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**India's Pet Dog Trade Poised for Big Jump
In last year alone it jumped 26%, to Rs 1,400 crore**

When Satish Cadabom recently brought a pair of Korean Dosa Mastiff pups, it hit the headlines—for the Rs. 2 crore he shelled out for them. He spends another Rs. 30,000 a month on food and care. "Expensive breeds are in high demand," said Satish, who has been a dog breeder for 20 years, adding that the demand for pets is on the rise.

Statistics agree. A study by *Euromonitor International* says the Indian pet-care market, at Rs. 1,394 crore, has more than doubled from Rs. 538 crore in 2011. The growth between 2014 and 2015 itself was about 26%.

But what is more interesting is the growth in e-commerce in the pets and pet-accessories business. Though it currently accounts for less than 1% of dog food value sales, digital sales are on the verge of an explosion, industry sources said.

"A pet is like a kid. People love to show them off," said Rana Atheya of *Dogspot.in*, an online portal, which in January raised investment from Ratan Tata. "Pet population is growing at 25% and most of the companies are

also witnessing 30% to 35% growth.

"The Indian market is still less than half of the size of that of Portugal," said Damian Shore, analyst at the *Euromonitor*.

The international market was worth about Rs 6.7 lakh crore in 2015, but it grew only about 3.5% between 2011 and 2015. "With a strong economy and attitudes to pets changing fast, this explosive growth is set to continue."

Dheraj Gambhir of *Petsworld* says there is a trend of "humanisation of pets". "People love buying clothes, and other accessories for pets. For instance, we sold more than 7,000 dog beds last year, compared to about 1,000 in 2014."

Consumer satisfaction is highly important in this segment. If engaged suitably, they call back. So companies are spending a lot of attention and time, using blogs and other means to spread awareness about their products, aspects of pet-care like buying the right breed, giving right food and animal health issues.

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State of the Environment in India

Developmental gains will crumble if India follows a model of growth that is resource-and-energy-intensive. As it is, rivers are degraded, pollution is growing, forest cover is thinning. Overhaul of green governance is the need of the hour.

SUBODH VARMA

● India is one of the 17 identified mega diverse countries of the world.

● India has 172 (2.9 per cent) of IUCN designated threatened species. These include the Asiatic Lion, the Bengal Tiger, and the Indian White-Rumped Vulture.

Here is a fact that should alarm you : of 180 cities monitored for air pollutants SO₂, NO₂ and PM10 in 2010, only two towns Malapuram and Pathanamthitta in Kerala met the criteria of low pollution (50% below the standard) for all pollutants, according to the Centre of Science and Environment (CSE). SO₂ and NO₂ are noxious gases, while PM10 is particulate matter such as dust and smoke particles. The number of critically polluted cities (1.5 times the standard) increased from 49 to 89 between 2005 and 2010.

This is only one dimension of multiple environmental challenges that India must address. India is home to 18% of world population, 15% livestock population and 7-8% of all recorded species. But we have only 2.4% of land area in the world. This puts an immense pressure on all natural features : air, land, water, animals, vegetation.

"India cannot afford to follow the West's development model of resource and energy intensive growth and lifestyle. The country's natural resources base cannot sustain such a growth model for all and there will be huge inequalities and social conflicts. We need a developmental model that puts premium on social welfare and not on resource intensive growth," stresses Chandra Bhushan of CSE.

Take water, for instance . Raw sewage and industrial waste has rendered water in more than half of India's 445 rivers unfit for drinking, according to the Central Pollution Control Board. Water from at least a quarter of the rivers surveyed can't even be used for bathing. Why is this so? Of the 38 billion litres municipal waste water generated everyday in India, only 29% is treated. By 2050, 100 billion litres may come from Indian cities each day, it said.

Another aspect of water mismanagement is the fall in India's per capita freshwater resources from 6,042 cubic metres in 1947 to 1,845 cubic metres in 2007. Indian cities are using 50 billion litres of municipal water a day.

While forest cover—estimated at 24% of geographical area—is not depleting, it is still short of the target of 33% set

in 1988. But there are clear warning signs : moderately dense forests, which hold the future growth of forests, declined by 1991sq km between 2011 and 2013, according to the most recent Forest Survey of India report. In 24% of forests there is 'inadequate' regeneration; in 10% none at all. A dangerous 73% of forest area is affected by light to heavy grazing by animals.

Environmental governance

From local to the national level - this needs an overhaul, feels Chandra Bhushan. Our laws, regulations, regulatory institutions etc are not suitable to deliver environmentally sound development in the 21st century, he says.

"The present governance system is top heavy, piecemeal, unaccountable and opaque. It has failed to involve people, communities, local governments and companies in solving the environmental problems," he added.

Environmental degradation is often directly a cause for severe economic loss and perpetuation of poverty. In India, more than 147 million hectares soil has become degraded, eroded and thus unproductive. About 5334 million tons of topsoil is lost annually. According to G. Mythili, Professor at Indra Gandhi Institute of Development Research, production loss due to land degradation in 2010 was 16%, that is, 13.4 million tons. That works out to about Rs 162 billion. Essential cereals make up 66% of this loss.

All these environmental challenges are going to get aggravated in the coming decades because of climate change. It will make the poor poorer and wipe out whatever development has taken place, argues Bhushan.

"Indians will have to start adapting to climate change. Simultaneously, we have to start reducing greenhouse gas emissions and work with the global community to limit the rise in the global temperature below 1.5 degrees C," he added.

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Ocean Acidity to rise 150%

The oceans are soaking up atmospheric carbon dioxide at such a rate that their acidity could increase 150 per cent by 2050. A more acidic ocean could mean that by the century's end, some 70 per cent of cold-water corals, will be exposed to these corrosive waters.

SAMAR HALARNKAR and CHETAN CHAUHAN

As deadlocked Climate talks in Copenhagen enter a critical, second week, a major new United Nations' study showed how quickly the world could be running out of time.

The world's biggest insurance policy against rapid warming, the oceans, are soaking up atmospheric carbon dioxide at such a rate that their acidity—and so their ability to nurture an intricate planet-wide web of life—could increase 150 percent by 2050.

This dramatic increase is 100 times more than at any time in the last 20 million years.

It could cause "irreversible damage", and highlights the link between climate change and the health of the oceans, said the study, released by the United Nations Convention on Biological Diversity.

"Ocean acidification is irreversible on timescales of at least tens of thousands of years, and substantial damage to ocean ecosystems can only be avoided by urgent and rapid reductions in global emissions of CO₂," said Ahmed Djoghlaif, Executive Secretary of the Convention.

Djoghlaif said this was a "critical issue" that now needed to be included in the climate-change debate. That may not be easy with rich and poor countries failing to agree even on the language of the possible joint statement at the end of the meeting, much less key points like cutting emissions and allocating money.

Seas and oceans absorb about one quarter of the carbon dioxide spewed into the atmosphere from the burning of fossil fuels, deforestation, and other human activities. Without this absorption, the global warming crisis would be greater than it is now.

"This CBD study provides a valuable synthesis of scientific information on the impacts of ocean acidification, based on the analysis of more than 300 scientific literature, and it describes an alarming picture of possible ecological scenarios and adverse impacts of ocean acidification on marine biodiversity," Djoghlaif said.

The study predicts direct impacts on commercial fishing. A more acidic ocean could mean that by the century's end some 70 percent of cold-water corals, a key refuge and feeding ground for species that fishermen catch, will be exposed

to these corrosive waters.

Given current emission rates—global emissions are up 30 per cent since the Kyoto Protocol was signed 12 years ago—the effects will begin much sooner. The Arctic Ocean will lose essential minerals by 2032 and the southern seas by 2050. That means a disruption of food sources to many marine species, particularly to mussels, oysters, shrimp, crab and lobsters, which need calcium to grow.

Scientists say some species might benefit from such changes to the ocean, but overall the effects are likely to be negative, with attendant effects that could range from livelihoods of coastal communities to planetary regulation of carbon dioxide.

"This publication...confirms again how great the stakes of sustainability are in the climate change negotiations," said Thomas E. Lovejoy, Biodiversity Chair of Washington D.C.'s Heinz Center for Science, Economics and the Environment, in the preface to the publication, officially titled *Scientific Synthesis of the Impacts of Ocean Acidification on Marine Biological Diversity*.

Fish Losing Survival Instinct

Fish are losing their survival instinct—even becoming attracted to the smell of their predators—as the world's oceans become more acidic because of climate change.

The study of fish in coral reefs off the coast of Papua New Guinea—where the waters are naturally acidic—showed the animals' behaviour became riskier.

"Fish will normally avoid the smell of a predator, that makes a perfect sense," lead author Prof. Philip Munday from Australia's James Cook University said. "But they start to become attracted to the smell of the predator. That's incredible".

He added the research, published in the journal *Nature Climate Change*, was important given that about 30% of the carbon dioxide released into the atmosphere is ultimately absorbed by the ocean, a process which results in the seas becoming more acidic.

Acidification around the reefs studied is at levels predicted to become ocean-wide by the end of the century as the climate changes.

Centenary of the Zoological Survey of India

Nearly a hundred years before the century-old Zoological Survey of India (ZSI) was founded in Kolkata, a series of India-specific articles on various aspects of zoology by the likes of B.H. Hodgson and Colonel S.R. Tickel that appeared in the *Journal of the Asiatic Society of Bengal* had turned the city into the key centre of zoological studies in India.

By the time India's first marine survey ship, 'Investigator', a wooden paddle-steamer weighting 580 tonnes and built in Mumbai, was launched and the first deep-sea faunatic survey commenced in 1885, the Indian Museum, which became the new venue for zoological research after Asiatic Society, had already had four decades' expertise in works on the group crustacean (crabs, shrimps, lobsters, barnacles etc).

When ZSI was founded in 1916, it already inherited the legacy of zoological research of nearly a century. Over the last 100 years, scientists at ZSI have recorded 97,515 faunal species in India, of which 4,668 are new to science, besides preserving more than 4.5 million specimens of 60,000 species in its repository.

India is considered one of the mega diversity countries in the world. ZSI has compiled information and made images of these 4,668 new species available between two covers—a book that Union Environment Minister Prakash Javadar unveil on July 1, 2016.

"This is the first time that all new discoveries from India have been put between two covers. Of these 4,668 new species reported in India, more than 100 are vertebrates (animals with backbone) and the rest are invertebrates (animals without backbone)", ZSI director Kailash Chandra said.

The large scale digitisation campaign taken on the occasion of its centenary celebration marks the institute's transformation from being merely a repository of scientific names and specimens to one that has made the entire knowledge gathered by its scientists accessible to anyone free of cost. It is also in the process of digitizing old and rare books in its library that number nearly 700. Some of these books are 200-300 years old.

Among the rare and old books are *Index Omnium Capitum* (1547), *Osservazioni Di Francesco* (1684), *d'Amboinsche rariteitkamer behelzende eene reschryvinge* (1705), *Descriptions and figures of Two Hundred Fishes* by

Russel, volume I & II (1803), and *Memoire Apterologique* by Hermann (1804)—which are otherwise difficult to access.

"Digitisation of more than 2.45 lakh pages has been completed and made available on the portal faunaofindia.nic.in. "Scanning of 22,891 pages of old and rare books is under way," he added.

Over the course of its century old run, the ZSI has published 10,045 scientific papers, apart from 1,500 books.

However, what could be more beneficial for scientists around the world is the ZSI's initiative of DNA bar-coding—which will make identification of species much easier. Another initiative worth nothing is GPS tagging. "GPS tagging will help researchers locate places where any particular species is found. It will be especially helpful in tracking near-extinct species and help formulate proper conservation plan," Chandra said.

ZSI scientists said the institution has played a key role not only in formulating the country's wildlife conservation policy, but also provide regular help to law enforcement agencies in curbing poaching-related crimes. Among the new discoveries reported in India, the Golden Langur and Namadapha Flying Squirrel—both from the North-east—stand out as the 'most remarkable discoveries'.

Besides, scientists at the Western Ghats Regional Centre have rediscovered two species that were believed to be extinct—Malabar Civet and the Small Travancore Flying Squirrel.

Notably, nearly 13% of the new discoveries (638 species) have been reported from West Bengal, home to the ZSI headquarters and the place where zoological studies in India began more than 200 years ago.

"Though ZSI scientists have reported more than four thousand species new to science, there are plenty more that still remain unreported and unrecorded. We are building up a nationwide network of taxonomy experts to discover species yet unknown to mankind," a senior scientist at ZSI said. Over the last century, the ZSI had been witness to the changing pattern and methods in zoological studies with the advent of modern technology. Now, after completing a century, it is ready to start a new journey. ZSI has entered the digital age.

—Snigdendu Bhattacharya



The seeds of the origin of the Zoological Survey of India (ZSI) can be traced as far back as the January 1784, with the establishment of the Asiatic Society (or the Asiatic Society of Bengal) by Sir William Jones, at Calcutta (now Kolkata). It was followed by the foundation of the 'Indian Museum' at Chowringhee, Calcutta, in 1814. These both organizations got and maintained valuable collections of the zoological specimens, brought by naturalists like that of snakes and fishes by Russel Patrick (1726-1805), fishes by Bloch (1785), plants and animals by Thomas Hardwicke, butterflies & moths by G. F. Hampson and Lionel de Niceville, fishes by Francis Hamilton and several other groups by William Griffith, Jerdon, Hodgson, Thomas Edward etc.

ZSI took birth within the premises of the Indian Museum, on 1st July 1916, with the appointment of Founder-Director Dr Thomas Nelson Annandale, three other officers and perhaps 7 staff members. From the beginning itself, the department was sustained directly under the Govt. of India, till today. It showed lot of promise on the animal studies from the very early stage, by surveying far off places in and outside the British India. A few earlier explorations include the Marine surveys (on the laboratory-ship 'Investigator'), the Cho-Oyu mountain expedition, the Siju Cave survey in the Garo Hills (largest cave in India), the series of surveys for several years in the Chilika Lake on the eastern coast etc.

ZSI had the services of some eminent and hard working zoologists during its last 100 years of journey. These great scientists include Dr T. N. Annandale, Dr Baini Parshad, Dr Sundar Lal Hora, Dr H Srinivasa Rao, Dr M. L. Roonwal, Dr M. S. Mani, Dr T. N. Ananthakrishnan, Dr Biswamoy

Biswas etc. Its present Director is Dr Kailash Chandra.

The department has in its repository valuable specimens of several groups of animals. These include Type-specimens. Some rare specimens are: (i) an Ammonite fossil; (ii) large collection of bird eggs including those of Ostrich and the Long Billed Vulture; (iii) *Typhloperipatus williamsoni*, the link between Annelida and Arthropoda; (iv) *Epiophlebia laidlawi*, the link between dragonflies and damselflies; etc. It is estimated that over 45 lakh specimens of nearly 60,000 species of animals are present in the ZSI collections.

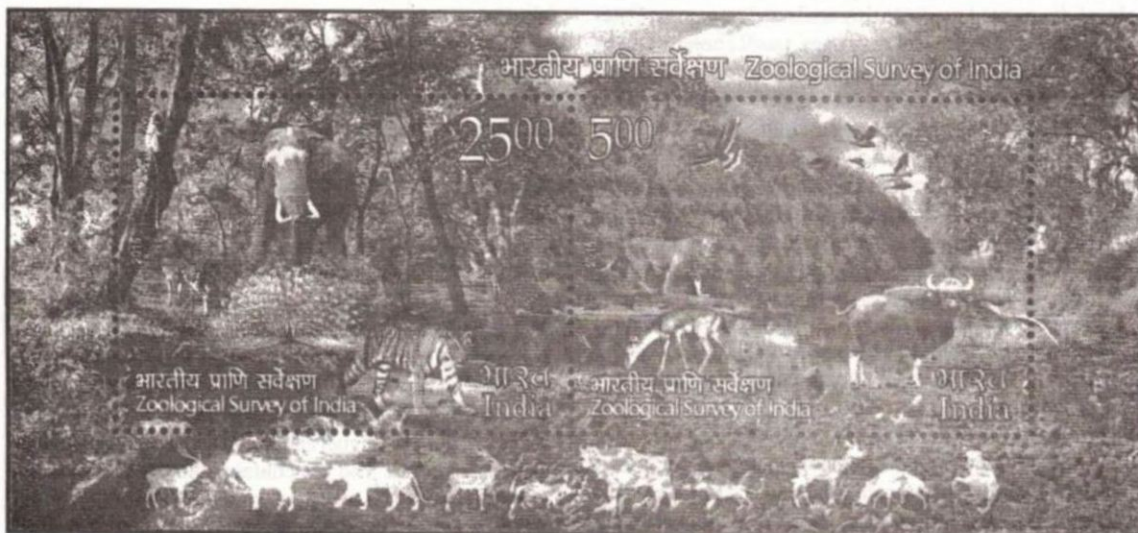
Somewhere in the forties of the last century, the Anthropological Survey of India took birth from the lap of ZSI and thus, studies related to Men and Tribes got transferred to that sister department.

ZSI has two strong arms. These are its library, which has over one lakh books on its shelves, and the publications released, which include several State-Faunas and fauna of regional and biotic zones. A plethora of hand-books, monographs, catalogues, checklists etc. have been published.

An oldest research journal of India, the *Records of Indian Museum* (now the *Rec. Zool. Surv. India*) is in its 116th volume. Among the books, the 'Animal Resources of India: Protozoa to Mammalia: State of the Art' (694 pp.) was released during the Platinum Jubilee celebrations in 1991.

In the sixties, some Regional Stations and later some Field Stations were opened, now all renamed as Regional Centres. The earliest ones were opened at Shillong, Dehra Dun, Pune, Chennai etc. At present there are 16 Reg. Centres, besides the HQ at Kolkata. For public viewing, ZSI

(continued on page 87)



On a Gourmet Trail to BHUTAN

VINITA CHATURVEDI

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It's impossible not to think of lushgreen landscapes, cloud-kissed misty mountains, happy people and an overwhelming sense of serenity when it comes to Bhutan. But little do people know about its rich culinary history. For an epicurean, ready to experiment, the possibilities of delightful discoveries are aplenty. Here are a few delicacies that shouldn't be missed by any self-respecting foodie.

Kiss of Chilli and Cheese

The foodies who go to Bhutan looking for a unique gourmet experience, get a eureka moment when they get up close and personal with ema datshe—a dish where chilli plays the main lead and cheese, a strong supporting role. It is a stew, which is extremely hot and the more authentic variety is made using molden Bhutanese cheese. Keeping an average traveller's palate in mind, these days several chefs use tinned cheddar cheese imported from India too. You can enjoy this delicacy with rice or bread, but are advised to keep a few glasses of water nearby. Yes, a few. I tried both the varieties—with and without the molden cheese—and preferred the fresh cheese one. Those who love the sharp taste of blue cheese, must opt for the latter. A word of caution: since this is supposed to be their national dish, Bhutanese people consider it a slight if you criticise the strong flavour of the dish.

Home-Grown Wellness

Cheese seems to be a thriving cottage industry in Bhutan, and it's sold in tea shops, grocery shops as well as colourfully painted roadside tiny stalls and bus stops. Carefully wrapped in individual poly bags, small cheese mounds are sold by petite Bhutanese women, dressed in colourful handwoven kira (their national costume). Sold at '50 to '60 a piece, this datshe is enjoyed as a stand-alone snack with tea and is also used to prepare various Bhutanese delicacies. Dry cheese cubes are also sold in the market arenas. A fellow Indian traveller and former diplomat, Dr Santosh Ganguly, who I met on this trip added another insight to this cheese trail. "It tastes amazing with wine or a glass of whiskey." His wife Swapna, a passionate chef, who loves to pick up exotic ingredients from all over the world, bought a lot of Datshe and aspragus for salads to be made back home. Mushroom cheese soup, also known as shamu datsi; phaksha paa is another delicacy.

Tea and Meikhu

A visit to any part of Bhutan—right from the border town of Phunsheling to its capital Thimpu and popular river-side destinations like Punakha and Paro—is incomplete with-

out the traditional cups of tea, an integral part of the country's heritage. But what doesn't change is the availability of meikhu (large crispy swollen puris) in the entire length and breadth of this small highland nation. "My morning doesn't begin till I enjoy a couple of meikhus along with butter tea, made by my wife," said our guide, Jimmy Dorji. You may not exactly take to it immediately, since Meikhu isn't seasoned with spices, but after a couple of days, its bland crispiness almost grows on you and complements the sweet and tangy taste of butter tea.

Meats on the Menu

If you traverse the Bhutanese landscape by road and observe things from close quarters, you realise that the people of this country love their meats. "Pork, beef, and lamb are mostly imported from India, along with vegetables and fruits," informed Yeshey Namgay, a grocery shop owner. Fried pork is a delicacy that is favoured by these highlanders, although most of them also love to have dal and rice for lunch or dinner along with an interesting potato pickle. Drolma, a businesswoman, shared: "Meat is an integral part of our daily meals. Phaksha paa, a pork dish made with red chillies, is a delight. For snacks as well as side dish, momos are most favoured, especially those with pork or beef filling."

Vegetarians can gorge on some amazing steamed momos with cheese, onion and cabbage filling. In Paro, you also get fried momos, which add a different dimension to this delicacy.

And after completing your pilgrimage to Punakha Tzong, Tiger's Nest Monastery, Dochula Pass, National Museum, Royal Textile Academy of Bhutan, Buddha Point, Motithank Takin Preserve, Tongsa Tzong and various other live relics of history and culture, when it is time for you to go back home, the sublime, yet diverse, flavours of Bhutan linger on in your taste buds.

Popular Baby Names

The most popular boys' name for babies born in the UK this year was Muhammad. Which are other most popular names in culture across the world? Sophia tops the list for girls' names both in UK and USA, while the top boys' name in the USA is Noah. In France, it is Nathan and Emma; in Brazil, Miguel and Sophia; while in Russia, it is Artem and Sofia. The list contains the top Indian baby names for boys and girls? Aarav and Saanvi.

NUTS!

Nuts protect against heart disease, control diabetes and help in weight loss, but only if eaten as raw or dry

RHYTHMA KAUL

Health benefits of a fistful of nuts :

- High levels of mono-unsaturated and polyunsaturated fats.

- No cholesterol.

- Minerals such as magnesium, zinc, iron, calcium, copper, selenium and potassium.

- Phytochemicals, such as plant-estrogens (isoflavones) and phenolic compounds, ellagic acid and flavonoids.

- Vitamins E, B6, niacin and folic acid.

- Plant protein, which makes them a good alternative to meat; nuts are also high in the amino acid arginine.

- High dietary fibre.

Once shunned for being packed with fat and calories, nuts are back on healthy menus across the world. With nutritionists celebrating the health benefits of mono- and polyunsaturated fats found in most nuts, people are now being told to eat nuts not just to loose weight, but also to keep it off.

Research over the last some 20 years strongly suggests that everyone's diet should include nuts, even through 30 gm (roughly 1/4 cup) of unroasted nuts provides 157 to 204 calories and 13 to 22gm of fat. Adding two almonds servings (50 gm) a day to your diet has no effect on body weight, reported the *British Journal of Nutrition*.

Along with the heart-protecting benefits of almonds, walnuts, and peanuts, pistachios are now being studied for their health benefits on the Indian population.

Recently, a team of senior doctors in Delhi announced the start of a six-month study on the health benefits of pistachio on the Indian population. It has proven heart-protective benefits on populations across the world, with studies in the USA showing it is a healthy snacking option despite high calories because of its high fibre and good fat content.

Like other nuts, pistachio brings with it the benefit of its high good cholesterol (high density lipoprotein or HDL) and low bad cholesterol (LDL) content, which makes it a healthy replacement for artery-clogging snacks such as pakoras and namkeens.

A team of doctors led by heart surgeon Dr. Naresh Trehan, cardiologist, Dr Ravi Kasliwal and diabetes expert Dr Anoop Mishra study a small group of people divided into two small groups—one will include pistachio in their regular diet, while the other group will stick to their regular diet.

"These people have some or the other risk factor for heart disease and diabetes. Apart from glucose control, we'll be tracking cholesterol levels, C-reactive and lowering oxidative stress," says Dr. Mishra, diabetes and metabolism expert.

It's not just the heart protective benefits of pistachio that will be studied, but also its impact on weight loss and glucose control in people at the risk of diabetes.

A Harvard study had found that people lost more weight on a moderate-fat nut diet than on a low-fat diet. "Nuts help people stick to diets better than fat-free foods because they are high in fibre, which provides a feeling of satiety and discourages snacking," says Dr Mishra.

The mono-unsaturated fat in nuts, like the fat in olive oil, helps lower bad cholesterol without affecting the levels of heart-protecting good cholesterol. It also reduces C-reactive protein levels that are linked with inflammation and increased risk of heart disease, says Dr Kasliwal, senior cardiologist. Nuts should be eaten as raw or dry.

The more nuts you eat—up to half a cup a day—the greater is the drop in the bad cholesterol level. So, go nuts as soon as you can!

Conference

Discussion Meeting on Entomology Curriculum in Institutions of Higher Learning

(Chennai, Dec. 15-17, 2016)

This Meeting alongwith the First Prof. T. N. Ananthkrishnan Memorial Lecture 2016, to be delievered by Prof. M. S. Swaminathan, on 15th Dec 2016, will be held at the Madras Christian College, Tambaram, Chennai - 600 059.

To be organised by the Entomological Society of India; the Division of Entomology, I. A. R. I, New Delhi; Prof T. N. Ananthkrishnan Foundation, Chennai; and Deptt. of Zoology, Madras Christian College, Chennai.

For Registration fee and other particulars, contact :

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Indian Agricultural Research Institute,

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Recent Damage to the Kashmir Willow Trees

Cricket Bat Industry of Meerut Hit Hard

ABHIMANYU MATHUR

When floods wreaked havoc in the Kashmir valley last September, they not only ruined thousands of lives, but also washed away a lot of willow trees, which in turn affected the production and supply of cricket bats in Meerut. With the rains pouring down on the valley during the few weeks, bat-makers and retailers in the West U.P. city are bracing themselves for a shortage of willow again. This time, the manufacturers say their worries are compounded by the fact that with the start of Indian Premier League and School's summer vacations, they'll see an increase in the demand for Kashmir willow bats. But with most of the willow probably getting damaged by the rains, they say their usual bumper season threatens to be a dry one.

Heavy Rains Damage the Willow

Heavy rains and stagnant water leaves a black mark on the good quality willow, effectively diminishing its quality. Bat manufacturers say that this damaged willow is still usable, but the quality of the bat suffers as a result. Paras Anand, marketing director, Sanspareil Greenlands, says, "Due to the rains, the willow gets downgraded. There are two kinds of willow for the manufacturing of the Kashmir willow bats—the one made from the best quality is called premium-grade willow, while the one that is stained and damaged is called bottom-grade willow. Normally, 20-30% of the Kashmir willow we receive is premium grade, but due to floods, the figure has dropped to 10-20%. Since the bottom-grade willow sells cheaper, it causes monetary losses to not only the farmers and processors in Kashmir, but also to us, manufacturers."

Major bat makers say that even though the floods in the Kashmir valley have not been as severe as they were last September, they are still wary of the damage the water has caused to the willow. "Thankfully, the rains this time haven't been as severe as last year. But still, our suppliers in Kashmir tell us that the wood has been damaged and the supply of good willow will be limited," says Rakesh Mahajan, director, BDM, adding, "When it comes to bat sales, there is no set pattern, as the customers' preferences change from one year to the next. Beginners and amateurs usually prefer Kashmir willow over English willow and with the IPL now under way, we were hoping for a surge in sales. But if the supply is limited, it will affect the manufacturing process as well."

Depleted Supply

Bat manufacturers complain that the absence of premium-grade Kashmir willow bats will curb the buying frenzy

that is usually associated with the Indian Premier League. Paras elaborates, "The IPL is about to start and the summer season is almost upon us. This is the time when we see a rise in the demand for bats, as they are cheaper compared to the English willow. However, the supply will contain mostly bottom-grade willow bats, which will not only affect the sales, but the brand as a whole. We can only hope that the rainfall is not as severe this time and our business does not suffer like it did during the September floods."

Retailers and sellers are also wary of the demand for these bats exceeding their supply. Deepak, who owns a sport shop in Suraj Kund market, says, "Generally, the demand for premium-grade Kashmir willow bats is more during the IPL and summer vacations, but manufacturers have indicated that the number of those bats will be considerably less this summer. This will definitely put a dent in our sales. IPL is the season for bumper sales for us," Anand Singh, a bat seller, says, "With many emergencies, we can plan ahead to minimise the damage. But in this case, we can't do anything as it is out of our control. We can only hope that we are able to meet our customers' demands. More than the monetary losses, my concern is that we'll have to turn away customers, which will affect our business in the long run."

Willow Bats Preferred

In recent years, the reduced cost of willow bats has made them more popular among buyers. Sellers and Coaches say that while Kashmir willow was reserved for the semi-professionals and club cricketers earlier, even pre-teens are buying them these days. Shahid Khan, a coach at the Victoria Park academy, says, "till a few years ago, Kashmir willow bats were only used by 'serious' players. But with an overall decrease in the cost of the willow bats, the customer base of the Kashmir willow bat shifted from players to young kids and beginners, while the players and club cricketers graduated to English willow bats. These days, a decent Kashmir willow bat is available for around Rs. 1,500, while the English willow bats are around Rs. 3,000. In the end, the number of young kids buying bats is more than serious players, which is why Kashmir willow bats tend to sell more."

Naresh Singh, a retailer of sports goods, says, "Most kids prefer Kashmir willow bats. So, during these months, the demand for Kashmir willow bats is high and since most kids want 'good' bats, they prefer the premium grade quality ones. If the supply for these bats will be low this year, then we will not be able to meet the demand."

Butterflies of Keoladeo National Park, Bharatpur (Rajasthan)

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The Indian State of Rajasthan (erstwhile 'Rajputana,' now with 32 Districts), with Jaipur as capital, covers an area of 342, 239 sq. km in north-western India, adjacent to Pakistan in the west, the Indian States of Punjab and Haryana in the north, Madhya Pradesh in the east and Gujarat in the south. It encompasses the following four biogeographical sub-sub-areas :

the THAR DESERT (all of Marwar, from Ganganagar to Jalore, Jaisalmer to Sikar);

the MEWAR-MALWA PLATEAU (all of Mewar from Sirohi to Alwar, and Ajmer to Kota);

the PUNJAB DOAB (northern tip of Alwar); and

the RANN OF CUTCH (southern extremity of Jalore).

The Aravalli Hills divide Rajasthan into its two major geographical regions: the desert Marwar in the west and the more vegetated Mewar in the east. The northern portions of this range near Jaipur and Ajmer have dominantly *Anogeissus pendula* Edgew. (Combretaceae) forests (*Dhokra*, local name), which have a decidedly limited distribution in north-west India, but the southern section of the Aravalli Hills near Udaipur also has *A. latifolia* Wallich (*Dhaura*, *dhawa* in local vernacular), especially on the western and southern slopes of the hills. The dry, western part of Rajasthan contains around 800 plant species as its flora (Rolla & Kanodia, 1952, 1964; Shetty & Pandey, 1977), while the eastern, more humid portion contains about 1,400 plant species (Majumder, 1977). Pramanick & Hariharan (1952) wrote on the climate of Rajasthan, Krishnan (1952) on its geology, and Mani (1974) on its biogeography. There are some 21 Wildlife Sanctuaries and National Parks (Protected Areas) designated in this State (Sankhala, 1964) as given in Table 1.

Two quotations that describe Rajasthan geography and its butterfly fauna are here reproduced :

"The Aravalli is the oldest range of India, traversing 800 km in NE-SW direction. Uplifted and folded during the Pre-Cambrian, it was reduced almost to the sea-level due to erosion, but a second uplift in the late Mesozoic elevated the

area to 1,200m near Udaipur and to about 300m at its either end near Delhi and Ahmedabad (Pichamuthu & Radhakrishna, 1968). The central range is made up of gneisses, schistose rocks and quartzite of the Aravalli system. To the SW. of the main Aravalli Range rises Mt Abu, its peak at Guru Shikhar (1,722m) is the highest point between the Himalayas and the Nilgiris." [from Legris & Meher-Homji, 1977, *Trop. Ecol.*, 18: 10-24].

"Dominated by the Thar Desert in the west, the Aravalli Hills (Guru Shikhar, 1772m [sic] is the highest peak near Mt Abu) cross the State in the south and east. The butterfly fauna of the State is predominantly Oriental with a few Afrotropical elements, and has not been completely documented. Rajasthan has a forest cover of about 13,280 sq. km, which is about 4% of the total [State] area. About 70 species of butterflies are recorded so far from this State. The forested areas undoubtedly contain many more species." [from Harish Gaonkar's 1996 manuscript, "*The Butterflies of the Indian region*," Vol. 1].

The Keoladeo National Park is a world famous wildlife reserve, especially for waterbirds and details on it can be found in Ali (1953, 1985), Donahue (1962), Gee (1962), Sankhala (1964), Scott (1966), and Breeden & Breeden (1982). After initial works on butterflies of Bharatpur by Palot & Soniya (2000, 2001), Trigunayat et al. (2008) presented a more or less complete list of butterflies of this protected area. However, the names used by these authors are either obsolete or incorrect and this list of mine below gives corrected and updated ones, even trinomials. The list (Table 2) is placed in alphabetical order for genera and species listed under each family, but these latter are in currently understood phylogenetic order, from basal to derived. Parentheses around author names for subsequent generic combinations are omitted in my list below, since these apply to most of the old names for a group that has been researched since the dawn of Entomology, from Linnaeus and Fabricius in the late 18th century, almost 300 years ago.

Table 1. National Parks and Wildlife Sanctuaries in Rajasthan.

Name	District	Habitat
1. Desert National Park	Jaisalmer	Desert thorn forest
2. Mount Abu Sanctuary	Sirohi	<i>Acacia, Butea</i> , dry grass, wetland
3. Phulwari Sanctuary	Udaipur	Dry deciduous sal
4. Kumbhalgarh Sanctuary	Udaipur	<i>Boswellia, Aegle</i>
5. Jaisamand Sanctuary	Udaipur	<i>Anogeissus pendula</i> , wetland
6. Sita Mata Sanctuary	Banswara	Dry teak, bamboo brake
7. Tal Chappar Sanctuary	Sikar	Dry mixed deciduous, thorn
8. Nahargarh Sanctuary	Jaipur	Dry mixed deciduous
9. Jamva-Ramgarh Sanctuary	Jaipur	Dry mixed deciduous
10. Sariska National Park	Alwar	Dry deciduous, <i>Anogeissus</i> , thorn
11. Todgarh Raoli Sanctuary	Bharatpur	<i>Boswellia</i>
12. Keoladeo National Park	Bharatpur	<i>Acacia, Butea</i> , dry grass, wetland
13. Van Vihar Sanctuary	Bharatpur	Dry deciduous, grassland, <i>A. pendula</i>
14. Ranthambore National Park	Sawai Madhopur	Dry mixed deciduous, <i>Anogeissus</i> ,
15. Kaila Devi Sanctuary	Sawai Madhopur	<i>Boswellia</i>
16. Jawahar Sagar Sanctuary	Kota	Dry mixed deciduous, thorn, wetland
17. Ramgarh Sanctuary	Kota	Dry deciduous
18. Gharial Sancturay	Kota	Riverine
19. Darah Sanctuary	Kota	<i>Anogeissus</i>
20. Shergarh Sanctuary	Kota	Dry mixed deciduous
21. Bhensrodgarh Sanctuary	Chittorgarh	Scrub, dry deciduous

It may be noted that in this arid tropical habitat, the Pieridae (23 spp.) are most diverse, followed by the largest butterfly family, the Nymphalidae (20 spp.; several subfamilies are recognized but are not mentioned here). Delhi, which is just 180km north of Bharatpur, has its butterfly fauna well researched. It is possible that other species of the Lycaenidae (14 spp. listed here; but 22 recorded from Delhi) and, especially, Hesperidae (7 spp.; 11 spp. in Delhi) occur around Bharatpur and await capture and identification, especially if nearby forested hills (with other food plant species of butterfly larvae) are also surveyed and sampled (*cf* MacPherson, 1927). The butterflies of Delhi have been studied in great detail, from Jandu (1942, 1943) to Donahue (1967, 1968), Ashton (1973), Larsen (1988, 2006) and Smetacek (1997, 2000, 2009), and these works are a good comparative documentation to a study of the Bharatpur District butterfly fauna, which could do with more detailed and focused surveys and sampling to reveal its actual butterfly diversity. Some 20 or more species than what are given in the list below are known from the Delhi area.

Recently, in late February 2015, I spent two days in this National Park and saw several of these recorded butterfly species there (no others) while sampling Diptera, these

latter mainly for my focused research on Syrphidae (hover or flower-flies). Butterflies were not especially searched for in this short period of time, during my participation by invitation to a *National Seminar on Bird Biodiversity of Rajasthan: Opportunities and Challenges*, at Keoladeo N.P., organized by Dr Ashok Verma of the Society for Research in Ecology and Environment (SREE) on 27- and 28 February 2015.

Works on butterflies of Rajasthan that I have been able to find are given above and in the References at the end of this note. Of other insect diversity recorded in Rajasthan, recently Kailash Chandra (2011: 199) gave a table indicating the number of species of the following insect Orders: Collembola (6), Protura (0), Diplura (0), Archaeognatha (0), Zygentoma (2), Ephemeroptera (0), Odonata (48), Dermaptera (3), Plecoptera (0), Embioptera (0), Orthoptera (87), Phasmida (0), Mantodea (9), Blattaria (4), Isoptera (61), Psocoptera (0), Phthiraptera (39), Thysanoptera (20), Hemiptera (59), Coleoptera (239), Neuroptera (5), Mecoptera (0), Siphonaptera (0), Strepsiptera (0), Diptera (135), Lepidoptera (216), Trichoptera (0), and Hymenoptera (116), for a total of 1,049 insect species so far known from Rajasthan. However, these numbers need further checking, and corroboration or correc-

Table 2. List of the Butterflies of Keoladeo National Park, Bharatpur, Rajasthan.

-
- Family HesperIIDae**
1. *Badamia exclamationis* Fabricius - Brown Awl
 2. *Caltoris kumara* Moore - Blank Swift
 3. *Hasora (vitta) indica* Evans - Plain Branded Awl
 4. *Parnara bada* Moore - Straight Swift
 5. *Suastus gremius* Fabricius - Indian Palm Bob
 6. *Taractrocera (maevius) sagara* Moore - Local Grass Dart
 7. *Udaspes folus* Cramer - Grass Demon
- Family PapilionIDae**
1. *Pachliopta aristolochiae* Fabricius - Whitespotted Rose
 2. *Pachliopta hector* Linnaeus - Crimson Rose
 3. *Papilio demoleus* Linnaeus - Lime Swallowtail
 4. *Papilio (polytes) romulus* Cramer - Black Mormon
- Family PierIDae**
1. *Aporia (agathon) phryxe* Boisduval - Great Blackvein [Not "*agathon agathon*" ! (Trigunayat et al., 2008, et seq.)]
 2. *Appias (albina) swinhoei* Moore - Southern Albatross [Not "*albina darada*" !]
 3. *Belenois aurota* Fabricius - Pioneer [Not "*Anapheis aurota aurota*" !]
 4. *Catopsilia pomona* Fabricius - Lemon Emigrant [and form *crocale* Cramer]
 5. *Catopsilia pyranthe* Linnaeus - Mottled Emigrant
 6. *Cepora (nerissa) evagete* Cramer - Field Gull [Not "*nerissa nerissa*" !]
 7. *Colias (croceus) edusina* Butler - Dark Clouded Yellow [Not "*fieldii menetries*" !]
 8. *Colotis (amata) calais* Cramer - Small Salmon Arab [Not "*amata*" !]
 9. *Colotis danae* Fabricius - Southern Crimson Tip
 10. *Colotis (danae) dulcis* Butler - Northern Crimson Tip [Not "*danae dulas*" !]
 11. *Colotis etrida* Boisduval - Small Orange Tip [Not "*etridas*" !]
 12. *Colotis fausta* Oliver - Large Salmon Arab [Not "*Madais fausta*" !]
 13. *Colotis vestalis* Butler - White Arab
 14. *Delias eucharis* Drury - Indian Jezebel
 15. *Eurema hecabe* Linnaeus - Two-Spot Grass Yellow [Not "*Terias hecabe contubernalis*" !]
 16. *Eurema laeta* Boisduval - Spotless Grass Yellow [Not "*Terias laeta sikkima*" !]
 17. *Eurema (andersoni) ormistoni* Watkins - One-Spot Grass Yellow [Not "*Terias andersoni andersoni*" !]
 18. *Eurema (brigitta) rubella* Wallace - Red-Line Grass Yellow
19. *Ixias (pyrene) satadra* Moore - Yellow Orange Tip [Not "*pyrene familiaris*" !]
 20. *Leptosia nina* Fabricius - Psyche
 21. *Pareronia (valeria) hippia* Fabricius - Indian Wanderer
 22. *Pierius brassicae* Linnaeus - Large Cabbage White [Not "*nepalensis*"; *nipalensis* Gray is a synonym]
 23. *Pieris (canidia) indica* Evans - Indian Cabbage White
- Family LycaenIDae**
1. *Azanus ubaldus* Cramer - Bright Babul Blue
 2. *Chilades lajus* Stoll - Lime Blue [Not "*laius*" !]
 3. *Chilades pandava* Horsfield - Plains Cupid [Not "*pandava*" !]
 4. *Euchrysops cnejus* Fabricius - Gram Blue
 5. *Freyeria (trochylus) putli* Kollar - Grass Jewel [Not "*trochylus*" !]
 6. *Jamides celeno* Cramer - Indian Cerulean
 7. *Lampides boeticus* Linnaeus - Pea Blue
 8. *Leptotes plinius* Fabricius - Zebra Blue [Not "*Syntarucus plinius*" !]
 9. *Pseudozizeeria maha* Kollar - Pale Grass Blue
 10. *Spindasis vulcanus* Fabricius - Indian Silverline
 11. *Tarucus venosus* Moore - Himalayan Pierrot [Not "*T. v. dharata*"; *dharta* Bethune Baker is a NE. Indian species !]
 12. *Zizeeria karsandra* Moore - Dark Grass Blue
 13. *Zizina (otis) indica* Murray - Lesser Grass Blue [Not "*Zizina otis*" !]
 14. *Zizula hylax* Fabricius - Tiny Grass Blue ["*Zizula gaika*" Tremen is a synonym !]
- Family NymphalIDae**
1. *Acraea violae* Fabricius - Tawny Coster
 2. *Argynnis hyperbius* Johanssen - Indian Fritillary [Not "*Argyreus*" !]
 3. *Ariadne (merione) tapestrina* Moore - Rounded Hill Castor [Not "*Ariadne merione assama*" !]
 4. *Danaus chrysippus* Linnaeus - Plain Tiger [and variety *dorippus* Cramer]
 5. *Danaus genutia* Cramer - Striped Tiger
 6. *Euploea core* Cramer - Indian Black Crow
 7. *Hypolimnas bolina* Linnaeus - Great Eggfly
 8. *Hypolimnas misippus* Linnaeus - Danaid Eggfly
 9. *Junonia almana* Linnaeus - Peacock Pansy [Not "*Precis*" !]
 10. *Junonia hierta* Fabricius - Yellow Pansy [Not "*Precis hierta magna*" !]
 11. *Junonia lemonias* Linnaeus - Lemon Pansy [Not "*Precis*" !]
 12. *Junonia (iphita) pluvialis* Frühstorfer - Chocolate Pansy [Not "*Precis iphita*" !]
 13. *Junonia (orithya) swinhoei* Butler - Blue Pansy [Not "*Precis orithya ocyale*" !]
-

14. *Melanitis (phedima) galkissa* Frühstorfer - Dark Evening Brown [Not "*Melanitis phedima bela*" !]
15. *Melanitis (leda) ismene* Cramer - Familiar Evening Brown
16. *Parantica (aglea) melanoides* Moore - Pale Glassy Tiger
17. *Phalanta phalantha* Drury - Large Leopard
18. *Tirumala (limniace) leopardus* Butler - Pale Blue Tiger
19. *Tirumala septentrionis* Butler - Dark Blue Tiger
20. *Vanessa cardui* Linnaeus - Painted Lady [Not "*Cynthia*" !]

TOTAL = 68 species, of 46 genera and 5 families.

tion, by specialists who will each know their taxa (Orders) better.

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(Bionotes).

Record Murrah Bull Earns Rs. 2,10,000 per day

A big crowd of gawkers has gathered around Yuvraj, a giant 1400 kg Murrah bull that on Friday was crowned champion at Meerut's All India Cattle Show by a 10-member jury, startled as much by the animal's size as by his owner's refusal to sell it for a mind-boggling Rs 7 crore.

As Yuvraj chews on unconcerned by all the adulation, Karamvir Singh, who has brought him up "like a son", says he doesn't really need the money. "I already earn close to Rs 50 lakh a year from Yuvraj," he smiles. "Everything in life is not about money."

Yuvraj generates 3.5-5ml semen daily, which is diluted up to 35ml.

0.25ml of the semen, which costs Rs 1,500, is used to inseminate a Murrah buffalo.

Based on this calculation, the owner makes Rs 2,10,000 every day on an average.

Ravinder Sangwan, senior scientist at Sardar Vallabh Bhai Patel Agriculture University, where the competition for India's top bull was held, has an explanation on why Yuvraj is a cash bull that Kurukshetra-based Karamvir Singh may not want to part with.

"Yuvraj is a perfect specimen of the Murrah breed," Sangwan says. "It generates 3.5 to 5ml of very high quality semen everyday which is diluted to increase the volume to 35ml. Now, 0.25ml, which is one dose of semen used for artificially inseminating Murrah buffaloes, costs close to Rs 1,500. So, ideally in a single day, a dairy farmer can easily earn roughly about Rs 2,10,000.

Fecundity of a fish, *Cirrhinus fulungee*, from the River Godavari, Maharashtra

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Dept. of Zoology, NES Science College, Nanded; and

*Dr. D.Y. Patil College of Biotechnology & Bioinformatics, Pune (Maharashtra).

Fecundity is reproductive capacity of a fish determined by the number of eggs stored in each spawning season and its knowledge is extremely important in successful management and exploitation of its fishery.

The analysis of fecundity data in relation to size and weight of the fish has often been used to provide a reliable index of density dependent factors affecting the population size. Inhibition and reproductive process due to influence of physico-chemical factors affects fecundity. Dense population of the fish brings in intra and interspecific competitions for food and reproduction.

Franz (1940) and Clark (1934), have observed that the fecundity in fishes increases in proportion to the square of the length. Hickling (1940), observed that the fecundity increased at a rate above the cube of the length in Herring of Southern North area. Simpson (1951), concluded that the number of eggs is related to the volume and consequently to the cube of the length. Lehman (1953), found a straight line relationship between the fecundity and length in American Shad *Albosa sapidissima* and stated that there is a direct proportional to increase in fecundity with increase in length, weight and age of the fish.

Material and Methods

Monthly sampling of normal, good, healthy and mature fish specimens of the *Cirrhinus fulungee* were done for estimation of fecundity from station B, on river Godavari at Nanded (Maharashtra state) from July-2008 to June-2010. Mature specimens were collected in the months of June to September 2008, 2009.

Altogether 450 specimen of *Cirrhinus fulungee* were collected during sampling from July-2008 to June-2010. Out of which 250 specimen were mature, of which 150 were females. From these 150 females, a sample of 10 fish was drawn randomly to determine fecundity. Specimens ranging from 14.6 to 25.8 cm in total body length, from tip of snout to distal end of caudal fin were selected. Before dissecting, the females were weighed carefully and their weight noted. After dissecting the females, ovaries were weighed properly and their weight was noted. The ovaries in stage IV were preserved in 10% formalin. The ovaries after being hardened for few days, removed from formalin and surface moisture was

blotted with blotting paper. The entire ovary was then weighed accurately to nearest milligram.

A small portion (1 gm) from the middle region of the ovary was then teased on a slide and few drops of formalin were put on them and number of ova were counted under the microscope. Care was taken to ensure that the ova were spread evenly in a single layer. From the number of ova obtained from the small portion of an ovary of known weight (1 gm), the number of ova in the entire ovary was calculated on the basis of its total weight.

Observations and Results

The fecundity estimates of the entire specimen examined were made by egg counts and also from variables like weight of fish and weight of ovary. The females ranged between 14.6 and 25.8 cm in length and 25.166 and 75.240 gm in weight, whereas the weight of ovary varied between 4.165 and 21.650 grams.

In *Cirrhinus fulungee*, the total number of ova varied from 1132 to 3170, which has given an average of 39 to 48 numbers of eggs per gram body weight (Table 1).

Discussion

Studies on fecundity are receiving much attention as they play a key role in fish stock assessment. Fecundity is the most important aspect of fishery biology. Fecundity has been determined for many fishes which provide information of population dynamics, racial characteristics, production and stock recruitment problems.

Different relationships have been found to exist between fecundity and various parameters. In *Catla* the fecundity is more closely related to weight of fish. The ratio of the total number of ova varied from 2, 72,944 in a fish measuring 529 mm total length to 27,17,036 in the fish measuring 824 mm total length. The minimum fecundity of *Catla* was 2,10,118 numbers of egg in a fish measuring 504 in length and largest specimen of 840 mm had the maximum fecundity of 34,21,005 numbers of eggs (Sakhare, 2000).

According to Chonder (1977) the number of egg production depends upon the weight of ovary more closely, as observed during present study of *Cirrhinus fulungee*, also appears to be related more specifically to the ovary weight.

Table 1. Fecundity of *Cirrhinus fulungee*, in Godavari, Maharashtra.

	Wt. of fish (gm)	Length of fish (cm)	Wt. of ovary (gm)	Total number of ova in ovary	No. of ova per gm body weight
1.	32.150	22.87	5.320	1286	40
2.	30.450	17.15	5.040	1279	42
3.	25.166	14.60	4.165	1132	45
4.	26.755	15.67	4.427	1284	48
5.	75.240	25.80	21.650	2934	39
6.	65.380	23.00	10.820	2680	41
7.	60.850	21.75	10.070	2616	43
8.	25.850	14.90	4.278	1163	45
9.	28.150	16.50	4.658	1239	44
10.	70.450	24.85	11.659	3170	45

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(brought forward from page 77)

runs six large animal galleries at the Indian Museum, Kolkata, and an Aquarium at the Digha coast (W. Bengal). All Regional Centres have their own buildings (with museum).

The survey of endangered and threatened species of Indian animals is an important objective of the ZSI. Both the field work and laboratory studies lead to unravel present status of populations for conservation efforts. Red Data Books of the vertebrates and the butterflies have been published. A special series under the title 'Conservation area series' is issued on the fauna of National Parks, Wildlife Sanctuaries and Tiger Reserves.

ZSI is well known for its taxonomic studies. This has brought to light a large no. of new families, new genera and new species to the science. The volumes under the 'Fauna of India' series (earlier the 'Fauna of British India including Ceylon and Burma') on different animal groups, are a lasting gift of ZSI to the nation.

Two special commemorative postal stamps on a sheet (see page 77) was released by the Govt. of India, in recognition of the department's achievements, on 3rd Dec. 2015.

The final centenary celebration of ZSI was held on the afternoon of the 1st July 2016, at its premises at Kolkata

(called the Prani Vigyan Bhawan). The chief guest was Shri Prakash Javadekar, the then Hon'ble Union Minister of Environment, Forest & Climate Change, Govt. of India, and the guest of honour was Shri Shovan Chatterjee, Hon'ble Minister-in-charge of Environment, Govt. of West Bengal. Some other high officials and dignitaries from different parts of the country attended. A special logo, the 'Jeevan Dhara' metal sculpture, to commemorate the centenary, was inaugurated. Several new publications of ZSI were released on the occasion.

A three-days symposium, the 'National Conference on Faunal Diversity in the Indian Land and Seascapes' was held from the 30th June to 2nd July, 2016. Some prominent Indian biology scientists, like Dr R Sukumar (Indian Instt. of Science, Bengaluru), Dr Ms B Meenakumari (Chairperson N B A, Chennai), Dr K Shankar (Director SACON, Coimbatore), Prof M S Jairajpuri and Dr A K Ghosh (former Directors ZSI), Mr Biswajit Roy Chowdhary (Editor *Environ*), Dr A J T John Singh (Wildlife Instt. of India, Dehradun) etc. participated in it. Yours truly also attended the celebrations and the National Conference.

—R. K. Varshney

Diversity of Ants (Hymenoptera : Formicidae) in an Organic Farm of North 24 Parganas, West Bengal

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*Zoological Survey of India, New Alipore, Kolkata-700 053.

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The ants belong to a single, very large family, the Formicidae. In West Bengal it is represented by nearly 250 species. The aim of this study is to know the diversity of ants in an agricultural field of West Bengal, where organic manure has been used for growing crops and vegetables.

The study was carried out during May, 2015 to April, 2016 in an agricultural field of Gobardanga, under Block-Gaighata, of District North 24-Parganas. The crops in that area are mainly Paddy and some green leafy vegetables like Spinach (*Spinacia oleracea*), Ladies finger (*Abelmoschus esculentus*), Til (*Sesamum indicum*), Lal Shak (*Amaranthus gangeticus*) etc.

After collection, the ants were preserved in 70% alcohol. Mounting and tagging was done following standard procedure. Identification up to genus level was done as per Holldobler & Wilson (1990), Bolton (1994) and Sheela (2008) and up to species level as per Bingham (1903), Bolton (1977) and Ward (2001).

In the present study, 24 species of ants belonging to 19 genera and seven sub-families were encountered.

Diversity of vegetation might have an influence on ants' diversity. Organic manure like chicken litter, excreta of cattle and vegetable compost may also have the potentiality to attract and create colonies of ants by providing various food sources. Based on the frequency of observation, ant species are classified as very rare (observed < 20%), rare (observed 20% - 40%), regular (> 40% but < 60%) and abundant (> 60%). The study reveals that *Solenopsis geminata* (Fab.) is most abundant species.

The list of ant species observed in an organic farm, N 24 Pgn., W. Bengal, is given as follows :

Order : Hymenoptera

Family : Formicidae

Subfamily : Aenictinae

- | | |
|--------------------------------------|------|
| 1. <i>Aenictus</i> sp. | Rare |
| 2. <i>Aenictus ceylonicus</i> (Mayr) | Rare |

Subfamily : Dolichoderinae

- | | |
|--|---------|
| 3. <i>Tapinoma melanocephalum</i> (Fab.) | Regular |
|--|---------|

Subfamily : Formicinae

- | | |
|--|-----------|
| 4. <i>Anoplolepis gracilipes</i> Smith | Rare |
| 5. <i>Camponotus compressus</i> (Fabr.) | Abundant |
| 6. <i>Camponotus sericeus</i> (Fab.) | Abundant |
| 7. <i>Lepisiota opaca</i> (Forel) | Rare |
| 8. <i>Oecophylla smaragdina</i> Fab. | Very rare |
| 9. <i>Paratrechina longicornis</i> (Latr.) | Abundant |
| 10. <i>Polyrhachis illaudata</i> Walker | Regular |
| 11. <i>Polyrhachis lacteipennis</i> Smith | Regular |
| 12. <i>Polyrhachis rastellata</i> (Latr.) | Regular |

Subfamily : Myrmicinae

- | | |
|---|-----------|
| 13. <i>Crematogaster rogenhoferi</i> Mayr | Rare |
| 14. <i>Crematogaster subnuda</i> Mayr | Very rare |
| 15. <i>Meranoplus bicolor</i> (Guer.) | Regular |
| 16. <i>Monomorium pharaonis</i> (Linn.) | Regular |
| 17. <i>Myrmicaria brunnea</i> Saunders | Rare |
| 18. <i>Pheidole</i> sp. | Regular |
| 19. <i>Solenopsis geminata</i> (Fab.) | Abundant |

Subfamily : Ponerinae

- | | |
|---|---------|
| 20. <i>Diacamma rugosum</i> (Le Guill.) | Regular |
| 21. <i>Leptogenys processionalis</i> (Jerdon) | Regular |
| 22. <i>Bothroponera rufipes</i> (Jerdon) | Regular |

Subfamily : Pseudomyrmicinae

- | | |
|---|------|
| 23. <i>Tetraoponera rufonigra</i> Smith | Rare |
|---|------|

Subfamily : Dorylinae

- | | |
|--|------|
| 24. <i>Dorylus orientalis</i> Westwood | Rare |
|--|------|

This study provides a preliminary knowledge on the diversity of ants in an agricultural field where various crops and vegetables have been grown and organic manure has been applied. Detailed study may generate much more diverse ants fauna, which may be considered as worthy to the taxonomic study on ants in West Bengal.

Acknowledgement: Authors are grateful to the Director, Zoological Survey of India for providing laboratory facility and permission to carry out this work.

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Letters

Thank you for recently sending us Vol. 18 No. 2 (Apr-Jun 2016) of "Bionotes"—we will gratefully add it to our collection.

According to our records, we did not receive Vol. 18 No. 1 and I wondered if it would be possible for you to supply us with a copy? Apologies if this was sent to us, however it does not seem to have reached us.

Many thanks for your assistance.

—Bobbie Winter-Burke,
Serials Librarian (Presentations & Exchanges),
Library and Archives,
The Natural History Museum,
London SW7 5BD (United Kingdom).

My name is Jeyanth and I'm working with the development sector for the past 20 years. I have completed my Masters in Physics and Social Sciences and worked with National and International NGOs.

With my grass-root level experience I have published 44 articles in various National and International Journals.

I came to know that you are publishing 'Bionotes'. I have prepared an article titled, 'Integral role of Ocean and Climate', by Jeyanth K. Newport & Keny J. Newport, which highlights the importance of ocean.

I request your esteemed Newsletter to consider this article for publication.

—Jeyanth K. Newport,
IISD, Yesudian Street,
Nagercoil-629 001 (Tamil Nadu).

Dear Sir

My son is a dedicated Butterfly enthusiast and has sighted the Dark Himalayan Oakblue *Arhopala rama* (Lepidoptera : Papilionoidea : Lycaenidae : Theclinae) from Tenga valley, W. Arunachal Pradesh. This appears to be the first record of the species from Arunachal Pradesh.

Please guide how can an article be submitted to you for publication?

Thanks and best wishes,

—Bhanu Pratap,

E-mail : bhanupratap2@gmail.com



Dear Dr. Varshney,

The BBC World Service carried news of the 'A Synoptic Catalogue of the Butterflies of India', in Newshour today. Here is the link : <http://www.bbc.co.uk/programmes/p036hn7k>

The news is from 42.12 to 45.00 of this program.

Warm regards,

—Peter Smetacek,

The Retreat, Jones Estate,
Bhimtal, Nainital (Uttarakhand).



Garbage plantation

Today garbage disposal has become a major problem. The heaps of garbage are seen near every city. This garbage can be converted into thick plantation site.

The tissue culture of any plant can be produced in millions. These tissue-cultured saplings can be spread on the heaps of garbage in the beginning of the rainy season. This operation can be done through helicopter. Even if 25% of the plants survive, whole area will be green within 5 years. This is the easiest and better method of converting 'garbage into greenery'.

Rain water harvesting : Sieve plantation method

This paper was presented at the Centre for Science & Environment, Delhi.

Use of sewage water for plantation

Even sewage water can be used for raising plantations, after a little treatment.

CSSRI, Karnal (Haryana), has developed such technology. Dr. Ranbir Chhabra, Scientist there can be contacted.

I retired as Professor, Osmania University, Hyderabad, working as Environmentalist for the last 30 years. As Green Belt Officer, I planted 2.5 lakh of plants in Osmania campus. As convener of 'Save Lakes', saved 170 lakes of Hyderabad.

—Dr. K. L. Vyas,

Flat No. 6, Block No. 3, Kendriya Vihar, Miyapur,
Hyderabad-500 049 (Telangana).



Notes from D'Abbrera'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. 2, page 62)

3. *H. albimacula* Wood - Mason & de Niceville, 1881
 i. *H. a. albimacula* Wood - Mason & de Niceville - Andamans.
 ii. *H. a. viola* Moore - Sikkim, Assam, India, Sri Lanka, Myanmar.
- (36) *Cowania* Eliot, 1973
 1. *C. achaja* Fruhstorfer, 1912 - ?S Myanmar, Thailand.
- (37) *Drupadia** Moore, 1884
 1. *D. rufotaenia* Fruhstorfer, 1912
 i. *D. r. archbaldi* Evans - Myanmar, Mergui, Thailand, Langkawi Is. —
 2. *D. ravindra* Horsfield, 1828
 i. *D. r. boisduvalii* Moore - Myanmar, Mergui, N and Central Thailand, Indo China.
 3. *D. theda* Felder, 1862
 i. *D. t. fabricii* Moore - S Myanmar.
 [‘Similar to *D. t. renonga* Corbet’ —D’ Abbrera].
 4. *D. niasica* Röber, 1886
 i. *D. n. scudderii* Doherty - S Myanmar, Mergui.
 5. *D. estella* Hewitson, 1863
 i. *D. e. nicevillei* Doherty - S Myanmar, Thailand.
 6. *D. scaeva* Hewitson, 1863
 i. *D. s. cyara* Hewitson - Bhutan, Sikkim, Assam. ? NW Myanmar.
 ii. *D. s. cooperi* Tytler - Central Myanmar, N Thailand.
 iii. *D. s. melisa* Hewitson - S Myanmar, Mergui, S Thailand.
- (38) *Cheritrella* de Niceville, 1887
 1. *C. truncipennis* de Niceville, 1887 - Sikkim, Assam, Central and N Myanmar, W China (Yunnan).
- (39) *Ticherra* de Niceville, 1887
 1. *T. acte* Moore, 1857
 i. *T. a. acte* Moore - Sikkim, Assam, Myanmar, Thailand.
 ii. *T. a. liviana* Fruhstorfer - S Myanmar, peninsular Malaya, ? Thailand, Sumatra.
- (40) *Cheritra* Moore, 1881
 1. *C. freja* Fabr., 1793
 i. *C. f. freja* Fabr. - S Myanmar, S Thailand, Mergui, Langkawi Is.
 ii. *C. f. pseudojafra* Moore - Sri Lanka.
 iii. *C. f. butleri* Cowan - S India.
 iv. *C. f. evansi* Cowan - Assam, Manipur, N and Central Myanmar, N and Central Thailand, ? Indo China.
- (41) *Spindasis* Wallengren, 1857
 1. *S. seliga* Fruhstorfer, 1912
 i. *S. s. seliga* Fruhstorfer - Peninsular Malaya, S Myanmar, S Thailand.
 2. *S. lohita* Horsfield, 1829
 i. *S. l. lazularia* Moore - Sri Lanka.
 ii. *S. l. himalayana* Moore - India, Nepal, Bhutan, Assam, Sikkim to Myanmar, N Thailand.
 3. *S. syama* Horsfield, 1829
 i. *S. s. peguanus* Moore - Myanmar, N Thailand, Indo China.
 4. *S. vulcanus* Fabr., 1775
 i. *S. v. vulcanus* Fabr. - India.
 ii. *S. v. fusca* Moore - Sri Lanka.
 iii. *S. v. tavoyana* Evans - Myanmar, Central Thailand.
 5. *S. schistacea* Moore, 1880-81
 i. *S. s. schistacea* Moore - Sri Lanka, India.
 ii. *S. s. gabriel* Swinhoe - Upper Myanmar.
 6. *S. ictis* Hewitson, ?1862
 i. *S. i. ictis* Hewitson - NW India.
 ii. *S. i. ceylonica* [? author] - S India, Sri Lanka.
 7. *S. trifurcata* Moore, 1883 - NW, Central and E India.
 8. *S. lunulifera* Moore
 i. *S. l. lunulifera* Moore - Sikkim, ? Assam, ? rest of India.
 ii. *S. l. fairlei* Ormiston - Sri Lanka.
 9. *S. nubilus* Moore, ?1883 - Sri Lanka.
 10. *S. maximus* Elwes, 1892 - Myanmar (Khalaw), Thailand.
 11. *S. lilacinus* Moore, 1884 - Assam, Myanmar, ? N Thailand.
 12. *S. greeni* Heron, 1896 - Sri Lanka (Punal Oya, 6000’).

* ‘Many species in this genus produce ‘dwarfs’ of both sexes. See Cowan, 1974. *Bull. Br. Mus. N.H.*, 29 (6) : 319’.
 —D’ Abbrera.

13. *S. nipalicus* Moore, 1884 - NW India, Sikkim, Nepal.
 14. *S. rukmini* de Niceville, 1888 - Sikkim, Assam, Naga Hills.
 15. *S. rukma* de Niceville, 1888 (= *sani* de Niceville, DSF) - Sikkim, Bhutan.
 16. *S. elwesi* Evans, 1925 - Sikkim.
 17. *S. learmondi* Tytler, 1940 - Myanmar (S Shan States).
 18. *S. evansii* Tytler, 1915 - Assam ["Not a race of *sani*" —D' Abrera].
 19. *S. abnormis* Moore, 1883 - S India.
- (42) *Jacoona* Distant, 1884
 1. *J. anasuja* Felder, 1865
 i. *J. a. nigerrima* Corbet - S Myanmar, Thailand.
- (43) *Neocheritra* Distant, 1885
 1. *N. amrita* Felder, 1860
 i. *N. a. amrita* Felder - S Myanmar, Thailand, peninsular Malaya, Singapore, Sumatra.
 2. *N. fabronia* Hewitson, 1878
 i. *N. f. fabronia* Hewitson - Sikkim to Thailand.
- (44) *Mantoides* Druce, 1896
 1. *M. gama* Distant, 1886
 i. *M. g. gama* Distant - S Myanmar, Thailand, peninsular Malaya.
 ii. *M. g.* race *maga* Corbet - Myanmar (Tavoy).
- (45) *Maneca* de Niceville, 1890
 1. *M. bhotea* Moore, 1884 - Sikkim, ? Bhutan, ? Assam, ? Nepal.
- (46) *Charana* de Niceville, 1890
 1. *C. mandarina* Hewitson, 1863
 i. *C. m. mandarina* Hewitson - Sikkim, Assam, Bhutan, Myanmar, Thailand.
 2. *C. cepheis* de Niceville, 1894 - Assam.
- (47) *Dacalana* Moore, 1884
 1. *D. burmana* Moore, 1884 - Myanmar, Thailand, ["Not a northern race of *D. vidura* Horsfield" —D' Abrera].
 2. *D. pencillegera* de Niceville, 1890 - Assam, Myanmar, Thailand.
 3. *D. sinhara* Fruhstorfer, 1914
 i. *D. s. sinhara* Fruhstorfer - S Myanmar, Thailand, peninsular Malaya.
 4. *D. cotys* Hewitson, 1865 - Sikkim, to Thailand.
- (48) *Creon* de Niceville, 1896
 1. *C. cleobis* Godart, 1824
 i. *C. c. cleobis* Godart - India, Assam to Thailand.
- (49) *Pratapa* Moore, 1881
 1. *P. icetas* Hewitson, 1865
 i. *P. i. icetas* Hewitson - N India, Sikkim.
 ii. *P. i. extensa* Evans - Myanmar, Thailand.
 2. *P. deva* Moore, 1857
 i. *P. d. deva* Moore - S India, Sri Lanka.
 ii. *P. d. lila* Moore (? = *angada* Fruhstorfer) - N India, Assam, Myanmar, Thailand.
3. *P. icetoides* Elwes, 1893
 i. *P. i. icetoides* Elwes - ? N India, Myanmar, N Thailand, ? Indo China.
- (50) *Ancema* Eliot, 1973
 1. *A. ctesia* Hewitson, 1865
 i. *A. c. ctesia* Hewitson (? = *agalla* Fruhstorfer) - Sikkim, Assam, ? Bhutan, ? Myanmar, Thailand, peninsular Malaya.
 [ii. *A. c. cakravastri* [?? lapsus] Fruhstorfer - Taiwan. Not in South Asia].
 2. *A. blanka** de Niceville, 1894 - S India to Java including Myanmar, Thailand, peninsular Malaya and possibly Indo China.
 i. *A. b. ? argentea* Aurivillius - Myanmar.
 ii. *A. b. ? sudica* Evans - S India.
- (51) *Tajuria* Moore, 1881
 ["... an omnibus or umbrella genus for convenience" —D' Abrera].
 1. *T. cippus* Fabr., 1798
 i. *T. c. cippus* Fabr. - N India, Assam to Thailand.
 ii. *T. c. longinus* Fabr. - Sri Lanka, S India.
 2. *T. luculentus* Leech, 1890
 i. *T. l. luculentus* Leech - China to Assam.
 3. *T. jehana* Moore, 1883
 i. *T. j. jehana* Moore - Central to N India.
 ii. *T. j. ceylanica* Riley - Sri Lanka, ? S India.
 4. *T. melastigma* de Niceville, 1887 - India, Assam to Myanmar.
 5. *T. illurgis* Hewitson, 1869
 i. *T. i. illurgis* Hewitson - Bhutan, Assam, ? N Myanmar, ? N Indo China, ? China.
 6. *T. illurgioides* de Niceville, 1890 - N India, Assam, Sikkim.
 7. *T. maculata* Hewitson, 1865 - Sikkim, Assam to peninsular Malaya, ? Sumatra, Borneo.
 8. *T. mantra* Felder, 1860
 i. *T. m. mantra* Felder - Myanmar, Thailand, peninsular Malaya, Sumatra, Borneo.
 9. *T. ogyges* de Niceville, 1895 - S Myanmar, ? Thailand.
 10. *T. yajna* Doherty, 1886
 i. *T. y. yajna* Doherty - NW India.
 ii. *T. y. ellisi* Evans - Myanmar, Thailand.
 iii. *T. y. istroidea* de Niceville - Assam.

* "There is considerable confusion over this taxon and on names like *lucida* Druce, *cippus* ?Fabr., *argentea* Aurivillius, *minturna* Fruhstorfer" —D' Abrera.

11. *T. ister* Hewitson, 1865
i. *T. i. ister* Hewitson - Assam, Myanmar, ? Thailand.
[12. *T. deudorix* Hewitson - Not in Indian region.]
13. *T. thydia* Tytler, 1915 - Assam to Thailand.
14. *T. albiplaga* de Niceville, 1887
i. *T. a. albiplaga* de Niceville - Sikkim, ? Assam.
ii. *T. a. pallescens* ? Evans - Assam, Myanmar, ? Thailand.
15. *T. megistia* Hewitson, 1869
i. *T. m. megistia* Hewitson - Assam.
ii. *T. m. thria* de Niceville - Myanmar to peninsular Malaya, Sumatra.
16. *T. diaeus* Hewitson, 1865
i. *T. d. diaeus* Hewitson - India, ? Myanmar, ? Thailand.
17. *T. isaesus* Hewitson, 1865
i. *T. i. tyro* de Niceville - Myanmar, N Thailand.
(52) *Pseudotajuria* Eliot, 1973
1. *P. donatana* de Niceville, 1899
i. *P. d. donatana* de Niceville - Myanmar to Singapore, Borneo, Sumatra.
(53) *Eliotia* Hayashi, 1978
1. *E. jalindra* Horsfield, 1829
i. *E. j. indra* Moore - C India to Thailand.
ii. *E. j. macanita* Fruhstorfer - S India.
iii. *E. j. tarpina* Hewitson - Andamans.
(54) *Suasa* de Niceville, 1890
1. *S. lisides* Hewitson, 1863
i. *S. l. lisides* Hewitson - C and N India, Assam to S Myanmar and Thailand.
(55) *Remelana* Moore, 1884
1. *R. jangala* Horsfield, 1829
i. *R. j. ravata* Moore - Sikkim, Assam to Myanmar and N Thailand.
ii. *R. j. andamanica* de Niceville - Andamans.
(56) *Bullis* de Niceville, 1897
1. *B. buto* de Niceville, 1895
i. *B. b. buto* de Niceville (? = *valentia* Swinhoe) - ? Assam, ? Myanmar, ? Thailand.
(57) *Britomartis* de Niceville, 1895
1. *B. cleoboides* Elwes, 1893
i. *B. c. cleoboides* Elwes - Sikkim to Myanmar.
(58) *Hypolycaena* Felder, 1862
["Includes all spp. previously put in *Chilaria* Moore" —D' Abrera]
1. *H. nilgirica* Moore, 1883 - Sri Lanka, S India.
2. *H. thecloides* Felder, 1826
i. *H. t. thecloides* Felder - Borneo, Sumatra, Java, Nicobars, Myanmar to peninsular Malaya, Singapore, Pulau Tioman.
3. *H. erylus* Godart, 1824
i. *H. e. himavantus* Fruhstorfer - Sikkim to N Thailand and Indo China.
ii. *H. e. andamana* Moore - Andamans.
4. *H. othona* Hewitson, 1865
i. *H. o. othona* Hewitson - India to N peninsular Malaya, ? Taiwan.
5. *H. merguia* Doherty, 1889
i. *H. m. merguia* Doherty (? = *watsoni* Swinhoe) - Mergui, S Myanmar, Thailand.
6. *H. kina* Hewitson, 1869
i. *H. k. kina* Hewitson - NW India to Thailand.
(59) *Zeltus* de Niceville, 1890
1. *Z. amasa* Hewitson, 1865
i. *Z. a. amasa* Hewitson - India to Myanmar, N Thailand.
(60) *Bindahara* Moore, 1881
1. *B. phocides* Fabr., 1793 - Entire Oriental region.
i. *B. p. moorei* Fruhstorfer - Sri Lanka.
(61) *Virachola* Moore, 1881
1. *V. perse* Hewitson, 1863
i. *V. p. perse* Hewitson - India to Thailand.
ii. *V. p. ghela* Fruhstorfer - Sri Lanka, S India.
2. *V. smilis* Hewitson, 1863
i. *V. s. smilis* Hewitson - Assam, Myanmar, peninsular Malaya, ? Thailand, Andamans, ? Sumatra.
3. *V. isocrates* Fabr., 1793 - Sri Lanka, India to Thailand, ? Indo China.
4. *V. subguttata* Elwes, 1893
i. *V. s. subguttata* Elwes - Myanmar.
5. *V. kessuma* Horsfield, 1829
i. *V. k. deliochus* Hewitson - Myanmar to Singapore, ? Indo China.
6. *V. dohertyi* Tytler, 1915 - Assam, Myanmar.
(62) *Rapala* Moore, 1881
1. *R. abnormis* Elwes, 1893
i. *R. a. abnormis* Elwes - Myanmar, Thailand, peninsular Malaya, Singapore, Borneo, Sumatra.
2. *R. pheretima* Hewitson, 1863
i. *R. p. petosiris* Hewitson - Sikkim, Assam, N Thailand.
ii. *R. p. sequeira* Distant - S Thailand, S Myanmar, peninsular Malaya, Langkawi, Singapore.
3. *R. suffusa* Moore, 1879
i. *R. s. suffusa* Moore - N India, Assam, Thailand to Indo China.
4. *R. buxaria* de Niceville, 1888 - Sikkim, Bhutan, ? Assam.
5. *R. damona* Swinhoe, 1890 - Andamans, N India, Myanmar, Thailand to peninsular Malaya, Singapore etc.

6. *R. dienece* Hewitson, 1878
 i. *R. d. dienece* Hewitson (= *xenophon* Auct.) - N India to peninsular Malaya, Singapore, Sumatra, ? Borneo.
 ii. *R. d. intermedius* Staudinger - Andamans.
7. *R. iarbus* Fabr., 1787
 i. *R. i. iarbus* Fabr. - ? Myanmar, Thailand to Sundaland.
 ii. *R. i. sorya* Kollar - Whole of India, ? Sikkim, ? Assam, Sri Lanka.
8. *R. hades* de Niceville, 1895 - S Myanmar, ? Thailand, ? peninsular Malaya.
9. *R. manea* Hewitson, 1863
 i. *R. m. schistacea* Moore - India to N Thailand, Sri Lanka, ? Andamans.
10. *R. scintilla* de Niceville, 1890 - N India, Sikkim, Assam, to peninsular Malaya, Thailand.
11. *R. varuna* Horsfield, 1829 - Entire Oriental Region.
12. *R. refulgens* de Niceville, 1891 - Assam, Myanmar, Thailand.
13. *R. lankana* Moore, 1879 - Sri Lanka, S India.
14. *R. elcia* Hewitson, 1863
 i. *R. e. rhoecus* de Niceville - Myanmar, Thailand, peninsular Malaya, Langkawi, ? Sumatra, Borneo, Palawan.
15. *R. tara* de Niceville, 1888 - Sikkim, Assam, ? Myanmar.
16. *R. rubida* Tytler, 1927 - Myanmar, Thailand.
 [Some authors place it in *Virachola*].
17. *R. rosacea* de Niceville, 1888 - Sikkim, Assam.
18. *R. nissa* Kollar, 1844
 i. *R. n. nissa* Kollar (= *diopites* Hewitson, *rectivitta* Moore) - N India to Thailand, and China.
- (63) *Strymonidia* Tutt, 1908
 [A Chinese genus].
 1. *S. mackwoodi* Evans - Myanmar (Shan States).
 2. *S. saitua* Tytler - Manipur (Saitu).
- (64) *Deudorix* Hewitson, 1863
 1. *D. epijarbas* Moore, 1857 - Throughout Oriental Region.
 i. *D. e. ancus* Fruhstorfer - N India.
 ii. *D. e. amatius* Fruhstorfer - Assam to N Thailand, Indo China.
 2. *D. diara* Swinhoe, 1896 - Assam, Myanmar, Java, N Borneo, ? Sundaland, ? Thailand.
 3. *D. gaetulia* de Niceville, 1892 - Assam to S Myanmar.
 4. *D. hypargyrea* Elwes, 1893
 i. *D. h. hypargyrea* Elwes - Myanmar to Sundaland.
- (65) *Artipe* Boisduval, 1870
 1. *A. eryx* Linn., 1771
 i. *A. e. eryx* Linn. - N India, Myanmar, Thailand to Indo China and S China.
- (66) *Sithon* Hübner, 1819
 1. *S. nedymond* Cramer, 1780
 i. *S. n. ismarus* Fruhstorfer - S Myanmar, Langkawi, ? Thailand.
- (67) *Araotes* Doherty, 1889
 1. *A. lapithis* Moore, 1857
 i. *A. l. lapithis* Moore - Sikkim, Assam to S China, W Thailand and Myanmar.
- (68) *Sinthusa* Moore, 1884
 1. *S. chandrana* Moore, 1883 - Sikkim to W China.
 2. *S. virgo* Elwes, 1887 - Sikkim.
- (69) *Heliophorus* Geyer, 1832
 1. *H. moorei* Hewitson, 1865
 i. *H. m. moorei* Hewitson (? = *marica* Leech) - NW India, Sikkim, Assam, N Myanmar (Yunnan), but essentially a Chinese sp.
 ii. *H. m. birmana* Fruhstorfer - S Myanmar.
 2. *H. brahma* Moore, 1857
 i. *H. b. brahma* Moore - NW India to Assam.
 ii. *H. b. mogoka* Evans - N Myanmar.
 3. *H. kohimensis* Tytler, 1912 - Assam [Nagaland].
 4. *H. epicles* Godart, 1824
 i. *H. e. indicus* Fruhstorfer - N India, Bhutan, Sikkim, Assam, Myanmar.
 [w. s. f. *rufonotata* —D' Abrera].
 5. *H. ila* de Niceville, 1896
 i. *H. i. nolus* Eliot - S Myanmar, ? Thailand.
 6. *H. cantlei* Eliot, 1965 - S Myanmar (Tenasserim) and ? Thailand.
 7. *H. tamu* Kollar, 1844 (= *kala* Tytler) - NW India to N Myanmar.
 8. *H. androcles* Doubleday & Hewitson - NW India, Sikkim, Assam to W China.
 [d. s. f. *tytleri* Riley —D' Abrera].
 9. *H. hybrida* Tytler, 1912 - Sikkim.
 [An aberrant form of *H. brahma* —D' Abrera].
- (70) *Anthene** Doubleday, 1847
 1. *A. emolus* Godart, 1824
 i. *A. e. emolus* Godart - India to Myanmar.
 ii. *A. e. race andamanicus* Fruhstorfer - Andamans.
 2. *A. lycaenina* Felder, 1868
 i. *A. l. lycaenina* Felder - Sri Lanka, S India.
 ii. *A. l. race lycambes* Hewitson - NW India to Indo China and Hainan.
 iii. *A. l. race miya* Fruhstorfer - Andamans, Thailand, peninsular Malaya etc.

* Revised by Tite, 1966. *Bull. Br. Mus. nat. Hist.*, 18 (8) : 256 - 275.

(To be continued).

Hill Gynura plant, *Gynura cusimbua*, as a possible new larval host plant of the Common Onyx butterfly, *Horaga onyx*, from southern Western Ghats, Kerala

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The author visited Silent Valley National Park, Palakkad District, Kerala (11°08'N 76°28'E) on 23 November 2011 during the field visit of the International Conference on Indian Ornithology. The Park is spread over an area of 236.74 sq.km.

During the visit the author photographed many birds and butterflies, one of the butterflies being Common Onyx *Horaga onyx*. This butterfly was sighted in an evergreen forest patch near the watch tower from where a panoramic view of the park is seen. It was noted that the butterfly was laying eggs on the calyx of flower buds and returning to the plant repeatedly. Also it opened its wings and basked for short durations of few seconds on nearby plants. The eggs were laid singly, were white in colour and looked disc-like with intricate design on its surface.

The larval host plant was photographed. From the photographs it was identified as Hill Gynura, *Gynura cusimbua* (Family Asteraceae). This could be a new larval host plant for Common Onyx butterfly, as out of the three important publications on butterflies of India (Evans, 1932, Wynter-Blyth 1957 and Kehimkar, 2008) only Kehimkar (2008) mentions *Coriaria nepalensis* as the single larval host plant for Common Onyx.

Notably, the Common Onyx is widespread across south Asia. In India it is found in the Western Ghats southwards of Maharashtra, in the Himalaya from Himachal Pradesh to Arunachal Pradesh and other countries including Nepal, Bhutan, Bangladesh, Myanmar, and Sri Lanka.

When the author informed this finding to butterfly experts, Mr. Peter Smetacek and Mr. Isaac Kehimkar, they informed that ovipositing does not necessarily mean larval acceptance and development. However, Peter added that, given this butterfly's wide choice of host families, a new record in the Asteraceae does not seem surprising. He gave me a list of larval host plants which range and include various plants belonging to Fabaceae, Malvaceae, Sapindaceae, Phyllanthaceae, Sabiaceae, Rosaceae and Rhamnaceae. Hence,

the report of a possible new larval host plant belonging to Asteraceae family and that too in Southern India may help lepidopterists in India to study the larval stages of the species in India and confirm the use of the host plant by the species.

Photographic documentation

The author uploaded the photographs of his observation on Wikimedia Commons website.

A photograph of Common Onyx laying egg on *Gynura cusimbua* is uploaded here:

https://upload.wikimedia.org/wikipedia/commons/1/19/Common_Onyx_Horaga_onyx_egg_laying_on_Gynura_cusimbua_by_Dr_Raju_Kasambe_1.jpg

A close-up photograph of the egg of Common Onyx is uploaded here:

[https://commons.wikimedia.org/wiki/File:Egg_of_Common_Onyx_Horaga_onyx_on_Gynura_cusimbua_by_Dr_Raju_Kasambe_\(2\).jpg](https://commons.wikimedia.org/wiki/File:Egg_of_Common_Onyx_Horaga_onyx_on_Gynura_cusimbua_by_Dr_Raju_Kasambe_(2).jpg)

And a photograph of the plant *Gynura cusimbua* is uploaded here:

[https://commons.wikimedia.org/wiki/File:Gynura_cusimbua_plant_at_Silent_Valley_National_park_Kerala_by_Dr_Raju_Kasambe_\(2\).jpg](https://commons.wikimedia.org/wiki/File:Gynura_cusimbua_plant_at_Silent_Valley_National_park_Kerala_by_Dr_Raju_Kasambe_(2).jpg)

Acknowledgements: Thanks to colleague and butterfly expert, Mr. Isaac Kehimkar for help in identification of the plant and in encouraging to write this note. Thanks to Lepidoptera experts Mr. Peter Smetacek and Mr. Keith Wolf for providing information regarding the larval host plants of the species.

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Research Notes

FURTHER RECORD OF SOME FLIES (INSECTA: DIPTERA) FROM THE INDIAN SUNDERBANS

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Sunderban Biosphere Reserve is one of the unique and largest mangrove ecosystem in the world, which spreads over India and Bangladesh. Attempts were undertaken to report the insect diversity from Indian Sunderbans. Mitra (2013) compiled a list of works on dipteran faunal diversity from this important Biosphere Reserve, reporting 125 species of flies. Apart from this, Mazumdar et al. (1998, 2000) reported some chironomids (non-biting midges) of Indian Sunderbans. Recently, more reports have been made by Mitra et al. (2014, 2015 a, b), where five more species were added to the dipteran fauna from this zone.

The present communication reports further six dipteran species of the families Syrphidae, Bombyliidae, Muscidae and Ulididae, reporting them from Sunderban Biosphere Reserve for the first time. All the collections were made under the Sunderban Pollinator Project, during 2015-2016, by B. Mitra and party.

Order Diptera

Family Syrphidae

1. *Allobaccha (Allobaccha) amphihoe* (Walker, 1849)

1849. *Baccha amphihoe* Walker, List Dipt. Brit. Mus. iii, p. 549.

Material examined: 1ex., Sunderban: Satjelia island: Binapani, 28.v.2015; 1ex., Sunderban: Satjelia island: 4 no. Satjelia, 29.v.2015; 1ex., Sunderban: Bakkhali, Kalisthan, 18.vi.2015.

Distribution: India : Andaman & Nicobar Island, Arunachal Pradesh, Assam, Kerala, Karnataka, Meghalaya, Mizoram, Sikkim and West Bengal.

2. *Dideopsis aegrota* (Fabricius, 1805)

1805. *Eristalis aegrota* Fabricius, Syst. Antl., p. 243.

Material examined: 1ex., Sunderban: Bakkhali, Bijoybati, 06.ii.2016.

Distribution: India : Andaman & Nicobar islands, Arunachal Pradesh, Assam, Kerala, Karnataka, Meghalaya, Maharashtra, Madhya Pradesh, Sikkim, Tamil Nadu, Uttarakhand and West Bengal. Elsewhere: Australia, Nepal

and New Guinea.

Family Bombyliidae

3. *Anthrax distigma* Wiedemann, 1828

1828. *Anthrax distigma* Wiedemann, *Auss. Zweifl.* i, p. 309.

Material examined: 1ex., Sunderban: Bali island, 9 no. Gheri, 02.iv.2015.

Distribution: India : Andaman and Nicobar Islands, Arunachal Pradesh, Bihar, Chandigarh, Karnataka, Meghalaya, Sikkim, Tamil Nadu, Uttarakhand and West Bengal. Elsewhere: Bangladesh, Java, Myanmar, Philippines, Sri Lanka, Sulawesi, Seychelles and Australasia.

4. *Micomitra vitrea* (Bigot, 1892)

1892. *Exoprosopa vitrea* Bigot, *Ann. Soc. Ent. France*, lxi, p. 344.

Material examined: 2ex., Sunderban: Sagar Island, Shikarpur, 07.v.2016.

Distribution: India: Maharashtra, Tamil Nadu, West Bengal and Western Ghats.

Family Muscidae

5. *Atherigona (Acritochaeta) orientalis* Schiner, 1868

1868. *Atherigona orientalis* Schiner, *Reise der osterreichischen Fregatte Novara. Zool.* 2 (1), p. 388.

Material examined: 1ex., Sunderban: Bali island, 9 no. Gheri, 21.iii.2015.

Distribution: India: widespread in the world.

Family Ulididae

6. *Physiphora aenea* (Fabricius, 1794)

1794. *Musca aenea* Fabricius, *Em. Syst.* 4: 335.

Material examined: 3ex., Sunderban: Sagar island, Gangasagar, 19.v.2015; 2ex., Sunderban: Satjelia island, 29.v.2015.

Distribution: India: West Bengal: Northern Districts and Orissa. Elsewhere: Widespread from Seychelles to Samoa; Hawaii to Australia; North and South Americas.

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(Contd. on p. 97)

DIVERSITY OF WATER ASSOCIATED ROVE BEETLES FROM UTTAR PRADESH (COLEOPTERA: STAPHYLINIDAE)

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The Staphylinidae is one of the largest families of the superfamily Staphylinoidea, distributed throughout the world. About 30,000 species are known from the world and more than 2000 species have been recorded so far from India. Motschulsky (1858), Kraatz (1859), Fauvel (1895), and Bernhauer (1915) are the pioneer workers of the family Staphylinidae. After Cameron's work in the *Fauna of British India* series (1930, 1931, 1932), Rougemont (1986) and Biswas & Biswas (1995) are noteworthy.

The present work on the family Staphylinidae is based on the collections brought from different districts of Uttar Pradesh by various survey parties from the Zoological Survey of India. This study is based on 89 examples, comprising 9 species under 3 genera and two subfamilies.

Order COLEOPTERA
Family STAPHYLINIDAE
Subfamily PAEDERINAE
Tribe PAEDERINI

1. *Paederus fuscipes* Curtis

1823-40. *Paederus fuscipes* Curtis, *Ent. Brit.*, 3: 108.

1931. *Paederus fuscipes*: Cameron: *Fauna of British India*, (Col.: *Staphylinidae*), 2: 40-41.

Material examined: 1 ex., Lucknow dist., Lucknow on bank of river Gomati, 6.x.2006, P. Mukhopadhyaya & Party coll; 1 ex., Chandi dist, Bank of river Ganga, 7.iv.2007, S. K Chatterjee & Party coll, 9 exs., Rampur dist, Bank of Kosi river, 4.xi.2007, P. Mukhopadhyaya & Party coll, 3 exs., Rampur, Kosi river, 6.iii.1990, S. Biswas & K. V. Surya Rao coll; 3 exs., Ballia dist, Bank of river Ganga, 13.ii.2009, V. D. Hegde & Party coll, ex., "river bed of Ganga", 3 exs., Mirzapur dist., Patauli ghal, 7.ii.2009, V. D. Hegde & Party, ex., "river bed of Ganga."; 25 exs., Hardoi, Near Bhaik ka Nala, 20.11.2011, V. D. Hegde & Party coll, 8 exs., Sitapur, Tendua Jheel, 24.ii.2011, V. D. Hegde & Party coll.; 4 exs., Sitapur, Sinhanipur Jheel, 23.ii.2011, V. D. Hegde & Party coll.

Distribution: India: Uttar Pradesh (Allahabad, Agra, Varanasi, Deoprayag, Lucknow, Kanpur, Tehri Garhwal,

Etawah, Rampur, Ballia, Mirzapur, Chandauli), Bihar, Karnataka, Madhya Pradesh, West Bengal, Meghalaya and Tripura.

2. *Paederus himalayacus* Bernh.

1914. *Paederus himalayacus* Bernhauer, *W.Z.B.*, 64: 98

1931. *Paederus himalayacus*: Cameron, *Fauna of British India*, (Col.: *Staphylinidae*), 2: 39-40.

Material examined: 2 exs., Sitapur, Tendua Jheel, 24.ii.2011, V. D. Hegde & Party coll, Ex. "Inside sugar cane leaf".

Distribution: India: Uttar Pradesh, West Bengal, Himachal Pradesh.

3. *Paederus atrocyaneus* Champ.

1927. *Paederus atrocyaneus* Champion, *Ent. Month. Mag.*, 63: 50.

1931. *Paederus atrocyaneus*: Cameron, *Fauna of British India*, (Col.: *Staphylinidae*), 2: 36-37.

Material examined: 3 exs., Sitapur, Sinhanipur Jheel, 23.ii.2011, V. D. Hegde & Party coll, Ex. "Inside Mud"

Distribution: India: Uttar Pradesh: Kanpur, Allahabad; West Bengal.

4. *Paederus nigricornis* Bernh.

1911. *Paederus nigricornis* Bernhauer, *Ent. Blatt.*, 7: 61.

1931. *Paederus nigricornis*: Cameron, *Fauna of British India*, (Col.: *Staphylinidae*), 2: 47-48.

Material examined: 2 exs., Allahabad, Ramghat, 3.xi.2009, V. D. Hegde & Party coll, Ex. "under leaf litter."

Distribution: India: Uttar Pradesh: (Etawah), Uttarakhand (Garhwal), Sikkim, Himachal Pradesh and West Bengal. Elsewhere: Nepal.

5. *Paederus conicollis* Motschulsky

1859. *Paederus conicollis* Motschulsky, *Et. Ent.*, 8: 73.

1931. *Paederus conicollis*: Cameron, : *Fauna of British India*, (Col.: *Staphylinidae*), 2: 51-52.

Material examined: 2 exs., Mirzapur dist., Chunar, 28.ii.2009, V. D. Hegde & Party coll., ex. "river bed of Ganga".

Distribution: India: Uttar Pradesh; Mirzapur Dist. (Chunar), Chandauli Dist. (Chandauli). West Bengal, Maharashtra, Tamil Nadu.

6. *Paederus birmanus* Fauvel

1895. *Paederus birmanus* Fauvel, *Rev. d'Ent.* 14: 233.

1931. *Paederus birmanus* Cameron, : *Fauna of British India*, incl. *Ceylon & Burma* (Col.: *Staphylinidae*), 2: 46-47.

Material examined: 3 exs., Allahabad dist., Fafamou, 4.ii.2009, V. D. Hegde & Party coll, ex. "bank of river Ganga".

Distribution: India: Uttar Pradesh (Noida, Kanpur), Uttarakhand, Nagaland. Elsewhere: Myanmar.

7. *Paederus pubescens* Cameron

1931. *Paederus pubescens* Cameron, *Fauna of British India, incl. Ceylon & Burma (Col.: Staphylinidae)*, 2: 47.

Material examined: 10 exs., Allahabad dist., Fafamou, 4.ii.2009, V. D. Hegde & Party coll., ex., "Bank of Ganga"; 1 ex., Mirzapur dist, Pataulighat, 7.ii.2009, V. D. Hegde & Party coll., ex., "river bed of Ganga".

Distribution: India: Uttar Pradesh; Allahabad dist. (Fafamou, Ramghat), Mirzapur dist. (Pataulighat); West Bengal; Assam. Elsewhere: Bangladesh, Pakistan.

8. *Cryptobium abdominal var. indicum* Kr.

1858. *Cryptobium abdominale var. rufipenne* Motschulsky, *Bull. Mosc.*, 31 (2): 651.

1931. *Cryptobium abdominale var. indicum*: Cameron, *Fauna of British India, incl. Ceylon & Burma (Col.: Staphylinidae)*, 2: 243-244.

Material examined: 10 exs., Allahabad dist., Fafamou, 4.ii.2009, V. D. Hegde & Party coll., "bank of Ganga". 9 exs., Mirzapur dist, Chunar, 28.ii.2009, V. D. Hegde & Party coll., ex., "river bed of Ganga". 2 exs., Sitapur, Sinhanipur Jheel, 23.ii.2011, V.D.Hegde & party coll.

Distribution: India: Uttar Pradesh (Allahabad, Mirzapur), West Bengal. Elsewhere: Sri Lanka.

Subfamily STENINAE

9. *Stenus (Hypostenus) pictus* Motschulsky

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Acknowledgements: Author is grateful to Dr. Kailash Chandra, Director, Zoological Survey of India for providing laboratory facilities. Thanks are also due to Shri K. C. Gopi, Scientist-F, for encouragement. Thanks are also due to the staff of the Coleoptera Section for their co-operation.

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'Women can see more colours'

A new study has confirmed that men have difficulty to tell the difference between hues, as one in 12 of them are colour blind, compared to one in 255 women. Researchers at the Newcastle University also believe that some women may be able to see 99 more colours than the average human being.

How the eyes perceive colour is broken down by ocular cells called cones. Each cone allows you to see around 100 shades. Most people have three types of cones, and are described as being "trichromatic", so their total number of combinations is at least 1003, or a million, the *Daily Mail* reported.

Individuals who are colour blind have only two types of cones (dichromatic). Most animals are colour blind.

A NOTE ON THE SANJAY GANDHI BIOLOGICAL PARK, PATNA, BIHAR

BIJAY KRISHNA

Scientist (Retd.), Botanical Survey of India, Ministry of Environment & Forest, Govt. of India;

Present address : Shiv Niketan, M. P. Sinha Road, Kadamkuan, Patna - 800 003 (Bihar).

India is a land of physical, ecological, biological, social, cultural and linguistic diversity over the centuries. The people of India have a close linkage with nature. The ethos of conservation is ingrained in India's cultural heritage. The cultural diversity of the Indian people helped to maintain a range of Biological diversity and also increased the natural diversity by the introduction of selected species of both flora and fauna. The same habitat character and disposition one will find in this Biological Park.

This Biological Park was established first as a Botanical Garden in 1969, over 34 acres of land, provided by the then Governor of Bihar, Hon'ble Shri Nityanand Kanungo, from the Raj Bhawan Complex.

In 1972, 58.20 acres of the Revenue Department land and 60.75 acres of PWD land were transferred to the Forest Department to develop the Park further. Since 1973 this Park has been developed as a Biological Park over an area of 153 acres. The land acquired from PWD and Revenue Department has been declared as a protected forest by the State Government on 8th March 1983. The Park is classified as one of the 16 large Parks in the country. At present this beautiful Biological Park consists of both different species of flora and fauna.

Colourful trees and flowers play an important role in the making of towns beautiful. They refine the minds of the inhabitants and also provide a healthy atmosphere. The plants not only add to the aesthetics of the city, but provide with a remarkable input to the beautification and purification of the environment.

Sanjay Gandhi Biological Park has a picturesque landscape of garden, lakes and zoo, the only favourite place for Patnaites which is their life-line also. More than 25 lakh visitors visit the Park every year. This is the only zoo which provides free entry to morning walkers, from 5 A.M. to 7 A.M. After that there is an entry fee of Rupees twenty per adult. The Park is closed on Monday.

The entire Biological Park has been classified into three sectors and three beats nicely depicted in the lay out of the map displayed inside the garden. There are two entry points to this Park. The one called the main gate is from Bailey Road, and the second one the Taylor Road behind Raj Bhawan.

As you enter from the main gate the evergreen Aam, Amaltas with yellow flowers, Ashok, Barh and *Delonix regia* with red flowers called flame of the forest are the first to greet you. As you proceed further into the circular road, to the left there is an orchard of nursery, sprawling lawns lined with hedges. There is an arboratum with many native trees like Badam (seeds eaten raw, fruits as a source of dye), Bahera, Kachnar with purple and white flowers, and Arjun etc. The evergreen *Putranjiva* with its drooping branches cures fever and liver problems. There is a firm belief that if small piece of root is tied in the left arm of a married woman, she is blessed with a son. This statement has been verified from a mali named Parasuram Singh of the zoo.

There are altogether more than 350 species of higher plants and shrubs which provide free oxygen, shade and aesthetic beauty to this garden.

There is a separate fern house where different species of the fern and fern allies, such as *Pteris*, *Pteridium*, *Adiantum* etc. are growing which provide a lush green coverage soothing to the eyes. As you proceed further, you will find desert plant house where cactus species like that of organ pipe, silver touch and powder puff are growing.

Besides all these mentioned above, there is a separate garden of medicinal plants called "Dhanwantari Udyan" where more than 50 medicinal plants are under cultivation. There you will find a human figure lying on a platform where different medicinal herbs are put on different organs of the body, such as Aswagandha for diabetic patients, Sarpagandha for blood pressure, Brahmi as brain tonic etc.

The Biological Park has two more attractions for the visitors, children, students and senior citizens. There is a big lake where boating facilities have been provided. You can enjoy it. By the side of the lake there is a nice restaurant where one gets all sorts of eatables.

As the name signifies, this Park on the other hand has a nice famous zoo. It has more than 75 types of animals such as Lions, Tigers, Leopards, Rhinos, Monkeys, Spotted Deer etc. All put nicely inside the enclosures. Similar is the case with birds, like Crimpon Horned Pheasants, Cuckoo, Parrots and Peacock etc. All of them are in enclosures. Some butterflies are also seen sucking juice from the flowers.

There is a very big Aquarium, Reptiles (snakes) in glass covers and Crocodile in small pond. Visitors have been requested by the zoo authority not to give any food to the animals and birds, as this may harm them.

As there is lot of pressure of visitors in this Park, the Environment & Forest Department of the State Government has developed another Eco-friendly Park, behind the Secretariate, during the last three years. It is also coming up nicely.

CLONE OF 'VIVEKANANDA TREE' PLANTED IN ALMORA, UTTARAKHAND

ARPITA CHAKRABARTY

Two clones of a peepal tree (*Ficus religiosa*) under which Swami Vivekananda meditated while on his sojourn in the Kumaon Himalaya in the early part of the 20th century, were planted recently at exactly the same spot in Kakrighat near Almora, where the original tree once stood before it died in June 2014.

The tree is believed to be at least 200 years old. A team of scientists from the Central Agro Forestry Research Institute, Jhansi; GB Pant University of Agriculture and Technology, Pantnagar; and Vivekananda Parvatiya Krishi Anusandhan Sansthan, Almora, took up the job of rejuvenating the tree.

The project was undertaken by the team under the guidance of senior scientist Dr. S. Ayappan, ex-Director General of the Indian Council of Agricultural Research (ICAR). After inspecting the tree in October, 2013 the scientists found that the tree had become quite old and the living stem was only around 10% of the total spread. Although the rejuvenation process failed, ten clonal plants from the original tree were successfully raised at Agroforestry Centre, GBPUAT, Pantnagar.

Two of the cloned trees were planted in Kakrighat by Swami Balabhadrananda, Assistant General Secretary of

Ramakrishna Math & Mission, Belur Math, in the presence of among others, Mr. Savin Bansal, the district magistrate of Almora.

Recounting the entire exercise, Dr. Salil Tewari, Professor at G.B. Pant University of Agriculture and Technology, who was involved in the cloning process, said, "Since 90% of the tree had already died, we disinfected whatever branches we got. A few cuttings were regenerated and put in a glass house under controlled conditions. At the end of the process, only 10 saplings could survive. Since March this year, the cuttings were put in open conditions so that they were able to survive in extreme weather during winter."

According to the book, '*The Life of Swami Vivekananda*', Vol I, Vivekananda spent one night at Kakrighat along with his brother disciple Swami Akhandananda while he was on the way to Almora from Nainital in 1890. He meditated under the peepal tree at the confluence of rivers Koshi and Suial. The book recounts Vivekananda as saying after the completion of the meditation, "I have just passed through one of the greatest moments of my life. Here under this peepal tree, one of the greatest problems of my life has been solved. I have found oneness of the macrocosm with the microcosm. In this microcosm of the body everything that is there (in the macrocosm), exists. I have seen the whole universe within an atom." This realization at Kakrighat was later expressed in his lectures on macrocosm and microcosm in New York (U.S.A.) delivered on the 19th and 26th of January, 1896.

Rare 'Marbled Map' butterfly sighted in the Eastern Ghats

When a group of green enthusiasts were exploring around the thick forest of Eastern Ghats, near P. M. Kota village of Maredumilli mandal in East Godavari district of Andhra Pradesh, some days ago, they were hoping to sight some interesting flora and fauna.

Little did they realise they would stumble upon a butterfly species never before sighted in the south India.

N. Chandramohan Reddy, an Indian Forest Service officer, currently working as the managing director of A. P. Urban Greening and Beautification Corporation Ltd., was on a "green walk" with his friends, when he chanced upon the 'Marbled Map', a rare butterfly species usually found in the north-east.

"It immediately struck me, I was looking at something special and unique. I am familiar with butterflies but this one I never saw before. Without any hesitation I took out my camera Nikon D7100 to shoot," says an excited Mr. Reddy.

He shared the snaps with his team of S. Raghupathy of

CII-Green Business, and his understudy Venkat Raju. On his return to the capital, the official immediately referred to published material on butterfly habitats and realised their find belonged to the 'Marbled Map' species.

According to the *Book of Indian Butterflies* by Issac Kehimkar and published by Oxford University Press, Marbled Map or *Cyrestis cocles* is listed as a "rare" butterfly species confined to forested hills in the region between Sikkim and Arunachal Pradesh, Jharkhand, Bhutan and Myanmar.

It is found to be pale green with faint vertical lines and rounded wings. Wings span is between 50-60 mm.

Mr. Reddy then contacted Mr. Kehimkar, a Deputy Director at Bombay Natural History Society, an expert in this field, to share his finding. The avid naturalist too confirmed the species. "It's a new find and good news because the species was found up to West Bengal and Orissa besides north-east. It shows that there is lot of work to be done in the Eastern Ghats where little research has gone into unlike the Western Ghats," he said.

India is home to 1,318 recorded butterfly species, while the figure is about 1,500 in the entire sub-continent.

New Publications

Book Reviews

(1)

No Fear of Flying

A PICTORIAL FIELD GUIDE TO BIRDS OF INDIA, PAKISTAN, NEPAL, BHUTAN, SRI LANKA AND BANGLADESH, by Bikram Grewal, Sumit Sen, Sarwandeep Singh, Nikhil Devasar and Garima Bhatia. 2016. 791 pp. Price Rs. 1500. Published by Om Books International, New Delhi.

The weekend after I got my copy of *A Pictorial Field Guide to Birds of India, Pakistan, Nepal, Bhutan, Sri Lanka and Bangladesh*, by multiple authors, I used it during a quick one-day birding trip. 800 pages of glossy paper give this field guide substantial heft. Fairly well-organized, it has a crisp introduction, and beautiful photographs for most of the 1200+ bird species found in our region. The introduction by Carol and Tim Inskipp, well known for their bird guides, including one that is very popular among Indian birders, offers a succinct view of the state of bird life in the subcontinent. It includes a concise history of birding in the area and the personalities who play key roles in it. It's a great read for anyone trying to get a grip on the vast range of our birdlife, their environs, and what is being done to ensure the survival of these birds. Towards the end, the Inskipp's make a good point about the lack of scientific data to actually say whether Indian birdlife is improving, suffering or changing.

This field guide includes not just an index but a complete checklist of birds and a taxonomic checklist of birds and their IUCN (International Union for Conservation of Nature) status. One of the book's nicer aspects is that the latest taxonomic conventions have been followed. This means it includes the latest accepted scientific names. Older birders like me who used the BNHS Oxford *Pictorial Guide to the Birds of the Indian Subcontinent* as beginners still refer to some birds the old way. This book is great to transition to the newer names and taxonomic organization.

The full-page interludes with a single species are nice but tend to affect usability as it makes the reference inconsistent. I'd have preferred each species referred to in a consistent manner—layout, inset images, and so on. However, this book is a joy to browse with its beautiful images of birds in their natural habitats including photographs of some exceedingly rare ones. Some of the full page images are especially gorgeous. Identification of birds in the field is aided by the accurate colour rendition of bird images, something very important for a photographic guide. Incidentally, there are

some critically endangered birds in India that still haven't been photographed.

Still, usability as a field guide is where this volume fails. And it is a major failing. The weight of the book would make it uncomfortable to refer to in the field. The inset photographs could be sex related (gender, breeding/non-breeding), the bird's growth stage (juvenile, sub-adult), morphological (morph), or just a different image of the same species. Surprisingly, there is no index to the graphic layout. The book just jumps from the introduction into references for each species. There is no guide to understand the layout, range map and description and use of inset photos. Then, the layout for each species includes a difficult-to-read range map allowing for identification by eliminating species that aren't found in your geography. All this is jarring.

One of the issues of photographic guides is the selection of images. Despite the now substantial number of bird images to choose from, it's difficult to maintain the quality of images while trying to stick to a standard layout. For example, you couldn't possibly find images of every bird species as a juvenile. It would have helped if the authors had included a table of characteristics to aid in the identification of bird groups that are difficult to identify—larks, wagtails and warblers. Even experienced birders struggle with identification within these groups. Also missing are pictures of birds in flight, especially accipiters. In the field, one is likely to see these in flight and positive identification is difficult based on photographs of them at rest. At the price, this book offers good value. The fantastic introduction and images and the revised checklists balance out the usability flaws. This would make a good second or third field guide for a birder. I wouldn't make it my primary field guide; there are better, lighter, and better designed books for that. All said, this is a good book to add to a collection of bird books, or to use a comparative reference.

—Abhijit Kadle

(2)

Return to Your Native Roots

ROOTS, by Rahul Bhatt, 2015. Price Rs. 270.00. Published by Banyan Publishing.

In one of the classics of English literature, *Return of the Native*, Thomas Hardy had delineated the protagonist Clym who leaves his roots and native land to create his career. While reading *Roots* by Rahul Bhatt similar emotions of longing and detachment are evoked.

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The protagonist represents the existential crisis of a modern man that leads him to leave his land and venture out in search of a living. The narrative then describes in detail how he grapples with the demons of solitary rootlessness and existence in the ruthless city of Delhi.

The narrative is set in two locales, one in the serene greens of the Tehri region in Uttarakhand and the other in the bustling capital of India. The stark contrast of the two regions is manifested in the hero's psychological dilemma too. He is just not able to connect to city life and when the Tehri town gets a mega hydro-electric dam project, he questions whether the development is actually beneficial or not.

The engaging narrative poses some serious questions on society and on life making the book an intense read.

—Nabanita Das

(3)

Wildlife Photography

ROAR, by Kamal Morarka. Ed. Bittu Sahgal. 2015. Published by Sanctuary Magazine, Mumbai.

Kamal Morarka is a well known industrialist and politician. Some also know him as a philanthropist and social activist, who has done seminal work in his native Rajasthan, where his NGOs are supporting organic farming, heritage conservation and educational projects for rural women. Others know him as a media owner, an author, a former MP and a Union Minister in the Chandra Shekhar government. His book of parliamentary speeches, *Left of Centre*, has been published by Rupa in English and Hindi last year. The Urdu version is on the way.

But soon, *Sanctuary magazine*, one of the most respected institution working in the area of environment protection and wildlife conservation, will be bringing out his first book of wildlife photographs with an introduction by Bittu Sahgal, its editor. The pictures in the book called *Roar* have been taken over the past two decades and capture the magic and the mystery of the wild. Some of them have been exhibited at Jehangir Art Gallery in recent years and attracted wide critical acclaim.

"I have searched far and wide for the beauty of India and its wildlife. In the process, I have not only learnt so much about this country and its people but also attempted, in my own small way, to bring about better awareness of its environmental concerns. This book is a tribute to those who have succeeded in preserving the wild and the wonderful species that populate it. I hope it will encourage young people to travel more, see more, and be more concerned about the need to protect what we have," says Morarka.

As Bittu Sahgal says in his introduction to Morarka's book, "The art of photography will remain one of the most

powerful weapons available to those who wish to protect wilderness, spaces and species. The fact is that a camera in the hands of a scientist or naturalist in the right place could deliver just the image that moves a nation, or a national leader to action. Just one image could equally help a lawyer or a citizen's group to protect a fragile wilderness."

That is why Morarka's work is of such seminal importance. It attempts to go beyond the art of photography to be a passionate defence of the urgent need for conservation.

(Anon.)

(4)

Scientific Writing

THE SCIENTISTS' GUIDE TO WRITING, by Stephen B. Heard. 2016. Paperback. 306 pp. Price US \$ 160.95. Published by Princeton University Press, Princeton, New Jersey (USA) and Oxford (U.K.). ISBN : 978-0-691-17022-0.

Stephen B. Heard is a Professor of Biology at the University of Brunswick in Canada and is the Associate Editor of the journal *American Naturalist*.

The book has a sub-title, "How to write more easily and effectively throughout your scientific career," which explains a lot. The book is a guide to the scientific research workers for whom writing of their findings is an unavoidable part in their career. The author has emphasized that the goal of all scientific writing should be absolutely clarity; that good writing takes deliberate practice; and advised on writing momentum, with practical tips on structuring a scientific paper, revising its first draft, handling references etc. (in the English language).

There are seven chapters with 28 sub-headings. These major parts are titled as : I. What Writing is; II. Behavior; III. Content and Structure; IV. Style; V. Revision; VI. Some Loose Threads; and VII. Final Thoughts. The book ends with a listing of large number of references and a list of Permanent URLs.

For Indian workers, primarily the young research scholars, the subject is of utmost importance. They may be facing the difficulties outlined in this book and therefore, must look for the solutions which are given in detail in this book. However, the scenario changes from one to other country and on different research aspects. Hence, treat this book as a general guide. It is necessary to follow the instructions given to the contributors in the journal concerned.

We recommend this book to the libraries of research institutions in our country, where young workers do require guidance on the language/expression to convey clearly the methodology, observations and results, and follow proper techniques about scientific writings.

—R. K. Varshney

Zoological Survey of India

Ministry of Environment, Forests and Climate Change
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