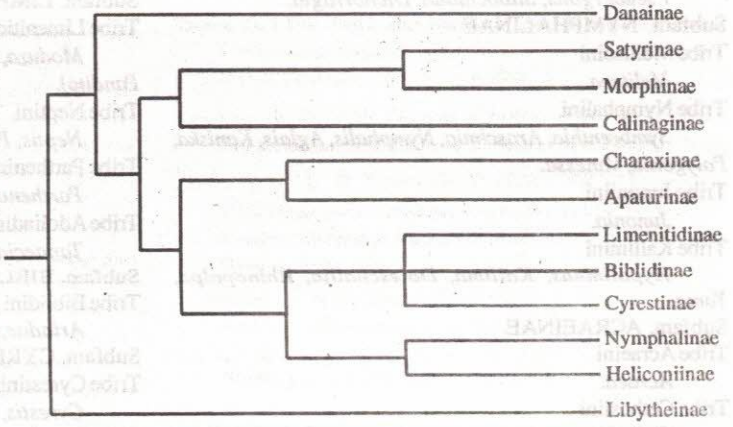


Fig. 1. A provisional arrangement of 12 subfamilies of the Indian Nymphalidae, in revised classification.

Butterflies of the Karnala Bird Sanctuary, Raigad, Maharashtra

RAJU KASAMBE

B-205, Trimurti Apartment, Borkar Lane, Tilak Nagar, Dombivli (East) - 421201, Distt. Thane (Maharashtra).
E-mail: *raju.bnhs@gmail.com.*

Introduction

Karnala Bird Sanctuary (18°53'N and 73°7'E) is situated in Panvel *taluka* of Raigad district and is about 60 km from Mumbai, on the Mumbai-Goa Highway (NH-17), with an elevation range of approximately 20 mts to 450 mts. It was declared as a Sanctuary in 1968 with an area of 4.48sq.km. In 1975 the area was increased to 12.11sq.km. About 2.5km long stretch of the highway passes right through the Sanctuary dividing it into two unequal parts, the larger part with the fort and the smaller part on the West side of the Highway. Situated in the Biogeographic province of Malabar Plains Region, the Sanctuary is part of one of the spurs of the Northern Sahyadri Range in the Western Ghats. The highest point of the Sanctuary is the Karnala Fort at 450mts. The Sanctuary shows a 40% tree cover. There are five distinct habitat types in the Sanctuary, viz., Hill Forests, mostly Southern Dry Mix Deciduous Forest, Open Forest of Teak (*Tectona grandis*), Riverine Fringe Forest and isolated patches of grasslands. There are few water bodies and streams flowing through it.

Materials and Methods

Butterflies were observed opportunistically during the span of five years, i.e., 2010 to 2015 in Karnala Bird Sanctuary. Most observations were taken in monsoon and winter along the existing trails earmarked for tourists and at a pond (mud-puddling site) during summer. Some observations were taken along the national highway passing through the sanctuary. Photography of the butterflies was done during the study period for identification purpose. No specimen was collected during this study. Butterflies were identified in the field or from the photographs using two field guides on Indian butterflies (Kehimkar, 2008; Wynter-Blyth, 1957).

The present paper provides a preliminary checklist of butterflies of Karnala with notes on their abundance. Butterflies were categorized into five groups based on their occurrence during the study period on the basis of frequency of sightings. Accordingly, those species observed were categorized as:

A-Abundant-Seen on 80-100% of field visits in most habitats
C-Common-Seen on 60-80% of field visits in most habitats
U-Uncommon-seen on 40-60% of field visits in most habitats
R-Rare-seen on 20-40% of field visits in most habitats
VR-Very Rare-seen on less than 20% of field visits

Results and Discussion

A preliminary checklist of butterflies was prepared after opportunistic surveys were done in the study area during the period of five years (2010-2015). The family-wise abundance of the species recorded during the survey is Papilionidae: 10 species, Pieridae: 14 species, Nymphalidae: 38 species, Lycaenidae: 33 species and Hesperiidae: 19 species (see Table 1). Thus total 114 butterfly species were recorded. The species-wise abundance was found to be Abundant:22 species, Common:22 species, Uncommon:27 species, Rare:22 species, and Very Rare:21 species.

The paper includes following three species photographed by other naturalists but not seen by the author in the study area. A Plain Puffin *Appias indra* was photographed by Nikhil Bhopale here in July 2008 (Bhopale, 2008). A Silverstreak Blue *Iraota timoleon* was photographed by Animish Mandrekar in February 2008 (Mandrekar, 2008). Omkar Godbole photographed a Common Map *Cyrestis thyodamas* here in January 2012 (Godbole, 2012).

Gaonkar (1996) had reported 208 species in the entire Western Ghats stretch of Maharashtra. Sharma & Chaturvedi (2006) had reported occurrence of 138 species in Sanjay Gandhi National Park and Mumbai region. Later Kasambe (2012) reported 172 species from the same area. Thus it can be said that, more intensive and systematic surveys will result into addition of many species in this preliminary checklist.

Acknowledgements: Thanks to my friends Mr. Vijay Kulkarni, Nandish Songire, Divakar Thombre, Bichees TV, Siddhesh Surve, Ms. Monica Jhaveri and son Master Vedant Kasambe, for accompanying me during the many visits to Karnala.

References

Bhopale, N. 2008. http://www.indianaturewatch.net/displayimage.php?id=55596. As accessed in January 2016.

Gaonkar, H. 1996. *Butterflies of Western Ghats, India (including Sri Lanka): A Biodiversity Assessment of a Threatened Mountain System*. Centre for Ecological Sciences, Indian Institute of Science, Bangalore; Zoo-

Table 1. Checklist of butterflies found in Karnala Bird Sanctuary, Raigad and their abundance.

	Common Name	Species Name	Abundance
		Family: Papilionidae	
1	Spot Swordtail	*Pathysa nomius* (Esper, 1798)	C
2	Common Jay	*Graphium doson* (C. & R. Felder, 1864)	C
3	Tailed Jay	*Graphium agamemnon* (Linnaeus, 1758)	A
4	Common Bluebottle	*Graphium sarpedon* (Linnaeus, 1758)	C
5	Lime Butterfly	*Papilio demoleus* (Linnaeus, 1758)	A
6	Blue Mormon	*Papilio polymnestor* (Cramer, 1775)	C
7	Common Rose	*Pachliopta aristolochiae* (Fabricius, 1775)	A
8	Crimson Rose	*Pachliopta hector* (Linnaeus, 1758)	C
9	Common Mormon	*Papilio polytes* (Linnaeus, 1758)	A
10	Common Mime	*Papilio clytia* Linnaeus, 1758	R
		Family: Pieridae	
1	Common Gull	*Cepora nerissa* Fabricius, 1775	A
2	White Orange Tip	*Ixias marianne* Cramer, 1779	U
3	Yellow Orange Tip	*Ixias pyrene* Linnaeus, 1764	U
4	Great Orange Tip	*Hebomoia glaucippe* Linnaeus, 1758	C
5	Common Jezebel	*Delias eucharis* Drury, 1773	A
6	Psyche	*Leptosia nina* Fabricius, 1793	A
7	Common Wanderer	*Pareronia valeria* (Cramer, 1776)	C
8	Common Emigrant	*Catopsilia pomona* Fabricius, 1775	A
9	Mottled Emigrant	*Catopsilia pyranthe* Latreille, 1758	C
10	Plain Puffin	*Appias indra* Moore, 1857	VR
11	Spotless Grass Yellow	*Eurema laeta* Boisduval, 1836	C
12	Common Grass Yellow	*Eurema hecabe* Linnaeus, 1758	A
13	Small Grass Yellow	*Eurema brigitta* (Stoll, 1780)	U
14	Pioneer	*Belenois aurota* (Fabricius, 1793)	U
		Family: Nymphalidae	
1	Glassy Tiger	*Parantica aglea* (Stoll, 1782)	C
2	Blue Tiger	*Tirumala limniace* Cramer, 1775	A
3	Dark Blue Tiger	*Tirumala septentrionis* (Butler, 1874)	R
4	Plain Tiger	*Danaus chrysippus* Linnaeus, 1758	A
5	Common Or Striped Tiger	*Danaus genutia* Cramer, 1779	A
6	Common Indian Crow	*Euploea core* (Cramer, 1780)	A
7	Brown King Crow	*Euploea klugii* Moore, 1858	R
8	Common Bushbrown	*Mycalesis perseus* (Fabricius, 1775)	A
9	Dark-brand Bushbrown	*Mycalesis mineus* Linnaeus, 1758	R
10	Long-brand Bushbrown	*Mycalesis visala* Moore, 1857	R
11	Common Leopard	*Phalanta phalantha* Drury, 1773	R
12	Tawny Coster	*Acraea violae* (Linnaeus, 1758)	C
13	Commander	*Moduza procris* (Cramer, 1777)	R
14	Common Sailer	*Neptis hylas* Linnaeus, 1758	A
15	Short-banded Sailer	*Phaedyma columella* (Cramer, 1780)	R
16	Chestnut-Streaked Sailer	*Neptis jumbah* Moore, 1857	R
17	Common Baron	*Euthalia aconthea* (Cramer, 1777)	C
18	Gaudy Baron	*Euthalia lubentina* (Cramer, 1777)	VR
19	Baronet	*Euthalia nais* (Forster, 1771)	R
20	Common Castor	*Ariadne merione* (Cramer, 1777)	U

21	Angled Castor	*Ariadne ariadne* Linnaeus, 1763	U
22	Painted Lady	*Vanessa cardui* (Linnaeus, 1758)	U
23	Gray Pansy	*Junonia atlites* (Linnaeus, 1763)	A
24	Peacock Pansy	*Junonia almana* (Linnaeus, 1758)	A
25	Yellow Pansy	*Junonia hierta* (Fabricius, 1798)	VR
26	Chocolate Pansy	*Junonia iphita* (Cramer, 1779)	A
27	Lemon Pansy	*Junonia lemonias* (Linnaeus, 1758)	A
28	Blue Pansy	*Junonia orithya* (Linnaeus, 1758)	R
29	Great Eggfly	*Hypolimnas bolina* (Linnaeus, 1758)	U
30	Danaid Eggfly	*Hypolimnas misippus* (Linnaeus, 1764)	C
31	Blue Oakleaf	*Kallima horsfieldi* Kollar, 1844	R
32	Black Rajah	*Charaxes solon* (Fabricius, 1793)	R
33	Tawny Rajah	*Charaxes bernardus* (Fabricius, 1793)	VR
34	Common Fivering	*Ypthima baldus* (Fabricius, 1775)	VR
35	Common Evening Brown	*Melanitis leda* (Linnaeus, 1758)	C
36	Common Nawab	*Polyura athamas* (Drury, 1773)	R
37	Anomalous Nawab	*Polyura agraria (Charaxes agrarius)* Swinhoe, 1887	VR
38	Common Map	*Cyrestis thyodamas* Boisduval, 1836	VR
		Family: Lycaenidae	
1	Plum Judy	*Abisara echerius* (Moore, 1901)	C
2	Red Pierrot	*Talicada nyseus* Guérin, 1843	U
3	Common Pierrot	*Castalius rosimon* Fabricius, 1775	A
4	Angled Pierrot	*Caleta caleta* Hewitson, 1876	U
5	Rounded Pierrot	*Tarucus nara* Kollar, 1848	VR
6	Malayan	*Megisba malaya thwaitesi* (Horsfield, 1828)	C
7	Common Hedge Blue	*Acytolepis puspa* (Horsfield, 1828)	U
8	Lime Blue	*Chilades laius* (Cramer, 1782)	U
9	Plains Cupid	*Chilades pandava* (Horsfield, 1829)	R
10	Dark Grass Blue	*Zizeeria karsandra* (Moore, 1865)	U
11	Lesser Grass Blue	*Zizina otis* (Fabricius, 1787)	U
12	Tiny Grass Blue	*Zizula hylax* (Fabricius, 1775)	U
13	Grass Jewel	*Freyeria trochylus* (Freyer, 1845)	C
14	Gram Blue	*Euchrysops cnejus* (Fabricius, 1798)	U
15	Pointed Ciliate Blue	*Anthene lycaenina* (C. & R. Felder, 1868)	VR
16	Forget-me-not	*Catochrysops strabo* (Fabricius, 1793)	U
17	Pea Blue	*Lampides boeticus* (Linnaeus, 1767)	C
18	Dark Cerulean	*Jamides bochus* Stoll, 1782	U
19	Common Cerulean	*Jamides celeno* (Cramer, 1775)	A
20	Common Lineblue	*Prosotas nora* (Felder, 1860)	R
21	Taililess Lineblue	*Prosotas dubiosa* (Semper, 1879)	R
22	Indian Sunbeam	*Curetis thetis* (Drury, 1773)	U
23	Angled Sunbeam	*Curetis acuta* Moore, 1877	VR
24	Leaf Blue	*Amblypodia anita* Hewitson, 1862	R
25	Yamfly	*Loxura atymnus* (Cramer, 1782)	R
26	Monkey Puzzle	*Rathinda amor* (Fabricius, 1775)	VR
27	Silverstreak Blue	*Iraota timoleon* (Stoll, 1790)	VR
28	Common Silverline	*Spindasis vulcanus* (Fabricius, 1775)	R
29	Peacock Royal	*Tajuria cippus* (Fabricius, 1798)	VR
30	Cornelian	*Deudorix epijarbas* (Moore, 1875)	VR

31	Common Guava Blue	*Virachola isocrates* Fabricius, 1793	VR
32	Indian Red Flash	*Rapala iarbus* (Fabricius, 1787)	VR
33	Zebra Blue	*Leptotus plinius* (Fabricius, 1793)	C
		Family: Hesperiidae	
1	Brown Awl	*Badamia exclamationis* (Fabricius, 1775)	C
2	Common Awl	*Hasora badra* (Moore, 1857)	U
3	Plain Banded Awl	*Hasora vitta* (Butler, 1870)	VR
4	Common Banded Awl	*Hasora chromus* (Cramer, 1780)	VR
5	Conjoined Swift	*Pelopidas conjuncta* (Herrich-Schäffer, 1869)	VR
6	Small Branded Swift	*Pelopidas mathias* (Fabricius, 1798)	U
7	Indian Skipper	*Spialia galba* (Fabricius, 1793)	VR
8	Chestnut Bob	*Iambrix salsala* (Moore, 1865)	U
9	Vindhyan Bob	*Arnetta vindhiana* (Moore, 1883)	U
10	Indian Palm Bob	*Suastus gremius* (Fabricius, 1798)	U
11	Dark Palm Dart	*Telicota ancilla* (Herrich-Schäffer, 1869)	U
12	Golden Angle	*Caprona ransonnetti* (Felder, 1868)	U
13	Black Angle	*Tapena thwaitesi* (Moore, 1881)	R
14	Common Spotted Flat	*Celaenorrhinus leucocera* (Kollar, 1848)	C
15	Tricoloured Pied Flat	*Coladenia indrani* (Moore, 1865)	R
16	Common Small Flat	*Sarangesa dasahara* (Moore, 1865)	A
17	Spotted Small Flat	*Sarangesa purendra* (Moore, 1882)	C
18	Common Redeye	*Matapa aria* (Moore, 1865)	VR
19	Grass Demon	*Udaspes folus* (Cramer, 1775)	U

logical Museum, Denmark; The Natural History Museum, London: 82pp.

Godbole, O. 2012. http://www.indianaturewatch.net/displayimage.php?id=293064. As accessed in January 2016.

Kasambe, R. 2012. Butterfly fauna of the Sanjay Gandhi National Park and Mumbai. *Bionotes*, 14 (3): 76-80.

Kehimkar, I. 2008. *The Book of Indian Butterflies*. Bombay Natural History Society, Mumbai: 1-497.

Mandrekar, A. 2008. http://www.indianaturewatch.net/displayimage.php?id=39265. As accessed in January 2016.

Wynter-Blyth, M.A. 1957. *Butterflies of the Indian Region*. Bombay Natural History Society, Mumbai: 523pp.

Tallest Mother and Son in India Guinness World Record

Karan Singh's parents were a worried lot when he started school. He was to be admitted to kindergarten but he was already 5 feet tall.

"When he started school, other kids used to run away from him because he was so unusually big. My wife and I worried for him. We wondered how he would fit in society. With time the kids got used to him, and now he has many friends," says Sanjay Singh, Karan's father.

Karan Singh holds the Guinness World Record for being the tallest kid for his age—in a few months, he will turn six years. He stands 5 feet 7 inches tall. He was 4 feet 5 inches when he was just two-and-a-half-years old.

But he is not alone. His 25-year-old mother, Shweatlana Singh, is 7 feet 2 inches tall. What is more, the family claims she is still growing, at about four inches every two years.

Till 2012, Shweatlana held the Guinness record for being India's tallest woman. Siddiqa Parveen, from West Bengal, at 8 feet 2 inches, recently displaced her.

Sanjay Singh of Meerut (U.P.), says of his wife: "She grows taller by at least four inches every two years." Singh is a dietician, and Shweatlana is an International Basket Ball Coach.

Additions to the Ichthyo-faunal diversity in Luni River, near Luni town, Jodhpur (Rajasthan)

HARINDER SINGH BANYAL and SANJEEV KUMAR

Desert Regional Centre, Zoological Survey of India, Jodhpur - 342005 (Rajasthan).
E-mail : *dr.harinderbanyal@gmail.com*

Luni, one of the most important seasonal river of Western Rajasthan, flows only during the rainy season. Luni's basin is situated in between 24° 11' to 26° 43' North latitude and 70° 37' to 74° 39' East longitude approximately. Luni starts from western slopes of the Aravali range at an elevation of 550 m, near Ajmer, and after traversing a distance of about 500km in a south-westerly direction through the districts of Ajmer, Pali, Jodhpur, Nagaur, Barmer, Jalore and Sirohi in Rajasthan, the river ends in the swampy land of Rann of Kachchh in Gujarat.

Its main tributaries are the Sukri, Mithri, Bandi, Khari, Jawai, Guhiya and Sagi from the left, and the Jojari River from the right. This river serves as a primary source of irrigation in the region. Primarily, it is not saline up to Balotara district but, gradually becomes saline when it meets the saline land in this area. This river has a tendency to increase its width rather than deepening the bed because the banks are made up of soil only.

Present research communication deals with studies on the fish diversity of river Luni at Luni junction, near Jodhpur city. Present research work was carried out in September, 2016. Monsoon rains average during July-September, 2016 in Jodhpur region have provided good amount of water in the Luni River from its catchment area which initiated the present investigation work. The paper reports presence of five species of fishes during the month of September, 2016 from Luni River in aforesaid area. Cypriniformes & Cyprinodontiformes were the dominant order of fishes each represented by two spp., followed by Perciformes with one species only.

Material and Methods

Fishes were collected mainly by using cast net. Hand net and scoop net were also used. The fishes were preserved in 10% formalin for further studies and were identified following Talwar & Jhingran (1991), Jayaram (1999) and Froese & Pauly (2014) i.e.www.fishbase.org, [version (06/2016)].

Results and Discussion

Yazdani (1996) has described a total of 142 species from the whole Thar Desert, out of which 112 species belonging to 64 genera 26 families and six orders were described from the Thar region of Rajasthan. Johal et al. (2000) have described 57 spp. of fish from the Thar Desert of Rajasthan, whereas Mohan & Singh (2006) reported 80 species of fish from the same region of the Thar Desert. Earlier Banyal (2012) has reported three spp. of fish from Luni River near Kankani village of Jodhpur district. Subsequently, Banyal & Kumar (2014) have reported eight spp. of fish from Luni River at Sanchore region of Rajasthan state. The present work reported five spp. of fish from this river.

Present observations justify presence of *Aphanius dispar* (Ruppell) in large numbers in this river as this fish tolerates slightly saline water. Similarly *Channa punctata* (Bloch) is also a hardy fish which can survive in adverse conditions. *Gambusia affinis* (Baird & Girard) is an introduced fish for mosquito control. *Salmophasia bacaila* (Ham.-Buch.) has been reported first time from the Luni River.

The above mentioned fishes are not important commercially but these fishes offer ideal habitat for utilization by piscivorous indigenous and migratory birds which visit this wetland ecosystem especially, during winter months. Hence, this ecosystem forms a vital part of the food chain of this region. Maintenance of critical water level by agencies in this river will facilitate food to the piscivorous birds dependent on this wetland.

List of the fishes reported from the river with classification and their IUCN (2012) status is given in Table I. According to the IUCN 2012, all the five species are of 'Least Concern' status.

Table I. Fishes in the Luni river, Rajasthan.

	Species name	IUCN (2012) status
	Order Cypriniformes	
	Family Cyprinidae	
	Subfamily Cyprininae	
1	*Pethia ticto* (Ham.-Buch.)	LC
2	*Salmophasia bacaila* (Ham.-Buch.)	LC
	Order Cyprinodontiformes	
	Family Cyprinodontidae	
3	*Aphanius dispar* (Ruppell)	LC
	Family Poeciliidae	
4	*Gambusia affinis* (Baird & Girard)	LC
	Order Perciformes	
	Family Channidae	
5	*Channa punctata* (Bloch.)	LC

Acknowledgement: Authors are thankful to Dr. Kailash Chandra, Director, Zoological Survey of India, for providing necessary facilities to undertake the present study.

References

Banyal, H S. 2012. Exploration of fish diversity in River Luni at Kankani village near Jodhpur, Rajasthan. *J. Env. Bio.-Sci.*, 26 (2) : 141-142.

Banyal, H. S. & Kumar, Sanjeev, 2014. New record of fish diversity in the Luni River at Sanchore region of Rajasthan State. *J. Env. Bio-Sci.*, 28 (1) : 45-46.

Froese, R. & Pauly, D. (Ed.) 2016. Fish Base. *World Wide Web electronic publication.*

Jayaram, K.C. 1999. *The Freshwater Fishes of the Indian region*. Narendra Publishing House, Delhi : 551pp.

Johal, M. S., Chauhan, R. C. & Gupta, M. L. 2000. Ichthyofauna of Thar Desert of Rajasthan, India. *Punjab Univ. Res. Bull.*, 50 : 73-90.

Mohan, D, & Singh, S. 2006. Fish faunal diversity of Thar Desert of Rajasthan. *J. Nat. Cong.* 18 (2) : 261-270.

Talwar, P.K. & Jhingran, A.G. 1991. *Inland Fishes of India and Adjacent Countries*. (Vols. 1 & 2). Oxford and IBH Publ. Co. Pvt. Ltd., New Delhi : 1158pp. +xix maps.

Yazdani, G.M. 1996. Fish diversity in Thar Desert. In: *Faunal Diversity in the Thar Desert: Gaps in Research*, (Eds. Ghosh, A. K., Baqri Q.H. & Prakash, I). Scientific Publishers, Jodhpur. : 285-295.

Regrow Saffron to help Afghanistan

AILI McCONNON

Bomb-blasted roads, frequent blackouts, shortages of basic equipment and an untested consumer market are hardly conditions that make for natural entrepreneurial opportunities.

But three Army verterans and one civilian, who all served in Afghanistan, have taken on those challenges in their new venture. Their company, Rumi Spice, buys saffron from Afghan farmers and sells it to international customers.

Rumi Spice, the company's name was inspired by the 13th century Persian poet. Started two years ago, Rumi Spice now sells saffron that is used by the chefs in renowned restaurants like the French Laundry in California and Daniel in NewYork. It appeared on the shelves and website of the luxury food seller Dean & DeLuca.

What is Saffron?

Saffron is one of the most expensive spices in the world, costing $2,500 to $30,000 a kilogram. A staple in Indian, Moroccaon and Persian cruisine, it is also a crucial ingredient in European dishes like Spanish paella and French bouillabaisse. As Americans search out the latest artisanal trends, Afghan saffron is starting to make inroads.

The Rumi Spice founders decided to focus on farmers because 80% of the Afghan population works in agriculture, according to the United States embassy in Kabul.

Growing Saffron

Saffron is expensive because it is difficult to grow and painstaking to harvest. Each amethyst-colored saffron crocus produces just three stigmas. The stigmas are separated by hand from the blossom and then dried into rusty-red threads.

About 150 flowers are needed to produce a single gram of saffron. Afghan saffron has a reputation for being particularly flavourful—in part because of the terrain and harsh climate around Herat, where it is grown.

In 2014, Keith Alaniz, an army engineer officer who worked with regional governments in Afghanistan, approached his friend Kimberly Jung, whom he had met while working for the Army Corps of Engineers after Hurricane Sandy in New York, about the idea of marketing Afghan saffron.

Jung had been an army engineer officer who searched for roadside bombs in Afghanistan. She was then at Harvard Business School with Emily Miller, also a former army engineer officer, who had assisted Special Operations on night raids.

The company's fourth founder, Carol Wang, had worked in Afghanistan on a World Bank-backed rural development programme.

Start of Rumi Spice

Rumi Spice worked with 34 farmers in 2015. The company plans to work with more than 80 farmers for this year's harvest in October and November. The next step was to open a processing plant. In April 2015, Rumi Spice began a Kickstarter campaign and raised nearly $33,000 in less than two months. The processing plant, based in Herat, employed 75 Afghan women in 2015.

In 2016, Rumi Spice is on track to reach its projected revenue of $500,000 for the year.

Hivers and Strivers and Golden Seeds, an investing group that backs start-ups created by women, have invested a combined $272,000.

Rumi Spice has hired locals to help provide security for the operations in Afghanistan. Abdul Shakoor Ehrarri, an agricultural specialist manages the saffron processing plant.

Additional Records of Some Odonata Species from Various Indian States

R. K. VARSHNEY

A Biologists Confrerie,
Raj Bhawan, Manik Chowk, Aligarh - 202 001.

Recently by the courtesy of Dr. Gaurav Sharma, I received a copy of his book on the damselflies and dragonflies of Rajasthan (Sharma, 2015). It is a beautiful pictorial handbook with large number of photographs. Although its subject matter is restricted to Rajasthan State, it makes all India coverage in two aspects : (i) showing distribution of species in different Indian States, and (ii) citing of the references of Odonata publications for India at large.

While going through this recent exhaustive and informative publication, I felt the fact that certain species have not been shown in some Indian States, from where they have already been recorded earlier. To make the distributional range of these species complete, I thought it proper to report such cases.

The species are arranged below in accordance with Sharma (op. cit.).

1. ***Agriocnemis pygmaea*** (Rambur)
(Sharma, 2015 : no. 1, p. 76)
Recorded from Kerala by Emiliyamma et al. (2005).

2. ***Ceriagrion cerinorubellum*** (Brauer)
(Sharma, 2015 : no. 2, p. 78).
Recorded from Kerala by Emiliyamma et al. (2005).

3. ***Ischnura nursei*** (Morton)
(Sharma, 2015 : no. 6, p. 86)
It is recorded from Kerala by Sharma (2015), but not by Emiliyamma et al. (2005). It is placed in genus *Rhodischnura* by Prasad & Varshney (1995).

4. ***Copera marginipes*** (Rambur)
(Sharma, 2015 : no. 11, p. 98).
Recorded from S. Andaman Is. by Prasad & Varshney (1995).

5. ***Disparoneura quadrimaculata*** (Rambur)
(Sharma, 2015 : no. 12, p. 100).
Recorded from Delhi, U. P. and Western Ghats, by Prasad & Varshney (1995). On the other hand, its records from Bihar, W. Bengal etc. by Sharma (2015) have not come to my notice.

6. ***Neurobasis chinensis*** (Linn.)
(Sharma, 2015 : no. 13, p. 104)
I collected specimens from a locality in Meghalaya in between Shillong and Nongpoh, in 1967. This material was deposited in the Eastern Reg. Stn. (now Northeastern Reg. Centre) of Z.S.I. I believe it is reported by Lahiri (1987) in his monograph on the Odonata of Meghalaya, where he has included my other large number of Shillong odonate collections.
Prasad & Varshney (1995) report its distribution as 'throughout India'.

7. ***Paragomphus lineatus*** (Selys)
(Sharma, 2015 : no. 15, p. 110).
Recorded from Haryana and U. P. by Prasad & Varshney (1995).

8. ***Anax immaculifrons*** Rambur
(Sharma, 2015 : no. 17, p.116)
Recorded from Kerala by Emiliyamma et al. (2005).

9. ***Brachydiplax sobrina*** (Rambur)
(Sharma, 2015 : no. 21, p. 128)
Recorded from Assam, Meghalaya and Chandigarh, by Prasad & Varshney (1995).

10. ***Bradinopyga geminata*** (Rambur)
(Sharma, 2015 : no. 23, p. 132)
Recorded from Kerala by Emiliyamma et al. (2005).

11. ***Diplacodes lefebvrei*** (Rambur)
(Sharma, 2015 : no. 25, p. 136)
Recorded from Kerala by Sharma (2015), but not by Emiliyamma et al. (2005).

12. ***Orthetrum triangulare*** (Selys)
(Sharma, 2015 : no. 35, p. 156).
I studied a rare specimen of it, having asymmetrical venation on the foewings of its left and right side wings (Varshney & Prasad, 1981). This specimen came from Mawroh, near Shillong, Meghalaya.
Also recorded from Haryana and Western Himalaya, by Prasad & Varshney (1995).

13. ***Palpopleura sexmaculata*** (Fabr.)
(Sharma, 2015 : no. 36, p. 158).
This species was recorded by me from the Khasi Hills (Meghalaya) (Varshney, 1971).
Prasad & Varshney (1995) show that this has two subspecies : *P. s. octomaculata* Fraser which is distributed in Eastern India; and *P. s. sexmaculata* which occurs throughout India.

14. ***Rhyothemis variegata*** (Linn.)

(Sharma, 2015 : no. 39, p.164).

A very common species in the plains of Bihar. I recorded it from 3 villages in the south of Patna (Varshney & Guha, 1972). Prasad & Varshney (1988) also recorded it from Bihar (Patna, Koilwar and Dhanbad, the last one is now in Jharkhand).

15. ***Trithemis kirbyi*** Selys

(Sharma, 2015 : no. 46, p.178).

Recorded from Himachal Pradesh by Prasad & Varshney (1995). Also recorded from Kerala by Emiliyamma et al. (2005).

After these 15 species, I desire to report two species recorded earlier from Rajasthan, but not included in Sharma (2015).

16. ***Lestes viridulus*** Rambur

Prasad in Ghosh et al. (1996) has shown its records from Punjab, Haryana, Gujarat, and Rajasthan (Jodhpur).

17. ***Selysiothemis nigra*** (Van der Linden)

It was earlier known in India from Jammu & Kashmir State only. Prasad in Ghosh et al. (1996) reported its occurence in Jodhpur, Rajasthan.

This species was earlier known as *Urothemis advena* Selys.

References

Emiliyamma, K. G., Radhakrishnan, C. & Palot, M. J. 2005. *Pictorial Handbook on Common Dragonflies and Damselflies of Kerala*. Zooloical Survey of India, Kolkata : 67pp.

Lahiri, A. R. 1987. Studies on the Odonata fauna of Meghalaya. *Rec. zool. Surv. India, Occ. Paper,* No.99 : 402 pp.

Prasad, M. 1996 . Odonata in the Thar Desert : pp. 145-149. In : *Faunal Diversity in the Thar Desert : Gaps in Research* (Eds. A. K. Ghosh et al.). Scientific Publishers, Jodhpur : 410 pp.

Prasad, M. & Varshney, R. K. 1988. The Odonata of Bihar, India. *Rec. zool. Surv. India, Occ. Paper,* No. 110 : 48 pp.

Prasad, M. & Varshney, R. K. 1995. A Check-list of the Odonata of India including data on larval studies. *Oriental Ins.*, 29 : 385-428.

Sharma, G. 2015. *Pictorial Handbook on Damselflies and Dragonflies (Odonata : Insecta) of Rajasthan*. Zoological Survey of India, Kolkata : 266 pp.

Varshney, R. K. 1971. On some dragonflies of Khasi Hills. *J. Assam Sci. Soc.*, 14 (1) : 97-100, 1 pl.

Varshney, R. K. & Guha, M. 1972. A note on the wing markings of dragonflies *Rhyothemis variegata variegata* (L.) (Odonata : Libellulidae). *Patna Univ. J.*, 27 (2 & 4) : 1 - 4.

Varshney, R. K. & Prasad, M. 1981. Asymmetrical wing - venation in *Orthetrum triangulare triangulare* (Selys) (Odonata : Libellulidae). *Sci. & Cult.*, 47: 292-294.

Uproot all Apple Trees over 50 yrs old

60% apple orchards produce inferior fruit

Over 60% of apple orchards in India are producing inferior quality fruit and need to be replaced. This was an observation made by horticulturists and farmers gathered in Dehradun from across the country to participate in the two-day National Apple Festival. Many experts said that many of the apple trees have grown too old to produce good quality fruit which is adversely impacting apple production. "We estimate that almost 4 lakh hectares of land out of a total of 6.5 hactares covered by apple orchards in the country is populated by senile trees. This is leading to a year-on-year reduction in our apple production since the last one decade," said Ravindra Chauhan, President of the Apple Growers' Association of India.

It is not as if the problem has not been recognised. In 2013, a scheme was started by the Union government which was intended to motivate farmers to replace old trees with new ones by giving them an incentive. However, the amount of Rs 351 per tree that was offered to uproot an old tree to plant a fresh one was perceived as "too little" by many farmers, as a result of which the scheme did not have many takers. "I have over 80 apple trees which were planted by my father in the 1950s but today they are not of much use. The meagre amount offered by the government could barely cover the costs needed to uproot a full grown old tree, treat the soil and plant new saplings. Hence, our interest in continuing with apple farming is slowly waning." said Ramesh Kashav, an apple farmer who has orchards near Shimla in Himachal Pradesh.

Experts said, "Apple production can multiply within three years of uprooting all the old trees, since the new variety of plants start fruiting from the third year of plantation. However, the government has to support the farmers in the gestation period by providing them alternate source of livelihood to ensure that they do not quit apple cultivation," said an expert at the festival. Dhani Ram Gautam, ex-director of the Y.S. Parmar University of Horticulture and Forestry in Solan, Himachal Pradesh, said, "if apple tree replacement project is left to farmers, there is a very high possibility that it will not get uniformly implemented, leading to a little or no improvement in yield."

Notes from D'Abrera's *Butterflies of the Oriental Region*, Relevant to South Asian Taxa

R.K. VARSHNEY

A Biologists Confrerie,
Raj Bhawan, Manik Chowk, Aligarh (U.P.) - 202001.

(Contd. from Vol. 18, No. 3, page 93)

(71) ***Niphanda*** Moore, 1875
1. *N. asialis* de Niceville, 1895
   i. *N. a. marcia* Fawcett - India to peninsular Malaya.
2. *N. tesselata* Moore, 1875 - S Myanmar, Sundaland.
3. *N. cymbia* de Niceville, 1884 - N India to peninsular Malaya, Sumatra, Borneo.

(72) ***Orthomiella*** de Niceville, 1890
1. *O. pontis* Elwes, 1887
   i. *O. p. pontis* Elwes - Sikkim.
   ii. *O. p. roverea* Fruhstorfer - N and Central Myanmar.

(73) ***Una*** de Niceville, 1890
1. *U. usta* Distant, 1886 - N India to Sundaland.

(74) ***Petrelaea*** Toxopeus, 1929
1. *P. dana* de Niceville, 1883 - "? Oriental region".

(75) ***Nacaduba*** Moore, 1881
[Based on Tite, 1963. *Bull. Br. Mus. nat. Hist.*, 13 (4): 70 - 116].
1. *N. pactolus* Felder, 1860 - Throughout Oriental Region and Australia.
   i. *N. p.* race *ceylonica* Fruhstorfer - Sri Lanka.
   ii. *N. p.* race *continentalis* Fruhstorfer - Sikkim to China, Indo China.
   iii. *N. p.* race *andamanica* Fruhstorfer - Andamans.
   iv. *N. p.* race *macrophthalma* Felder - S Nicobars, Pulo Mihu.
2. *N. pavana* Horsfield, 1828
   i. ["*N. p.* ?subsp." on fig. and in the text: "the figured specimen represents an undescribed race from Andaman Is." —D'Abrera, p. 638].
   ii. *N. p.* race *vajuva* Fruhstorfer - ?S Myanmar, Thailand, ? Indo China.
3. *N. hermus* Felder, 1860
   i. *N. h.* race *sidoma* Fruhstorfer - Sri Lanka, S India.
   ii. *N. h.* race *nabo* Fruhstorfer - Assam, Myanmar to N Thailand, ? Indo China.
   iii. *N. h.* race *vicamia* Corbet - S Nicobars.
4. *N. ollyetti* Corbet*, 1947 - Sri Lanka.
5. *N. subperusia* Snellen, 1896
   i. *N. s.* race *nadia* Eliot - Nicobars.
6. *N. berenice* Herrich - Schaeffer, 1869
   i. *N. b.* race *ormistoni* Toxopeus - Sri Lanka.
   ii. *N. b.* race *plumbeomicans* Wood - Mason & de Niceville - India to N Myanmar, Andamans.
   iii. *N. b.* race *nicobaricus* Wood-Mason & de Niceville - Nicobars.
   iv. *N. b.* race *aphya* Fruhstorfer - S Myanmar, Thailand.
7. *N. sinhala* Ormiston, 1924 - Sri Lanka.
8. *N. kurava* Moore, 1857
   i. *N. k.* race *prominens* Moore - Sri Lanka.
   ii. *N. k.* race *canaraica* Toxopeus - S India.
   iii. *N. k.* race *euplea* Fruhstorfer - Sikkim to Myanmar, Thailand.
   iv. *N. k.* race *sambalanga* Tite - Nicobars.
9. *N. beroe* Felder, 1865
   i. *N. b.* race *minima* Toxopeus - Sri Lanka.
   ii. *N. b.* race *gythion* Fruhstorfer - Assam to Myanmar, ? Thailand.

(76) ***Ionolyce*** Toxopeus, 1929
1. *I. helicon* Felder, 1860
   i. *I. h.* race *merguiana* Moore - S Myanmar, Thailand to Singapore, Sumatra, ? Borneo.
   ii. *I. h.* race *viola* Moore - Sri Lanka , ? India, ? Assam.
   iii. *I. h.* race *brunnea* Evans - Andamans.
   iv. *I. h.* race *kondulana* Evans - Nicobars.

(77) ***Catopyrops*** Toxopeus, 1930
1. *C. ancyra* Felder, 1860
   i. *C. a.* race *aberrans* Elwes - Assam, Myanmar to peninsular Malaya, ? Sumatra.

(78) ***Prosotas*** Druce, 1891
1. *P. aluta* Druce, 1873
   i. *P. a.* race *coelistis* de Niceville - Andamans, India, Assam, ? Sri Lanka.
2. *P. nora* Felder, 1860
   i. *P. n.* race *ardates* Moore - Sri Lanka and India.
   ii. *P. n.* race *fulva* Evans - Andamans.
   iii. *P. n.* race *dilata* Evans - Nicobars.
3. *P. pia* Toxopeus, 1929

---

* "Corbet's ♀ allotype of *ollyetti* is actually *sidoma* —G. E. Tite" in D' Abrera.

i. *P. p.* race *marginata* Tite - Sikkim, Assam and Myanmar.
4. *P. bhutea* de Niceville, 1883 - Sikkim, Assam, Myanmar, Thailand, peninsular Malaya.
5. *P. dubiosa* Semper, 1879
i. *P. d.* race *indica* Evans - Sri Lanka, India, Sikkim, Assam, Myanmar, ?Thailand.
6. *P. noreia* Felder, 1868
i. *P. n.* race *noreia* Felder - Sri Lanka.
ii. *P. n.* race *hampsonii* de Niceville - S India.

(79) ***Jamides*** Hübner, 1819
["In need of total overhaul and revision" —D'Abrera].
1. *J. bochus* Stoll, 1782 - Entire Oriental region.
i. *J. b. bochus* Stoll - Sri Lanka.
ii. *J. b. plato* Fabr. - India to Myanmar to China.
iii. *J. b. nicobaricus* Wood - Mason & de Niceville - Nicobars.
2. *J. pura* Moore, 1886 - Sikkim, Assam to Sumatra.
3. *J. coruscans* Moore - Sri Lanka.
4. *J. cunilda* Snellen, 1896
i. *J. c. purpura* Evans - Myanmar and ? N Thailand.
5. *J. philatus* Snellen, 1878
i. *J. p. subdita* Moore - Myanmar to peninsular Malaya.
6. *J. celeno* Cramer, 1775
i. *J. c. tissama* Fruhstorfer - Sri Lanka.
ii. *J. c. kinkura* Felder - Nicobars.
7. *J. caerulea* Druce, 1873
i. *J. caerulea* Druce - Myanmar to Singapore, Sumatra and Borneo.
8. *J. kankena* Felder, 1862 - Nicobars.
9. *J. elpis* Godart, 1824
i. *J. e. pseudelpis* Butler - Myanmar, Thailand, Singapore.
10. *J. lacteata* de Niceville, 1895 - Sri Lanka, India to Sikkim, Assam. ?Myanmar.
11. *J. ferrari* Evans, 1932
i. *J. f. ferrari* Evans - Nicobars.
12. *J. alecto* Felder, 1860
i. *J. a. meilichius* Fruhstorfer - Sri Lanka and S India.
ii. *J. a. eurysaces* Fruhstorfer - N India, Assam to Thailand.
iii. *J. a. kondulana* Felder - Nicobars.
iv. *J. a. ozea* Fruhstorfer - Sikkim.

(80) ***Lampides*** Hübner, 1819
1. *L. boeticus* Linn. - In all Regions, except Americas.

(81) ***Catochrysops*** Boisduval, 1832
1. *C. panormus* Felder, 1860
i. *C. p. panormus* Felder - Sri Lanka, India to Indo China.
2. *C. strabo* Fabr., 1793 - Sri Lanka, India, Sikkim to Indo China, Sundaland. ?Sulawesi.

(82) ***Castalius*** Hübner, 1819
1. *C. rosimon* Fabr., 1775 - Entire Oriental Region.

(83) ***Discolampa*** Toxopeus, 1929
1. *D. ethion* Westwood, 1851 - Throughout Oriental Region, except Taiwan.
i. *D. e. ?colmus* Frushstorfer - S Andamans and Sri Lanka.
ii. *D. e. airavaki** Doherty - Nicobars.
iii. *D. e. ethion* Westwood - N India and from Sikkim to Myanmar.
iv. *D. e. vavasanus* Fruhstorfer - S India.

(84) ***Caleta*** Fruhstorfer, 1922
1. *C. roxus* Godart, 1824
i. *C. r. roxana* de Niceville - Myanmar, Thailand to Indo China.
ii. *C. r. manluena* Felder - Nicobars, ?Andamans.
2. *C. elna* Hewitson, 1876 (?= *decidia* Hewitson)
["Distribution and taxa are totally confused in Seitz (1927)" —D' Abrera].

(85) ***Tarucus*** Moore, 1881
1. *T. nara* Kollar, 1848 (?= *callinara* Butler) - Sri Lanka, India, Myanmar.
2. *T. ananda* de Niceville, 1883 - India, Assam, Myanmar, ?Thailand.
3. *T. venosus* Moore, 1882 - NW India, Sikkim to Bangladesh.

(86) ***Talicada*** Moore, 1881
1. *T. nyseus*** Guerin, 1843
i. *T. n. assamica* Fruhstorfer - Assam to Myanmar and N Thailand.
ii. *T. n. nyseus* Guerin - Sri Lanka and S India.
["One of the most beautiful butterflies in Region" —D' Abrera]

(87) ***Bothrinia*** Chapman, 1909
1. *B. chennellii* de Niceville, 1884 - Assam to N Thailand.
["*binghami* Chapman and *celebica* Fruhstorfer treated in *Lycaenopsis* group". —D' Abrera].

(88) ***Pithecops*** Horsfield, 1828
1. *P. fulgens* Doherty
i. *P. f. fulgens* Doherty - Assam and Manipur.

(89) ***Everes*** Hübner, 1819
1. *E. lacturnus* Godart, 1824 - Throughout Oriental Region, including Sri Lanka.

(90) ***Tongeia*** Tutt, 1918
1. *T. moorei* ?Leech, 1889 - Assam to Indo China.

---

* Evans (1932) has spelt it as '*airavati*' (sic).

** Evans (1930) reported two more subspecies *T. n. khasiana* and *T. n. burmana*. Recently Rajesh Kumar et al. (2009) proposed a new subspeices *T. n. delhiensis*.

2. *T. potanini* Alpheraky, 1889
i. *T. p. potanini* Alpheraky - Myanmar to Central and S China.
(91) ***Neopithecops*** Distant, 1884
1. *N. zalmora* Butler, 1870
["Superficially similar is *Pithecops corvus*". " Four other species of this genus in Oriental Region, which are dealt in *Lycaenopsis* group".—D' Abrera].
i. *N. z. dharma* Moore - Sri Lanka.
(92) ***Megisba*** Moore, 1881
1. *M. malaya* Horsfield, 1828 - Throughout Oriental Region.
(93) ***Euchrysops*** Butler, 1900
1. *E. cnejus* Fabr., 1798 - Throughout Oriental Region.
["?monobasic genus. It has some seasonal forms in Sri Lanka / S India" —D' Abrera].
(94) ***Chilades*** Moore, 1881
1. *C. ?parrhasius* Fabr., ?1798
["Confusion over its correct name; confusion with *E. cnejus*." —D' Abrera].
i. *C. p. nila* [Evans] - Sri Lanka.
2. *C. pandava* Horsfield, 1829 - Sri Lanka to Myanmar, Sundaland.
3. *C. lajus* Stoll, 1780 - Sri Lanka to Myanmar, Taiwan, Hong Kong, Hainan, Mangulam Is. (NW Sabah, Borneo), Philippines.
i. *C. l. tavoyana* Evans - Malaya and Myanmar.
(95) ***Freyeria*** Courvoisier, 1920
1. *F. trochylus* Freyer, 1845 - India, Sri Lanka, ?Java, ?Sumatra to Philippines, Australia, New Guinea.
i. *F. t. putli* Kollar - Sri Lanka.
(96) ***Zizina*** Chapman, 1910
1. *Z. otis* Fabr., 1787 - Throughout Oriental Region, except Sri Lanka and peninsular India.
(97) ***Zizeeria*** Chapman, 1910
1. *Z. karsandra* Moore, 1865 - Oriental Region.
(98) ***Pseudozizeeria*** Beuret, 1955
1. *P. maha* Kollar, 1848 - India to China.
i. *P. m. ossa* Swinhoe - S India.
(99) ***Zizula*** Chapman, 1910
1. *Z. hylax* Fabr., 1775 - Entire Oriental Region, except Andamans, Nicobars and the Philippines.
i. *Z. h. hylax* Fabr. - Madras Presidency [figured ex.].

RIODINIDAE
(NEMEOBIIDAE)

(1) ***Zemeros*** Boisduval, 1836
1. *Z. flegyas* Cramer, 1836
i. *Z. f. flegyas* Cramer - Assam, N India to China.
ii. *Z. f. allica* Fabr. - Myanmar, Thailand, Langkawi, ?Indo China.
(2) ***Dodona*** Hewitson, 1861
1. *D. egeon* Westwood, 1851
i. *D. e. egeon* Westwood - N India, Assam to Thailand.
2. *D. adonira* Hewitson, 1865 (?= *kala* Tytler, *learmondi* Tytler)
i. *D. a. naga* Tytler - Naga Hills.
ii. *D. a. argentea* Fruhstorfer - Myanmar.
3. *D. dipoea* Hewitson, 1865 (?= *dracon* de Niceville, *putoa* Tytler) - NW India, Assam, Myanmar. ?Indo China.
4. *D. eugenes* Bates, 1867
i. *D. e. eugenes* Bates - Sikkim, Assam to Myanmar, ?N Thailand and ? Indo China.
ii. *D. e. venox* Fruhstorfer - Sikkim, Assam.
5. *D. durga* Kollar & Redteubacher, 1844 - Nepal. [A Palaearctic sp.]
6. *D. ouida* Hewitson, 1865 - Assam, Myanmar, ? N Thailand, ? Indo China.
i. *D. o. phlegra* Fruhstorfer - Nepal.
7. *D. deodata* Hewitson, 1876
i. *D. d. longicaudata* de Niceville
(? = *angele* Grose - Smith & Kirby, *binghami* Moore) - Assam to S Myanmar.
(3) ***Abisara*** Felder, 1860
1. *A. fylla* Hewitson, 1851 - Assam, Myanmar.
2. *A. echerius* Stoll, 1790
i. *A. e. prunosa* Moore - Sri Lanka, S India.
ii. *A. e. suffusa* Moore - N India, Nepal, Assam, Bhutan.
3. *A. abnormis* Moore, 1883 - Assam, Myanmar.
4. *A. bifasciata* Moore, 1877
i. *A. b. angulata* Moore - Sikkim, Manipur to S Myanmar.
ii. *A. b. bifasciata* Moore - Andamans.
5. *A. saturata* Moore, 1878
i. *A. s. maya* Bennett - Myanmar, Thailand.
ii. *A. s. baraka* Bennett - Manipur.
6. *A. savitri* Felder, 1860
i. *A. s. savitri* Felder - India.
ii. *A. s. attennata* Tytler - Manipur.
7. *A. neophron* Hewitson, 1860
i. *A. n. chelina* Fruhstorfer - Myanmar, S Thailand, peninsular Malaya, Indo China, S China.
ii. *A. n. neophron* Hewitson - N India.
8. *A. chela* de Niceville, 1886
i. *A. c. chela* de Niceville - Sikkim, Assam.
ii. *A. c. amplifascia* Tytler - India.
iii. *A. c. kalawna* Evans - S Shan States, Myanmar.
9. *A. burnii* de Niceville, 1895 - Assam, Myanmar, S China.
i. *A. b. burnii* de Niceville - Naga Hills.
(4) ***Laxita*** Butler, 1879

1. *L. thuisto* Hewitson, 1861
   i. *L. t. sawaja* Frushtorfer - Myanmar, Mergui, Thailand.
(5) ***Paralaxita*** Eliot, 1978
   1. *P. telesia* Hewitson, 1865
      i. *P. t. boulleti* Fruhstorfer - ? Mergui, Thailand.
   2. *P. orphna* Boisduval, 1836
      i. *P. o. laocoon* de Niceville - Myanmar to peninsular Malaya.
(6) ***Taxila*** Doubleday, 1847
   1. *T. haquinus* Fabr., 1793
      i. *T. h. fasciata* Moore - Myanmar, N Thailand, Mergui.
(7) ***Stiboges*** Butler, 1876
   1. *S. nymphidia* Butler, 1876
      i. *S. n. nymphidia* Butler - Assam to peninsular Malaya.

(Concluded).

Flowering Teas

RACHEL CHITRA and APARNA DESIKAN

1. Flowering teas were traditionally sourced from China, but are now being made out of India.

2. Apart from Camomille and Jasmine Pearl, over 100 varieties of flowering teas are available in the market.

3. Ornamental tea varieties like Silver-tip and Golden tip which contain anti-oxidants, are purchased by hospitality majors.

4. These teas require 3-5 minutes steeping for the flower petals to unfurl.

5. Flowering teas take 15 mins to make, as the bundle takes a while to open.

6. Care should be taken to brew the tea the right way up or flower could bloom upside down.

Fancy a little cottage with a farm in your teacup? Or may be a hillock overgrown with a profusion of flowers? Flowering teas or display teas that burst into beautiful landscapes on steeping in boiling water have become all the rage. Packaged in silken bags and with whiffs of exotic scents, flowering teas are slowly seeing fanciers in the domestic market as more people enjoy their 'blooming' teas, say dealers.

Terming these living artworks 'a feast for the eyes,' Anjoo Tiwari, owner of cafe *Thirstea Teateria*, says creating them is as much fun as drinking. "Flowering teas are made by wrapping bundles of dried tea leaves around one or more dried flowers into a bulb and letting them dry. When steeped in boiling water, the bulb unfurls like a flower in bloom. Usually flowers like globe amaranth, chrysanthemum, jasmine, lily" says Tiwari, who runs her cafe in Jaipur.

Flowering teas have exotic names to suit their flamboyant nature—from milky sweetpea tea to starlight chamomile tea to Chang moon flower tea—the names range from quaint to bizarre. "I stock Chang moon flower which I usually sell in packs of 18 leaves for Rs 2,000. But that's the retail price and there are other teas that are costlier," says Vishwam of retailer *Av Life Care* in Bangalore.

Display teas apparently give good value for money and can be reused for 15 days. "Each bundle can be used 3 times a day. And there's very little dilution in taste, says Vishwam. For some the selling point is the nutrient value. "Just like green teas, flowering teas are supposed to act as antioxidants, control cholesterol, loss weight and improve digestion," adds Vishwam. As to the target base, Ratan Tata-backed *Tea box* sells flowering tea to aspirational customers who buy it for its visual appeal. "Our target base has residential customers and high-end salons for the ornamental value," says Kaushal Dugar, founder of *TeaBox*.

As the flavour is not predictable, some tea connoisseurs prefer to stay away from them. "I'd say it is an acquired taste. We've had to convince our regulars to give it a try as there isn't a lot of awareness about flowering teas. Then again the tea's flavour can differ, based on the flowers used, but the base notes are pretty similar and there are some strong adherents to display teas," says *Thristea Teateria's* Tiwari.

Places such as Gangtok, Darjeeling and Kochi, which attract tourists, are hotspots for display trade consumption. "Developing urban spaces such as Rajkot, Pune, NCR, Gurugram and Noida are also seeing increasing traction, more than cities such as Mumbai, Delhi and Bengaluru," says *TeaBox*'s Dugar.

"It is mostly those with higher disposable income, who spend on ornamental, display tea. As the process involves manual labour, with a person spending 15 to 30 minutes to make one roll, flowering tea is price sensitive and one kilo may cost anywhere between Rs 5000 to Rs 50,000. As a trend, it is slowly catching up in India, whereas in Japan and Taiwan, where it originated, the market is already saturated," says Dugar.

Research Notes

ERRATA : *CRASSOCEPHALUM CREPIOIDES*, AND NOT *GYNURA CUSIMBUA*, POSSIBLE NEW LARVAL HOST PLANT OF THE COMMON ONYX BUTTERFLY, *HORAGA ONYX*, FROM SOUTHERN WESTERN GHATS, KERALA

RAJU KASAMBE

B-205, Trimurti Apartment, Borkar lane, Tilak Nagar, Dombivli (East) - 421201, Distt. Thane (Maharastra).
E-mail : *raju.bnhs@gmail.com*

Last issue of *Bionotes*, vol.18 (3) had published a short note by me with the caption "Hill Gynura plant, *Gynura cusimbua*, as a possible new larval host plant of the Common Onyx butterfly, *Horaga onyx*, from southern Western Ghats Kerala".

After I received the confirmation from the editor of *Bionotes* that the note is getting published; Dr. V.C. Balakrishnan from Kerala informed that the plant is in fact *Crassocephalum crepioides* (Asteraceae) and not Hill Gynura *Gynura cusimbua* (Asteraceae) as mentioned in the note. I confirmed this identification with Dr. Swapna Prabhu, Botanist at Bombay Natural History Society, Mumbai.

My apologies for the mistake.

Acknowledgement: I thank Dr. V. C. Balakrishnan, Kerala and Dr. Swapna Prabhu, Botanist, BNHS, Mumbai, for confirming the identification of the plant.

Reference

Kasambe, R. 2016. Hill Gynura plant, *Gynura cusimbua*, as a possible new larval host plant of the Common Onyx butterfly *Horaga onyx*, from southern Western Ghats, Kerala. *Bionotes*, 18(3): 94.

Obituary

Monika Ghurde
A Perfumer Obsessed with Scent of Jasmine

Thirty-nine-year-old Monika Ghurde who was found murdered in her home in Goa was a perfumer, best known for her obsession with jasmine.

Nicknamed Lady of Smell, Ghurde had swapped a career in photography for one in perfumery, training at the UK-based Picot Laboratories.

Such was her keen interest in the scent of jasmine that it resulted in a collaborative work with author William Dalrymple to trace the history of the flower since ancient times.

The entrepreneur had moved from Mumbai to Chennai in 2009, had then to Sangolda in North Goa last July to establish her own company, where she worked as an independent perfumer and researcher.

It was when she opened up Mo Labs in Chennai that she earnestly pursued perfumery. Her work involved conducting 'Smell' workshops for adults and children, where she would educate people on developing their sense of smell, as well as research on different fragrances.

She was also researching on the effects of perfumes on human consciousness.

The globetrotter travelled extensively to conduct her sessions, as well as take part in perfumer conferences and olfactory workshops, apart from visiting fragnance boutiques. She even collaborated with *Vogue India* to narrate her experiences.

A well-known name in social circles, Ghurde was found dead at her apartment, close to Goa's famous Calangute beach in a suspected case of rape and murder, police said.

She lived alone while her husband stayed in another house nearby.

Police inspector of Porvorim, J.G. Dalvi, said the woman's body was found on Thrusday night without clothes and her hands and legs tied to a bed in her three-bedroom apartment in the Sangolda village, about 10 km from Goa capital Panaji.

Goa police sent teams to neighbouring states to follow up on leads into the murder of perfumer Monika Ghurde, who was found naked and bound at her home in Sangolda village on October 6.

"We will be able to crack this case soon. We are working on different theories. On Friday, we sent teams to different locations, including neighbouring states," deputy inspector general of police, Vimal Gupta said on Saturday.

Police suspect the 39-year old was raped and murdered somewhere between October 5, 2016, afternoon and night, as she had not been in touch with anyone since then.

The cops ruled out robbery as nothing was missing from the flat, raising suspicions that the killer might have been someone Ghurde knew.

Hailing from Nagpur, Ghurde was married to photographer Bharat Ramamrutam from Tamil Nadu and was residing at Porvorim before the couple separated; she then shifted to Sangolda this year.

ECOLOGY CONSERVATION OF INSECTIVOROUS MEDICINAL PLANT *DROSERA* THROUGH TISSUE CULTURE

SUPRIT PRADHAN and SUSHIL PRADHAN

Green Paradise,
Plot No. 116 (1), Vivekananda Nagar,
Sonepur - 767017 (Odisha).
E-Mail : *drshushilpradhan@gmail.com*

Insectivorous medicinal plant *Drosera* belongs to the Family of Droseraceae, Order Caryophyllales, Dicotyledoneae, Angiospermeae. It is locally called "Patkanduri" (Odia), "Mukhajali" (Hindi), and "Sundew" (English). India harbours its three species. From Odisha only *Drosera burmannii* Vahl. is being reported.

This is a small red colour annual herb with white pentamerous flowers completing its life cycle during September - March and dies in March first week, due to hot climate. Local village physicians (Kabiraj and Baidyas) use this plant for the treatement of the cold and cough in the children in rainy season. In the present field investigation, an attempt has been made to undersatnd its unique reproductive phase and life cycle, thereby planning for its conservation and propagation through various techniques of tissue culture and biotechnology.

Drosera was firstly reported from Odisha in the year 2011, from Arjunpur Reserve Forest area of Sonepur in the district of Subarnapur, in shady moist places of running water stream. It is an interesting rare insectivorous medicinal plant frequently used by the local physicians. Until now, 194 species of *Drosera* are recorded all over the world and India harbours three species. Odisha has only one species as reported in this paper.

Present investigation is mainly a field study with some laboratory work for cytological investigation. Until now the chromosome number of this species has not been reported. So it is intended to investigate the cytological work to find its chromosome number, thereby planning for its conservation and propagation through various techniques of tissue culture and sustainable biotechnology.

During September 2015 - March 2016, weekly once the status of the plant *Drosera burmannii* Vahl. was observed. Growth of the plant is maximum during December and January of the next year, and afterwards the plant dies, perhaps due to dry soil. During September, the plant starts growing with beautiful white flowers. Plants were studied for their genome investigation, Its chromosome number (2n) is yet to be reported. The plants are annual but being tried to grow perennially, which is successful in the laboratory conditions, but not in the field conditions yet.

Acknowledgements: We thank for the laboratory and library facilities, Sri Brajendra Narayan Mohapatra, Principal, Boudh Panchayat College, Boudh; for topography of Arjunpur Reserve Forest area, we acknowledge the help and cooperation of Sri Debarchan Behera and Sri Bimal Chandra Mishra, Divisional Forest Office, Sonepur. Assistance by Sri Milan Naik in collecting material from the field and microscopic analysis is praiseworthy.

References

Fleisch, A., Robinson, A.S., McPherson, S, Heinrich V. Gironella, E. & Maldulida D.A. 2011. *Drosera ultramafica*, a new sundew species of the ultramafica flora of the Malesian highlands. *Blumea*, 56 (1) : 10-15.

Pradhan, Sushil 2011a. Insectivorous medicinal plant *Drosera* from Arjunpur Reserve Forest, Sonepur of Subarnapur District, Odisha : A new record from the State. *Proc. Natl. Sem. Medicinal and Aromatic Plants : Traditional Knowledge and Current Research*. Jajpur, Odisha, Feb. 5-6, 2011 : p. 82.

Pradhan, Sushil 2011 b. Record of medicinal insectivorous plant *Drosera* from Arjunpur Reserve Forest, Sonepur, Odisha. *Bionotes* 13(4) : 155-156.

Pradhan, Sushil 2016. *Drosera* ecology conversation through techniques of tissue culture and biotechnology. *Proc. 103rd Indian Science Congress*, : 181-182.

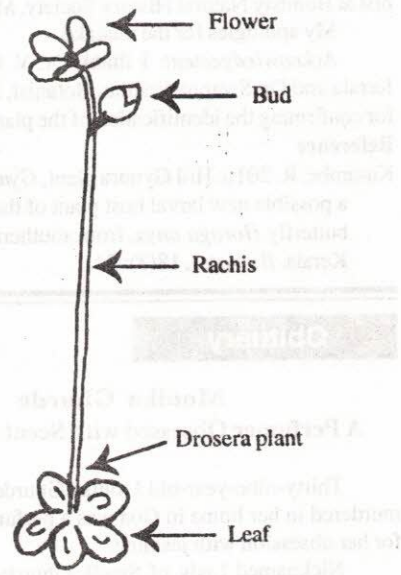


Fig. 1. - *Drosera burmannii* (morphology).

NOTES ON GENUS *TANYMECUS* GERMAR, 1817 FROM THE SUNDERBAN BIOSPHERE RESERVE, W. BENGAL (CURCULIONIDAE: COLEOPTERA)

BULGANIN MITRA*, BALARAM PANJA, UDIPTA CHAKRABORTI*, OLIVE BISWAS*, SANKARSAN ROY* and PRIYANKA DAS***

**Zoological Survey of India, New Alipore, Kolkata ; and **Office of the Divisional Forest Officer, 24- Parganas (South division), Kolkata (West Bengal).*

Curculionidae, the largest weevil family has so far been reported to have 4,600 genera and 51,000 described species from all over the world (Talwar, 2014). They feed on living plants or are saprophagous. Weevils are recognizable by their elongate rostrum (or snout), with mouthparts situated at the apex; geniculate antennae; and compact antennal club.

Genus *Tanymecus* belongs to the tribe Tanymecini of the subfamily Brachyderinae. 151 species of it are known from the world. 45 species are reported from India and 16 species are found in West Bengal (Supare et al., 1990). In genus *Tanymecus, T. marginalis* Gyllenhal, 1834 has been reported by Marshall (1916) from Port Canning and Matla, Sundarbans. The second species, *T. albomarginatus* Gyllenhal, 1834 has been reported by Mandal & Nandi (1989). Third one, *T. indicus* Faust, 1894 has been reported by Banerjee & Basu (1954) as a serious pest of paddy from Amjhara village in Basanti Tehsil, of South 24 parganas district of Sunderban Biosphere Reserve. Supare et al. (1990) have reported this species as *T. indicus indicus* Faust and described another new subspecies, *T. indicus assamensis.*

Among the three species, two species, *T. marginalis* and *T. indicus* have been collected during the recent survey (2015-16) from different localities of the Sunderban Biosphere Reserve. This is the second report on the occurrence of both the species in W. Bengal, after the first report of Marshall (1916) and Banerjee & Basu (1954). This is also the first report of *T. marginalis* collected from the mangrove plants.

According to Marshall (1916), the morphological differences among these three species are as follows; *T. indicus* is a black colour insect, with brown scaling more or less irrorated with grey, and usually with a few green scales at the apex of the rostrum. *T. marginalis* is also a black colour weevil with thin yellowish-grey scaling dorsally, the prothorax and elytra with a denser lateral yellow stripe, on the elytra this stripe does not reach the margin. The body colour of *T. albomarginatus* is grey or fawn, but the elytra with a broad whitish lateral stripe which does not reach the extreme margin, prothorax with a broad denuded lateral stripe.

Order Coleoptera
Family Curculionidae
Subfamily Brachyderinae

1. ***Tanymecus indicus* Faust, 1894**

Material examined: 1 ex. , Pakhirala, Gosaba island , 13.xii.2015. coll. B. Mitra and Party.

Remarks: Talwar (2014) reported that *T. indicus* is primarily a pest of *Triticum* (wheat) and other cereals like *Zea mays* (maize), Sorghum (jowar), *Hordeum vulgare* (barley), *Oryza sativa* (rice), *Cicer arietinum* (gram), *Pisum sativum* (pea), *Cortalaria juncea* (sannhemp), *Lens esculenta* (lentil), *Corchorus corchori* (jute), *Beta vulgaris* (beetroot), *Brassica* (mustard), *Eruca sativa* (argula), *Carthamus tinctorius* (safflower), *Papaver* (poppy) and *Gossypium* (cotton). Banerjee & Basu (1953) reported its infestation on paddy of Sunderbans. Present collection was made from a light trap in the mangrove ecosystem.

2. ***Tanymecus marginalis* Gyllenhal, 1834**

Material examined: 1 ex. , Sagar Island, 10.vi.2015, 1 ex. , Panmazani : Sagar Island, 9.vi.2015. coll. B. Mitra and Party; 2 exs. , Debnibas, Bokkhali, 16-17.vi.2015. coll. B. Mitra and Party; 5 exs, Dulibhasani, 05.x.2016. coll. B. Panja, Host: *Sonneratia apetala* Buch.-Ham.

Remarks: This is the first report of this species from the plants of *Sonneratia apetala* Buch.-Ham.

Acknowledgements : Authors are thankful to Dr. Kailash Chandra, Director, Zoological Survey of India, Kolkata for support and encouragement. Thanks are also due to Shri K. C. Gopi, Scientist-F & In-charge of Entomology Division (A & B), Z.S.I., for help and support. Authors are also thankful to Mr. Biswajit Mridha and Mr. Udayan Sutar, for their co-operation during the field surveys.

References

Banerjee, S.N. & Basu, A., 1954. *Tanymecus indicus* Faust, A new Curculionid pest of paddy with suggestions for its control. *Curr. Sci.*, 23 (1) : 22.

Mandal, A. K. & Nandi, N. C. 1989. In: *Fauna of Sundarban Mangrove Ecosystem, West Bengal, India*. Fauna of Conservation Areas, Zoological Survey of India. 3: 116 pp.

Marshall, G. A. K. 1916. *The Fauna of British India including Ceylon and Burma, Col. : Curculionidae*. Taylor & Francis, London : 361 pp.

Supare, N. R., Ghai, S. & Ramamurthy, V. V. 1990. A revision of *Tanymecus* from India and adjacent countries (Coleoptera: Curculionidae). *Oriental Ins.*, 24: 1-126.

Talwar, N. 2014. A review on the pest potential of *Tanymecus* (Coleoptera: Curculionidae: Brachyderinae). *J. Ent. & Zool. Studies*, 2 (3) : 14-15.

New Publications

Book Reviews

(1)

Vincent Van Gogh Cut Off his Ear

VAN GOGH'S EAR : THE TRUE STORY, by Bernadette Murphy, 2016. 336 pp. Price Rs. 450.00. Published by Chatto & Windus.

In February 1888, Vincent Van Gogh arrived in Arles, a tiny Provencal town in the south of France. He wished to establish a sort of painters' colony, a group of artists who would work together and discuss art together, a desire that did not come to fruition. Only Paul Gauguin arrived, and Van Gogh and Gauguin shared for some months a house and an intense, fractious relationship.

Van Gogh's own work, though, saw a remarkable efflorescence ever since his arrival at Arles. In a period of extraordinary fecundity, he created the majority of the masterpeices for which he is best remebered—work that, at the time, had found few takers.

In the time between his arrival in Arles in February 1888 and his death in July 1890, Van Gogh produced the work on which his legend is built.

These canonical paintings—such as Starry Night, Wheat Fields with Cypresses, The Cafe Terrace on the Place du Forum, Arles, Night (Also known as Night Cafe in Arles), Vase with 12 Sunflowers, The Yellow House, and numerous haunting potraits of himself as well as people he knew in the area—have, as Julian Barnes wrote in a 2015 essay, "turned Van Gogh into a world brand".

The work of those-two-and-a-half years resulted in the Van Gogh kitsch industry: the reincarnations on fridge magnets and tote bags, on tea doilies and mugs.

This was also the most tumultuous and calamitous period of his life. It culminated with Van Gogh's death, at the age of 37, from a self-inflicted gun wound. It also contained the gruesome incident of the painter cutting off his ear, a tragedy that has gone some way towards establishing the mythology and iconography, the kitsch and the branding of Van Gogh even among—espiacially among—those who are not too intimately familiar with his work.

Bernadette Murphy's book is a detailed exploration of this period in Van Gogh's life, and a forensic examination of that December day in 1889 when he cut off his ear. She comes up with what she calls three major findings. First, Van Gogh slashed off his entire ear as opposed to a part of it.

Secondly, he gave the severved ear not, as had been thought, to a local prostitute, but to a maid who worked in a brothel close to where Van Gogh lived.

Thridly, it was not, as many accounts have said, the majority of the town that wanted Van Gogh removed from Arles and committed to an asylum, but a handful of people who had vested interests in the house Van Gogh was renting in Arles. Intrepid and conscientious, Murphy hops across continents to glean information. The research is exhaustive; the text it yields is exhausting.

If you want to know how Van Gogh thought and felt, the best place by far to go to remain his letters and his paintings (the strongest sections of *Van Gogh's Ear* are the extended excerpts from the artist' writing and the gorgeous reproduced colour plates of his paintings).

If you are of a mind to find out more about that final, tortured, prodigious phase of his life, Martin Gayford's *The Yellow House*, an evocative , intimate account of his life and work in the south of France (and a book of which Murphy is unreservedly critical) is your best bet. For a quick understanding of his art and life, Julian Bell's 2015 slender-but-hardly-slight biography, *Van Gogh: A Power Seething*, does the job.

Murphy's persistence is admirable, but her book does little to enhance our understanding of one of the greatest painters the world has ever seen.

—Soumya Bhattacharya

(2)

Writers on the Global Warming

THE GREAT DERANGEMENT, by Amitav Ghosh, 2014. 275 pp., Price Rs. 399.00. Published by Penguin.

Like tigers in the Sunderbans, where the beast remains elusive but not its footmarks, climate change is seemingly everywhere and yet found nowhere. Despite its improvable though astoundingly real occurrences, the climatic events have been restricted to our fleeting consciousness. So far, only 19 countries have inked the non-binding Paris Agreement to limit global warming to well below 2°C. All this is taking place while social media has made climate change research a part of the public discourse. The aim is to trigger action towards a credible policy response. Far from it. Discomforting as it may be, the eerie silence around the dangers of climate change has come to rest on the skewed awareness that we are all living in a 'new normal'.

Amitav Ghosh questions this notion and our inability to think about the lurking dangers of climate changes and challenges the uniform expectations rooted in the 'regularity

of bourgeois life'. Need it be said that unstinted faith in such perceived regularity has driven the modern world to the point of derangement. It follows that we cannot recognise the environmental problems created by our way of life. As every individual is incentivised to improve his or her standard of living and the state is driven by the capitalist model of double-digit growth, what will drive us to exit the comfort zone of this 'new normal' remains a vexed question.

Being a celebrated story-teller himself, Ghosh wonders why climate change has not been taken seriously by fiction writers and literary journals. Although the subject has figured obliquely in his own writings, he contends that a broad imaginative failure has prevented writers from negotiating the currents of global warming. *The Great Derangement* is thus a call for writers to pull climate change out from the realm of scientific research into the literary domain such that contemporary culture may find it easy to deal with it. After all, the climate crisis is as much a crisis of culture as a crisis of the imagination, an inability to think about the 'unthinkable'.

There is a difficulty in accepting such consideration. Research shows that people do not learn about climate change through personal experience or act on the issue unles it evokes strong visceral reactions. Why would people think about climate change, which involves thoughts on death and their own mortality? Most individuals rarely take seriously even predictions on water scarcity. No wonder then that a film like *The Day After Tommorow*, with its depiction of glacial melt down leading to a submerged Manhattan, served merely as action-movie entertainment and did not lead to serious climate discourse among movie goers.

The literary mainstream too has remianed on the margins of the crisis and has been restrained on the forest fires, cloudbursts, tornadoes and tsunamis that have been pounding our world with ferocious regularity. As public response to climate change is caught between the polarities of widespread denial and overt activism, literary minds do have the power to free society from the shackles of motivated reasoning. Ghosh argues that there can be no more compelling period in human history to recognize the urgency for such an engagement. *The Great Derangement* views the history and politics of climate change through personal stories. It is a refreshing take on a subject that has just about moved from the post-scientific consensus stage to a pre-social one. Scientific knowledge in itself is never socially or politically inert, particularly when it prompts changes in people's beliefs or actions. However, it takes time for social acceptance to emerge. Only by acknowledging this subtext can the cultural schism be bridged.

The author's anxiety on the subject comes through clearly in this erudite narrative. But science does not have the final word when it comes to bringing about a shift in our cultural practices. Even the scientific 'proof' of a casual connection between smoking and lung cancer has been hard to establish. Science can only describe the problem; it is for cultural processes to guide social and political change. The goal should be to prepare society to address the full scope of the climate change issue. *The Great Derangement* is an absorbing narrative on the subject, the impact of which is getting closer with each passing day. Shorn of scientific jargon, it is an interesting exposition on the most urgent task of our time.

—Sudhirendar Sharma

China is Using Animals to Predict Earthquakes

Chinese government researchers are using chickens, fish and toads to try to predict earthquakes, media reported. The Seismological Bureau in the eastern city of Nanjing has transformed seven animal farms into seismic stations, the *China Daily* newspaper reported in July 2015.

Breeders on the same farms are asked to update the Bureau about the behaviour of the animals twice a day, the report said. Possible abnormal behaviour which could indicate imminent earthquakes includes chickens flying atop trees, fish leaping out of water or toads moving in a group, it added. Nanjing plans to recruit seven more farms into the scheme this year, it said. Facilities need to house more than three species to be eligible.

But some animal keepers seemed reluctant to become involved. "Our zoo is not being transformed into a monitor station because the animals will display abnormal behaviour when they are teased by visitors," the report quoted a local zookeeper as saying.

Using animals to predict eathquakes is not new in China. State-run media said last year that the central city of Nanchang was using dogs to predict tremors.

China is regularly hit by seismic incidents, with hundreds of thousands killed in major disasters in the past. Three people died in a recent fatal earthquake that hit the far western region of Xinjiang.

75 th Issue (Sept. 2017) will be the 'Platinum Jubilee Number'. Send your Manuscripts.

R.N.I. Registration No. 71669/99 *BIONOTES* Counter Price of this Copy—₹20.00

Vol. 18, Year 2016
(Mar / June / Sep / Dec)

Zoological Survey of India

Ministry of Environment, Forests and Climate Change
(Government of India)
Prani Vigyan Bhawan, M-Block, New Alipore,
Kolkata - 700053.
Website: www.zsi.gov.in

'100 Years of Service to the Nation'

List of Some Recent Publications

1.	**Records of the Zoological Survey of India**	
	Volume 115 (Part-1)	**Rs. 920/-**
	Volume 115 (Part-2)	**Rs. 790/-**
	Volume 115 (Part-3)	**Rs. 900/-**
	Volume 115 (Part-4)	**Rs. 995/-**
2.	**Memoirs of ZSI Volume 22 No. 3; Taxonomic Revision and Distribution of Family Lycaenidae (Papilionoidea : Lepidoptera)**	**Rs. 2680/-**
3.	**Zoology for Future Education and Research**	**Rs. 1800/-**
4.	**Birds of Andaman and Nicobar Islands**	**Rs. 1710/-**
5.	**Reef Fishes of Andaman and Nicobar Islands**	**Rs. 2140/-**
6.	**A Pictorial Handbook on Lizards and Snakes of Western Ghats**	**Rs. 1410/-**
7.	**Wetland Ecosystem Series, 19, Faunal diversity of Krishnaraja Sagar Reservoir, Karnataka**	**Rs. 760/-**
8.	**State Fauna Series 22, Fauna of Uttar Pradesh (Part-1)**	**Rs. 1120/-**
9.	**State Fauna Series 22, Fauna of Uttar Pradesh (Part-2)**	**Rs. 4580/-**

Mode of Payment : Advance by Demand Draft/Multicity Cheque in favour of PAO (BSI/ZSI), Kolkata
Discount as per Govt. Rule : Individuals and Libraries - 10%, Book sellers - 25%
For all enquiries regarding publications, please write to:

Publication Division
Zoological Survey of India
4th Floor, Annexe Building, M-Block, New Alipore,
Kolkata - 700053.
E-mail : ppozsi60@gmail.com

Published and printed by Dr. R.K. Varshney, address : A Biologists Confrerie, Raj Bhawan, Manik Chowk, Aligarh. Type setting and printed by Mahima Compu-Printers, Avanti Bai Chauraha, Vatsa Palace, Agra Road, Aligarh. Editors : Dr. R.K. Varshney and Prof. S.K.Saxena.