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Tribal Jews arrived in India 1500 Years ago

Mystery of some Lost Tribes of Israel Solved by Genetic Studies

The mystery behind the fabled 10 lost tribes of Israel, has been unlocked by scientists of the Centre for Cellular and Molecular Biology, Hyderabad (CCMB) and the Estonian Biocentre, Estonia, in an international study, after months of painstaking research. They asserted that the first Jews (*Yahoodi* in hindi) arrived on Indian shores about 1,500 years ago.

In a study, entitled 'Genetic Affinities of the Jewish Populations of India', the scientists said that the Jewish Diaspora in India got concentrated in three pockets: (i) Kochi, Kerala, (ii) the Bene Israel in Mumbai, and (iii) the Baghdadi Jews of Kolkata. These Jews migrated to India from the Middle East by the sea route.

To arrive at results, CCMB scientists first acquired DNA from the individuals of those belonging to this Diaspora. Their genome was studied and compared with the original Jew tribes in Israel. DNA of the descendants of the mixed Indian society was also studied, since it is believed that after settling in India, these Jews married with the local communities and their inbreeding led to present day Indian Jew (*yahoodi*) populations.

Those Jews who settled in Cochin were called Kerala Jew or Cochin Jew (descendants of Roubel), in Mumbai were called Bombay Jew (descendants of Bene Israel), and in Kolkata were called Baghdadi Jew.

Using a technique known as the high resolution genetic marking, the DNA of Indian Jew Diaspora was compared with the DNA of the Native Indians, Jews of Israel and with that of people from other parts of the world. Further, the study of the "disease history" of the Jewish Diaspora analysed, which suggested remarkable resemblance to Indians.

CCMB principal scientist Dr K. Thangaraj explained that blood samples from 305 Jews in Cochin, and 302 samples from 7 local populations were tested. Further, some Jews found domestic spouses, rather than looking for a mate within their own community. "When we compared the DNA samples, we found that there were certain similarities in the markers that distinguish the Jewish DNA from the rest of the world," Thangaraj told. He added, "Due to the lack of proper written records or inscriptions, the origins of Indian Jews remained moot".

Dr. Neeraj Roy of the CCMB and Dr Gyaneshwar Choubey of the Estonian Biocentre lead the team of scientists.

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BIONOTES

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Message

प्रकाश जावडेकर
Prakash Javadekar

सत्यमेव जयते

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MESSAGE

I am happy to know that 'BIONOTES', a research newsletter magazine of Life Sciences, is entering 18th year of publication. It is even more heartening that this quarterly magazine has provided a very good platform for the past 17 years to the young research workers in the fields of biodiversity, forestry, agriculture, wildlife, environmental sciences and fauna and flora to share their research based knowledge for the larger consumption of the scientific community.

My best wishes and compliments to the Editor and Publisher of this magazine.

(Prakash Javadekar)

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Message

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Date: 04.01.2016

MESSAGE

India has witnessed an impressive spread of Scientific Knowledge, since independence in 1947. Scientific Knowledge enable people to understand the basic functioning pathway of life; often intelligent use of scientific knowledge led to application through technology. Dissemination of knowledge in such a scenario remains essential. And how small efforts from a group of dedicated scientists could help spread such information can be evidenced in the genesis of "Bionotes". It's an unbelievable journey which started nearly two decade back. With limited resource it has been using all the space, annually covering in its four issues, totalling +/- 120 pages. It's not the appearance that matters; one should evaluate how much new information has reached us through "Bionotes". There lies its success. I extend my warm wishes to my erstwhile colleague Dr. R.K. Varshney, a Lepidopterist of international fame and his band of dedicated associates who have given their time and labour to make this venture a success. Young scientists in Biological Sciences must use the opportunity of writing out their own findings in 'Bionotes' and help it grow further.

I am sure Bionotes will continue to grow with more glory.

A K Ghosh
Director, Centre for Environment and Development
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Chennai / Paris
The Global Warming Apocalypse for India

KANTI BAJPAI

The climate change negotiations in Paris will almost certainly get the world a deal, but not one that will prevent a 2°C increase in global temperatures. The problem is that the current temperature rise of 1°C is already too high. The Chennai floods and a number of other episodes indicate that climate change is not in the future : Climate change and its effects are already upon us. The future is now.

Let's tick off some of those episodes. The Chennai floods are related to EI Nino changes which can be traced back to climate change. Climate change caused a cotton-crop infestation in Punjab and is already contributing to social unrest there. There is a view that rising temeratures and falling water availability were linked to the rise of Maoism in central and eastern India. The cloudburst in Uttarakhand in 2013 was likely induced by climate change.

The effect of climate change is not restricted to India. The entire area from North Africa to Bangladesh is perhaps the most susceptible to climate change. These are also the areas of the world with the weakest governments, the highest civil unrest (to put it mildly), abysmal human development, a tickling demographic and gender time-bomb, unmatched religious and ethnic strife, and largescale unemployment.

An example of what that can mean is Syria. Food and water shortages in Syria combined with a host of political, developmental, demographic, gender, and ethnoreligious factors caused the state to collapse. Indeed, the entire Arab Spring was fuelled if not casued by the increase of food prices from about 2008 onwards, some of which can be attributed to climate change, and Syria-like politicial and economic conditions.

As climate change deepens, extreme weather events will intensify, and the polar ice caps will melt causing sea levels to rise. Over time, cities will be repeatedly flooded, from excess rainfall and rising sea levels. Several big cities will go under water more or less simultaneouisly, to the point that recovery will be impossible. They will simply have to be abandoned. Kerry Emanuel, a professor at MIT, Cambridge, predicts that New Orleans will have been either abandoned or moved within a hundred years. I doubt that we will have to wait that long for several Indian cities to disappear as human habitats.

India will therefore be assailed by an enormous shift of desperate pepole—from within India and from our neighbours—moving inland. They will encounter others eking out an existence in fairly miserable conditions on higher land. It dosen't take much imagination to see what might ensue as migrants come into contact with settled populations and compete for land, water, shelter, government jobs and social services.

India is poised for a perfect storm of a physical and social change. It is unlikely that there will be serious mitigation efforts globally. The only question therefore is whether temperatures will go beyond a 2°C rise. Adaptation—how to deal with the consequences—has largely been ignored. Focussing on adaptation risks the moral hazard problem: If we adapt, we don't start putting in place systems to save Indians from the worst effects of climate change, millions will die, and our unity and democracy will collapse.

Ahead of us is the bigger question that Amitav Ghosh recentley hinted at, one that Ramachandra Guha in 2006 phrased as, 'How Much Should a Person Consume?' Western industrialisation sees no end to consumption. India can never be industrial in that way, for various cultural, politicial and economic reasons. It must create a soft industrialisation that generates wealth such that the vast majority of its population is assured a decent life, not a life of excess. India's genius in manufacturing is not the Make-in-India model of Prime Minister Narendra Modi but rather historically a model that doesn't rely much on heavy machinery. It relies on softer skills, in handicrafts, textiles, leather work, jewellery, food processing, pharmaceuticals, computer programming and the like, organised on a smaller, gentler scale.

The global warming apocalypse is upon us. It is our biggest challenge. India must think the change it wants to see.

(From *The Times of India*)

Corrigendum and Apology

Bionotes in its last issue erroneously published a felicitation article reporting that Dr. T.N. Ananthakrishnan is completing his 90 years in Dec. 2015. It proved to be unfortunately wrong, as Dr. Ananthakrishnan left us on 7th August 2015. Since he lived in New Jersey (U.S.A.), we were not aware of the tragedy. With no excuse, I personally and *Bionotes* tender sincere apology.

By that article, we remembered his life and works in detail.

—R.K.Varshney, Editor *Bionotes*

Dr. Devi Shetty
Pioneer of the Healthcare Industry in India

AVIK DAS
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- Founded Narayana Hrudayalaya in 2000.
- Runs 23 hospitals, 8 heart centres and 25 primary care facilities across 31 cities.
- With wife holds 62% stake, valued at over Rs 4,200 crore.
- Performed first neonatal heart surgery in India in 1989.
- Received Padma Bhushan in 2012.

Long before he started Narayana Hrudayalaya, Dr. Devi Shetty was a well-known name in the Indian medical world. In 1989, he performed the first neonatal heart surgery in the country, on a 9-day old baby. He served as the personal physician of Mother Teresa.

On 6th Jan. 2016, the Indian Stock Market gave a thumping cheer to his Bengaluru-based company—which offers cutting edge medical care at a fraction of what it costs elsewhere in the world—by valuing it at more than $1 billion.

It was another feather in the cap for the Mangaluru born cardiac surgeon, who resolved to be a doctor when his fifth grade teacher told the class that a South African surgeon had just then performed the world's first heart transplant.

He received a Master's degree in surgery from the University of Mysore in 1982 and then trained in cardiac surgery at the Guy's Hospital in England. He returned to India in 1989 to set up the Birlas' cardiac hospital in Kolkata— the B M Birla Heart Research Centre.

"Devi stands out from others because of his passion and commitment towards his profession," says Dr. Bhujang Shetty, Chairman of eye hospital Narayana Nethralaya and a close relative of Dr. Devi Shetty. "I know Devi from our college days where we used to go for karate and he put his heart and soul into it to become a master," he recalled.

Dr. Bhujang Shetty said Dr Devi Shetty never went home during the first 100 surgeries he performed at the Birla hospital, because he believed being the senior doctor he should be available round the clock. "He is a perfect team player," Dr. Shetty said.

Dr. Devi Shetty later returned to Karnataka to set up the Manipal Cardiac Center in Bengaluru. In 2000, he established Narayana Hrudayalaya, a multi-speciality hospital on the outskirts of Bengaluru, with the vision that heath care costs could be dramatically lowered by adopting the idea of economies of scale. The heart division is said to be the largest in the world with 1,000 beds and performing over 30 major heart surgeries a day. This industrialisation of healthcare prompted the *Wall Street Journal* to describe Dr. Shetty as the Henry Ford of heart surgery.

Shares of Narayana Hrudayalaya rose 38% in its debut, valuing the hospital chain operator at $1 billion (Rs 6,881 crore), and boosting the outlook for public offerings this year. Founder Dr. Devi Shetty and his wife Shakuntala together hold 62% directly in the comany, post offer, and present share price values that at over Rs 4,200 crore. Dr Shetty is regarded as one of the pioneers of low-cost quality medical care in India.

The offering raised about Rs 613 crore after its IPO was priced at Rs 250, the top end of the expected range of Rs 245-250. The Bengaluru-based company's shares opened at Rs. 291 on Jan 6, 2016 and touched a high of Rs 344, before closing at Rs 337 on the BSE.

All the 245.2 crore shares for the IPO were offered by existing shareholders who constitute about 12% of the company's post-offer paid-up share capital. Those who sold include US bank JP Morgan, and Shetty and his wife. JP Morgan's stake dropped to 4.67% from 10.67% after the offering.

"India needs three million new beds for treatment and as of now, healthcare reaches about 10-15% of the population. The government cannot build so many beds and it has to be done by the private sector. And scaling in healthcare requires a lot of capital," Shetty told. "We are in the process of commissioning four hospitals in the next two years in Jammu, Lucknow, Mumbai, and Bhubaneswar."

Driven by population growth, rising income levels, and increase in lifestyle-related diseases, the healthcare delivery industry in India is expected to reach Rs 6.8 trillion by 2020, growing at a CAGR of 12%, according to research firm Crisil.

Kazakhstan's Horse Milk

Kazakhstan, hit hard by the oil price crash, hopes to boost export revenues by offering a new product, powdered mare's milk on global markets. Processed milk from just 100,000 mares can generate product worth $1 billion (a year). The national drink, horse milk, can become a major source of export revenue.

Growing Water Chestnuts (Singharas) At a Floating Farm on the Yamuna River, Delhi

ANINDYA CHATTOPADHYAY

It's not often that you will meet someone these days who will sing praises of the Yamuna. But Mohammed Riazuddin, 55, surveys his crew bobbing up and down on perilous contraptions fabricated out of rubber tubes on the water, pulling at a floating mess of leaves. His dark, pitted face breaks into a bright smile as he says, "Log Yamuna ko ganda bolte hain, par hum to isi ke pas baithe hamare parivar ka pet chalate hain (People decry the Yamuna for its polluted water, but to me it is the provider of food for my family)," As he speaks, one of his workers pulls in a net full of burgundy-green fruit. Every kilo of the singhara (water caltrop or water chestnut) harvest will fetch Riazuddin Rs 40 at the wholesale market.

For two decades now, Riazuddin has farmed water chestnut in a private wetland fed by the Yamuna. Having come to the capital to try his luck from Bijnor in Uttar Pradesh, he promptly saw an opportunity in replicating the traditional business of most families back home. Today he is the proud owner of the 40-bigha holding at Rainy Well Thoka Number 13 in east Delhi, where with little competition and a good demand for the starchy edible seed, he has been able to experience the benevolence of a famed river.

Anyone who sees the men expertly manoeuvring their rubber floats in the sea of stalks and leaves will realise that harvesting water chestnut is an art in itself. Such expertise is hard to find in the capital, and Riazuddin brings in his workforce of around 10 men from Bijnor. "Back home, every house hold is into the singhara business. My father and grandfather did the same thing," says Pappu as he gathers the long stalks of the caltrop plant and plucks the nuts. He comes twice a year with Satpal Singh, Jaipal Singh, Zaheer Hussain, Sher Singh and some others to work at the floating farm near Kishankunj—once at sowing time at the outset of the monsoons and then again between September and November at harvest time.

On good days, the men collect up to 800 kg of singhara, which are carted off by vendors and wholesalers from Ghazipur mandi. Each man earns Rs 250 for a day's work. It is quite a windfall for them, because, as Pappu say, "The rest of the year we work as labourers". However, the money is hard-earned. For one, they work half submerged in polluted water and there is no way of knowing what hazards lie beneath the muddy, leaf-strewn surface. There have been cases of snake bites, and in Bijnor, even deaths.

The Yamuna's alarming deterioration is obviously taking a toll on the business and making the job of these men a health risk. At the time of sowing Riazuddin uses a special compound, a white powder that coagulates the pollutants, which sink to the bottom, leaving fairly clear water on the top. The water chestnuts are then sown.

This year, says Riazuddin, his income will be hurt by a lower than usual yield. Pesticide-laced water from neighbouring fields flowed into his farm during the monsoons and contaminated his crop. Yet, unlike many others who live off the dying river, the greying Riazuddin refuses to think of the Yamuna's demise. "Our survival is dependent on it. It's a source of life for all of us from Bijnor ," he says, as his eyes stray to the sacks of strangely-shaped fruit waiting to be hauled away.

200 New Species Discovered in Eastern Himalaya

A snub-nosed monkey that sneezes when it rains, a walking fish and a jewel-like snake are among more than 200 new species discovered in the fragile eastern Himalaya, according to a new report by WWF.

A report on wildlife in Nepal, Bhutan, the far north of Myanmar, southern Tibet and north-eastern India by The World Wildlife Fund said that discoveries in the past five years included 133 plants, 26 species of fish, 10 new amphibians, one repitle, one bird and one mammal.

"Some of the most striking discoveries include a vibrant blue dwarf 'walking snakehead fish', which can breathe atmospheric air and survive on land for up to four days, although moving in a manner much clumsier than a slithering snake. "The report details an unfortunate monkey whose upturned nose leads to a sneeze every time the rain falls, and a living gem—the bejewelled lance-headed pit viper, which could pass as a carefully crafted piece of jewellery," the report said.

The snub-nosed monkey—or "Snubby" as they nicknamed the species—from locals in the remote forests of northern Myanmar, who said it was easy to find when it was raining because it often got rainwater in its upturned nose, causing it to sneeze.

To avoid the problem, snubby spend rainy days sitting with their heads tucked between their knees, the report said.

"These discoveries show that there is still a huge amount to learn about the species that share our world," said Heather Sohl, WWF-UK's chief adviser of species.

Godavari River Highly Polluted

Two months since the river was cleaned for Kumbh Mela, it is back to being a murky nullah choked with foam, filth, household waste, plastic and puja material dumped into it

SUMITA SARKAR

Two months since the Godavari was cleaned for the Kumbh Mela in Nashik, the river is back to being a murky nullah choked with garbage of all sorts—house-hold waste, plastic and puja material dumped into it during the recent festive period.

Residents have resumed washing clothes on the banks of the river, which has lost its usual placid flow after the Kumbh Mela, Navaratra, Diwali and the most- recent Chhath Puja. The new ghats, which were constructed for the 12-yearly religious congregation, have become dirty, a striking contrast to what it was a few months ago.

During the Kumbh Mela, water was released from the upstream dams to ensure that the river was periodically washed. But with scanty rain fall this monsoon and no water to release for maintaining the river's flow, it is unlikely that the Godavari will assume its pristine look before the onset of the next rainy season.

The Nashik Municipal Corporation (NMC) had put in months of hard work and planning to prepare the river ghats for the biggest religious congregation of the world, hosted in the city every 12 years. After the event, the civic body seems to have lost its diligence and vigour, with one major consequence: the Godavari has become a murky nullah with foam, filth, plastic, used puja material and other garbage swirling in it.

"Washing vehicles has reduced but solid waste disposal and washing of clothes continue to pollute the river. The tributaries, particularly Nasardi, Kapila and Waldevi are the worst polluted," said green activist Rajesh Pandit.

Even during the event, foam formation was seen on one side of the Sangam bridge, and filthy water from the Nasardi met the Godavari on the other side of the ghats. The NMC had installed a net on the view from the bridge to conceal the murky water from the view of the pilgrims. The net has been removed ever since.

During a hearing on the Godavari pollution, the Bombay High Court observed that the river had become dirty after the Mela, in response to a September 5 letter addressed by the executive engineer, irrigation division to the district collector, requesting him to release water from the Gangapur dam for cleanning and washing away the filth accumulated in the river during the Kumbh Mela.

But this year's scanty rain fall induced the Government to redirect a major share of the dam waters to the parched Marathwada.

Based on the HC's directions and National Environmental Engineering Research Institute's (NEERI) recommendations, the NMC made some permanent and temporary arrangements to arrest the pollution during the Kumbh.

NEERI is now working on the problem in collaboration with IIT-Powai to bring down the bio-chemical oxygen demand (BOD) of the outlets of the sewage treatment plants (STPs). "The BOD of the STPs is in accordance with the specifications of the centre. But since the sewage water is not treated completely, NEERI suggested that it be brought down", said UB Pawar, the superintending engineer of the NMC's sewage department.

"The foam formation is our original problem but it is just an aesthetic issue. The increase in the foam formation is due to season change," he added. "The NMC put up boards all over the banks and bridges to prevent river pollution; has done phytorid treatment for water purification at Someshwar nullah; diverted the sewage released in the nullahs to the STP plants permanently; and in two places—Anandwalli and Lendi nullahs, temporary diversion has been done," Pawar said.

An official in the NMC's health department said the problem of unclean ghats would soon be solved as they sought the general body's approval for outsourcing the sanitation work to 700 people. "At present, we have only 40 sanitary workers in Ramkund and the surrounding areas. We have 1,500 sanitary employees and the requirment is 4,500,"he said.

Maharashtra Pollution Control Board collected water samples from Ramkund, Tapovan, Takli Sangam and Dasak in Nashik & Kushawarth, Ahilya Sangam and Bada Udasin Akhada in Trimbakeshwar during Kumbh. BOD was found between 3 and 9 mg per litre on an average. Dissolved oxygen was found to be between 3 and 6 mg/litre on an average, recommended level is 5 mg/litre. NEERI director Rakesh kumar said the BOD should be below 3 mg/litre for bathing.

From December 6, 2012 till October 29, 2015, the Bombay HC issued several directions to curb river pollution. In its latest order after the Kumbh, the HC observed that the river has once again become dirty and appointed NEERI again to study and suggest long-term and immediate solutions to check the pollution of the river.

Avian Diversity of Gogabeel Lake in Katihar, Bihar

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Gogabeel Lake (25° 21.737' N, 87° 41.195' E) is situated 33 km south east from Katihar in Amdabad block and is one of the most beautiful birding site of Bihar, including its surrounding wetlands namely Baghar Beel, Baldia Chaur which are connected to the main lake and Kanchira wetland close to it. Area of the Gogabeel lake is about 88 ha. of which about two third belongs to the Government of Bihar and rest is the private land. The water spread area which includes Baghar Beel and Baldia Chaur in a stretch of nearly 5 km. is about 400 ha. The lake is linked to the Ganga and Mahananda rivers. In the periphery of Gogabeel, there is Neema village in north, Sura par tal in south, Muzbar in east and Madua village in the west. Baldiya chaur remains almost a marshy land and cultivated in the dry season (Fig. 1).

During the peak rainy season and floods, the lake recharges by the rivers Ganga and Mahananda through channels and tributaries. The site is a potential virgin area, much suitable to serve as a sanctuary for varieties of terrestrial and aquatic animals, birds and plants. The wetlands are rich in flora and fauna and have enormous potential for the development of an important eco tourism destination.

Varieties of migratory birds visit in and around the lake during winter every year. But since long time this important lake is not having any status of protected area even in the form of a Community Reserve. However, the site enjoys the designation of an Important Bird Area (IBA) since more than a decade. Therefore, there is an urgent need to declare this lake as a Community Reserve under the protected areas of Bihar to preserve the flora and fauna of the lake for future.

Recently 32 species of zooplankton and 19 species of Molluscs with 71 genera 91 species of avian fauna comprising 37 families (dominating family Anatidae) were studied exclusively from this wetland. Leasing out the lake for fishing is a great disturbance to this small roosting and breeding area of birds. The local or migratory birds are facing a threat as they are entangled in the fine fishing nets which are used by the fishing community in the lake. The heavy eutrophication due to *Eichhornia* and use of pesticides and insecticides in and around the lake is also a serious threat to the birds.

Ecology

The ecological condition of the lake is immensely suitable for the birds of family Anatidae, Ardeidae and Scolopacida as there are rich diversity of aquatic molluscs and Macrophytes on which they feed. The birds of family Anatidae are generally herbivorous, feeding on various water-plants, although some species also eat fish, molluscs, or aquatic arthropods. In a number of species, the young include a high proportion of invertebrates in their diet, but become purely herbivorous as adults. The open land of the lake is also very much suitable for the family Ardeidae (Herons) medium-sized to large wading birds with long bill, neck and legs.

The lake provides a vast area of water line with semi

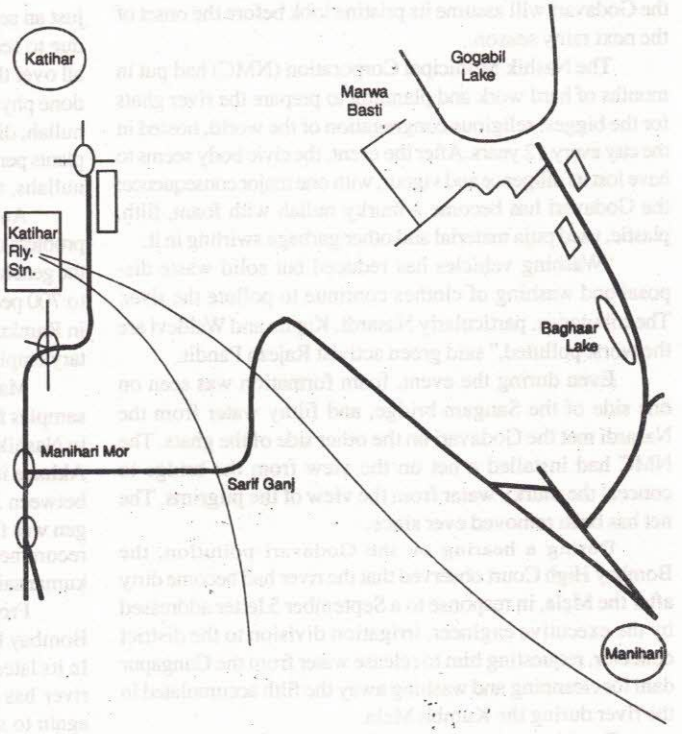

Fig. 1- Route map of Gogabeel Lake, Katihar.
Courtsey: Janlakshya, Gogabeel, Katihar.

Table 1. Avian diversity of Gogabeel Lake, Katihar, Bihar.

	Common Name	Scientific Name	Family	Order
1.	Western Marsh-Harrier	*Circus aeruginosus* (Linnaeus, 1758)	Accipitridae	Accipitriformes
2.	Black Kite	*Milvus migrans* (Boddaert, 1783)	Accipitridae	
3.	Pallas's Fish Eagle	*Haliaeetus leucoryphus* (Pallas, 1771)	Accipitridae	
4.	Red-crested Pochard	*Netta rufina* (Pallas, 1773)	Anatidae	Anseriformes
5.	Ruddy shell duck	*Tadorna ferruginea* (Pallas, 1764)	Anatidae	
6.	Garganey	*Anas querquedula* Linnaeus, 1758	Anatidae	
7.	Common teal	*Anas creca* Linnaeus, 1758	Anatidae	
8.	Gadwall	*Anas strepera* Linnaeus, 1758	Anatidae	
9.	Northern Pintail	*Anas acuta* Linnaeus, 1758	Anatidae	
10.	Bar Headed Goose	*Anser indicum* (Latham, 1790)	Anatidae	
11.	Spot bill duck	*Anus poecilorhyancha* Forster, 1781	Anatidae	
12.	Northern Shoveler	*Anas clypeata* Linnaeus, 1758	Anatidae	
13.	White-eyed Pochard	*Aythya nyroca* (Güldenstädt, 1770)	Anatidae	
14.	Lesser-Whistling Duck	*Dendrocygna javanica* (Horsfield, 1821)	Anatidae	
15.	Tufted Duck	*Aythya fuligula* (Linnaeus, 1758)	Anatidae	
16.	Common Pochard	*Aythya ferina* (Linnaeus, 1758)	Anatidae	
17.	Eurasian Wigeon	*Anas penelope* Linnaeus, 1758	Anatidae	
18.	Darter	*Anhinga melanogaster* (Pennant, 1769)	Anhingidae	Suliformes
19.	Cattle Egret	*Bubulcus ibis* (Linnaeus, 1758)	Ardeidae	Pelecaniformes
20.	Purple Heron	*Ardea purpurea* (Linnaeus, 1766)	Ardeidae	
21.	Pond heron	*Ardeola grayii* (Sykes, 1832)	Ardeidae	
22.	Little Egrets	*Egretta garzetta* (Linnaeus, 1766)	Ardeidae	
23.	Median egret	*Mesophoyx intermedia* (Wagler, 1827)	Ardeidae	
24.	Large egret	*Ardea alba* Linnaeus, 1758	Ardeidae	
25.	Grey Heron	*Ardea cinerea* Linnaeus, 1758	Ardeidae	
26.	Night Heron	*Nycticorax nycticorax* (Linnaeus, 1758)	Ardeidae	
27.	Ashy Wood Swallow	*Artamus fuscus* Vieillot, 1817	Artamidae	Passeriformes
28.	Pied kingfisher	*Ceryle rudis* (Linnaeus, 1758)	Cerylidae	Coraciiformes.
29.	Red-wattle lapwing	*Vanellus indicus* (Boddaert, 1783)	Charadriidae	Charadriiformes
30.	Grey-headed lapwing	*Vanellus cinereus* (Blyth, 1842	Charadriidae	
31.	Northern Lapwing	*Vanellus vanellus* (Linnaeus, 1758)	Charadriidae	
32.	Little ringed plover	*Charadrius dubius* Scopoli, 1786	Charadriidae	
33.	Open-Bill Stork	*Anastomus oscitans* Boddaert, 1783	Ciconiidae	Ciconiiformes
34.	Lesser Adjutant	*Leptoptilos javanicus* Horsfield, 1821	Ciconiidae	
35.	Black-necked Stork	*Ephippiorhynchus asiaticus* (Latham, 1790)	Ciconiidae	
36.	Wooly-necked stork	*Ciconia episcopus* Boddaert, 1783	Ciconiidae	
37.	Painted stork	*Mycteria leucocephala* (Pennant, 1769)	Ciconiidae	
38.	Spotted Dove	*Spilopelia chinensis* (Scopoli, 1768)	Columbidae	Columbiformes
39.	Collared Dove	*Streptopelia decaocto* (Frivaldszky, 1838)	Columbidae	
40.	House Crow	*Corvus splendens* Vieillot, 1817	Corvidae	Passeriformes
41.	Jungle Crow	*Corvus macrorhynchos* Wagler, 1827	Corvidae	
42.	Rufous Treepie	*Dendrocitta vagabunda* (Latham, 1790)	Corvidae	
43.	Greater coucal	*Centropus sinensis* (Stephens, 1815)	Cuculidae	Cuculiformes
44.	Black Drongo	*Dicrurus macrocercus* (Vieillot, 1817)	Dicruridae	Passerriformies

45.	Red Avadavat	*Amandava amandava* (Linnaeus, 1758)	Estrildidae	Passerriformies
46.	Common Kestrel	*Falco tinnunculus* Linnaeus, 1758	Falconidae	Falconiformes
47.	White-breasted kingfisher	*Halcyon smyrnensis* (Linnaeus, 1758)	Halcyonidae	Coraciiformes.
48.	Stork-Billed Kingfisher	*Pelargopsis capensis* (Linnaeus, 1766)	Halcyonidae	
49.	Common Swallow	*Hirundo rustica* (Linnaeus, 1758)	Hirundinidae	Passeriformies
50.	Pheasant tail Jacana	*Hydrophasianus chirurgus* (Scopoli, 1786)	Jacanidae	Charadriiformes
51.	Brown-winged Jacana	*Metopidius indicus* (Latham, 1790)	Jacanidae	
52.	Brown Shrike	*Lanius cristatus* Linnaeus, 1758	Laniidae	Passeriformies
53.	Brown-headed gull	*Larus brunicephalus* Jerdon, 1840	Laridae	Charadriiformes
54.	Black-headed gull	*Chroicocephalus ridibundus* (Lin. 1766)	Laridae	
55.	Jungle Babbler	*Turdoides striata* (Dumont, 1823)	Leiothrichidae	Passeriformes
56.	Green Bee eater	*Merops orientalis* Latham, 1802	Meropidae	Coraciiformes
57.	Black-napped monarch	*Hypothymis azurea* (Boddaert, 1783)	Monarchidae	Passeriformes
58.	White Wagtail	*Motacilla alba* Linnaeus, 1758	Motacillidae	Passeriformes
59.	Yellow-headed wagtail	*Motacilla flava lutea* Gmelin, 1774	Motacillidae	
60.	Yellow Wagtail	*Motacilla flava* Linnaeus, 1758	Motacillidae	
61.	White-browed Wagtail	*Motacilla maderaspatensis* Gmelin, 1789	Motacillidae	
62.	Rosy Pipit	*Anthus roseatus* Blyth, 1847	Motacillidae	
63.	Paddy field pipit	*Anthus rufulus* (Vieillot, 1818)	Motacillidae	
64.	Bluethroat	*Luscinia svecica* (Linnaeus, 1758)	Muscicapidae	Passeriformes
65.	Osprey	*Pandion haliaetus* (Linnaeus, 1758)	Pandionidae	Accipitriformes
66.	Little Cormorant	*Microcarbo niger* (Vieillot, 1817)	Phalacrocoracidae	Suliformes
67.	Large Cormorant	*Phalacrocorax carbo* (Linnaeus, 1758)	Phalacrocoracidae	
68.	Black-rumped flameback	*Dinopium benghalense* (Linnaeus, 1758)	Picidae	Piciformes
69.	Little Grebe (Dabchick)	*Tachybaptus ruficollis* (Pallas, 1764)	Podicipedidae	Podicipediformes
70.	Red-vented Bulbul	*Pycnonotus cafer* (Linnaeus, 1766)	Pycnonotidae	Passeriformes
71.	Coot	*Fulica atra* Linnaeus, 1758	Rallidae	Gruiformes
72.	Indian Moorhen	*Gallinula chloropus* (Linnaeus, 1758)	Rallidae	
73.	White-Breasted Waterhen	*Amaurornis phoenicurus* Pennant, 1769	Rallidae	
74.	Black-winged stilt	*Himantopus himantopus* (Lin., 1758)	Recurvirostridae	Charadriiformes
75.	White-Throated Fantail	*Rhipidura albicollis* (Vieillot, 1818)	Rhipiduridae	Charadriiformes
76.	Common Sand Piper	*Actitis hypoleucos* (Linnaeus, 1758)	Scolopacidae	Charadriiformes
77.	Fan tailed common Snipe	*Gallinago gallinago* (Linnaeus, 1758)	Scolopacidae	
78.	Wood Sandpiper	*Tringa glareola* (Linnaeus, 1758)	Scolopacidae	
79.	Temmink's Stint	*Calidris temminckii* (Leisler, 1812)	Scolopacidae	
80.	Green sandpiper	*Tringa ochropus* Linnaeus, 1758	Scolopacidae	
81.	River Tern	*Sterna aurantia* (Gray, J. E., 1831)	Sternidae	Charadriiformes
82.	Common Tern	*Sterna hirundo* Linnaeus, 1758	Sternidae	
83.	Indian-whiskered Tern	*Chlidonias hybrid* (Pallas, 1811)	Sternidae	
84.	Spotted Owlet	*Athene brama* (Temminck, 1821)	Strigidae	Strigiformes
85.	Bank Myna	*Acridotheres ginginianus* (Latham, 1790)	Sturnidae	Passeriformes
86.	Asian Pied Starling	*Gracupica contra* (Linnaeus, 1758)	Sturnidae	
87.	Common Myna	*Acridotheres tristis* (Linnaeus, 1766)	Sturnidae	
88.	Red-napped (Black) Ibis	*Pseudibis papillosa* (Temminck, 1824)	Threskiornithidae	Pelecaniformes
89.	Black headed ibis	*Threskiornis melanocephalus* Lin., 1758	Threskiornithidae	
90.	Glossy Ibis	*Plegadis falcinellus* Linnaeus, 1766	Threskiornithidae	
91.	Hoopoe (Hudhud)	*Upupa epops* Linnaeus, 1758	Upupidae	Bucerotiformes

dry and wet mud and low vegetation for those birds of the family Scolopacidae having narrow heads, small eyes and long, slim neck related to their feeding behaviour by tactile methods. Since the whole water body and dry area of the lake is free from big trees, allow these birds (having long narrow pointed wings) in rapid and direct flight action. The birds of family Scolopacidae fly in flocks, and they turn in unison with speed and precision.

Threats to avifauna

The presence of terrestrial as well as aquatic birds is affected by certain anthropogenic factors such as destruction of habitat, illegal hunting and poaching. Various threats are observed that are responsible for decreasing avian diversity in the Gogabeel Lake. Some of the plausible major threats confronted by the birds are:

i. Agricultural expansion, pollution due to heavy use of chemicals in the form of pesticides, weedicides and fertilizers in the cultivated areas.

ii. Dumping of domestic and commercial garbage and dead animals in open areas, especially in the areas nearby human habitation.

iii. Due to less rain prolonged dry periods leading to scarcity of food and shelter for the migratory avi fauna.

iv. Illegal hunting and poaching of birds for various purposes is another major threat to avifauna of the Gogabeel Lake.

vi. Unavailability of proper nesting and roosting trees nearby lake is one of the major threat to big birds.

Discussion

Altogether 71 genera, 91 species comprising 37 families of avian fauna (Fig. 2) were studied from the Gogabeel Lake. This is an exclusive avian fauna study for the first time of this lake. Awareness programmes, campaigns concerning local water bodies other than main lake, bird observations as a hobby etc should be launched and sustained by the State Forest Department for the bird watchers.

Acknowledgements: Authors are very much thankful to the Director, Zoological Survey of India, Kolkata for encouragement. Thanks are due to Sri Navin Kumar, General Manager, Bihar State Tourism Development Corporation, and the officers and staff of ZSI / GPRC/ Patna for their kind support.

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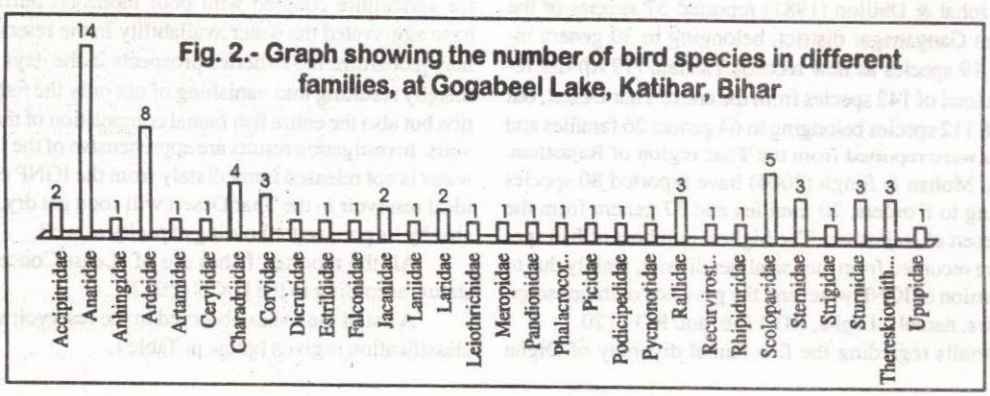

Fig. 2.- Graph showing the number of bird species in different families, at Gogabeel Lake, Katihar, Bihar

Assessment of Ichthyofaunal Diversity of the Digha Escape Reservoir of the Indira Gandhi Canal, District Jaisalmer, Rajasthan

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The Thar Desert of Rajasthan has never been considered a rich spot for fish faunal diversity. Himalayan waters through Indira Gandhi Nahar Pariyojana (IGNP) brought in to the Thar Desert fulfilled the requirement of water for drinking and irrigation in the most xeric conditions prevailing in the region. The canal water from the Harike Barrage at Sultanpur in Punjab has brought many changes in the faunal composition of the Thar Desert, including fish and fisheries resources. Since north western parts of the state, especially the districts of Sriganganagar, Hanumangarh, Barmer, Churu and Bikaner, besides western parts Jodhpur and Jaisalmer, get Himalayan water from the IGNP, they now exhibit diverse fish faunal diversity, because of high moisture realm in the region.

In order to reduce the pressure on the main canal, five major escape reservoirs have been naturally developed along the main canal, for the surplus water which is intermittently released from the main canal. These escape reservoirs are perennial water bodies and harbour rich biota including fish diversity. IGNP canal has become the main source of bringing fish spawn from the Himalayan rivers such as Sutlej and Beas. This factor has made the area a field with enormous potential for Ichthylogical explorations.

Previously, due to extended droughts, fish species diversity was very less, but floods in the recent past have increased the diversity by adding 21 more fish species to the region. Johal & Dhillon (1981) reported 57 species of the fish from Ganganagar district, belonging to 30 genera including 19 species as new records. Yazdani (1996) has reported a total of 142 species from the entire Thar Desert, out of which 112 species belonging to 64 genera 26 families and 6 orders were reported from the Thar region of Rajasthan. Besides, Mohan & Singh (2004) have reported 80 species belonging to 6 orders, 20 families and 37 genera from the Thar Desert of Rajasthan. The highest numbers of fish species were recorded from the Jaisalmer district, mainly due to the extension of IGNP water and the presence of three escape reservoirs, namely, Digha, RD 1356, and RD 1120.

Details regarding the fish faunal diversity of Digha reservoir are almost not available. Hence, this reservoir (N 27°25.888' & E 070°58.829') was surveyed in the year 2014, to know the fish faunal diversity.

Material and Methods

Fishes were collected mainly by using cast and gill nets. Hand net, scoop net, drag net and baited hooks were also used. The fishes were preserved in 10% formalin for further studies and were identified following Talwar & Jhingran (1991), Jayaram (1999) and Froese & Pauly (2014) i.e. *www.fishbase.org*, [version (02/2014)].

Results and Discussion

Absolutely no information is available on consolidated description of the fish faunal composition from Digha Reservoir. During the present studies, 17 spp. of fishes are reported from this reservoir (Table 1). Cypriniformes was the dominant order of fishes (7 spp.), followed by Channiformes (3 spp.), Siluriformes (2spp.), Mastacembeliformes (2spp.), Clupeiformes (1sp.), Osteoglossiformes (1sp.) and Beloniformes (1sp.), in order of their presence in the waters. Among fishes, *Labeo bata* (Ham-Buch) and *Channa marulius* (Ham-Buch) were found to be the dominant species in fish catches, whereas other species of fishes were less in numbers. Presence of above mentioned species of fishes and their juveniles in Digha reservoir pointed out that most of the fishes are established in the reservoir. Decrease in water level in the recent past due to increase in harvesting of canal water for agriculture coupled with poor monsoon during 2014, have aggravated the water availability in the reservoir. This may jeopardize the fisheries prospects in the days to come, thereby resulting into vanishing of not only the fish population but also the entire fish faunal composition of these reservoirs. Investigation results are apprehensive of the fact that if water is not released immediately from the IGNP canal, this ideal reservoir in the Thar Desert will soon get dry, accentuated by its poor water holding capacity as well.

All the reported fishes are of 'Least Concern (LC)' status, according to the IUCN (2012).

A list of the fishes observed in the reservoir with their classification is given below in Table I.

Table 1. Fish fauna of the Digha Escape, IGNP, Jaisalmer.

	Species name	Utility of fish	IUCN Status
	Order- Osteoglossiformes		
	Family- Notopteridae		
1	*Notopterus notopterus* (Pallas)	Commercially important	LC
	Order- Clupeiformes		
	Family- Clupeidae		
2	*Gudusia chapra* (Ham-Buch)	Commercially not important	LC
	Order-Cypriniformes		
	Family-Cyprinidae		
	Subfamily- Cyprininae		
3	*Cirrhinus mrigala* (Ham- Buch)	Commercially important	LC
4	*Labeo bata* (Ham-Buch)	Commercially important	LC
5	*Labeo boggut* (Sykes)	Commercially important	LC
6	*Labeo calbasu* (Ham-Buch)	Commercially important	LC
7	*Pethia ticto* (Ham-Buch)	Commercially not important	LC
8	*Salmophasia bacaila* (Ham-Buch)	Commercially not important	LC
9	*Rasbora daniconius* (Ham-Buch)	Commercially not important	LC
	Order- Siluriformes		
	Family- Bagridae		
10	*Mystus gulio* (Ham-Buch)	Commercially not important	LC
11	Family- Heteropneustidae		
	Heteropneustes fossilis (Bloch)	Commercially important	LC
	Order- Beloniformes		
	Family- Belonidae		
12	*Xenentodon cancila* (Ham-Buch)	Commercially not important	LC
	Order- Synbranchiformes		
	Family- Synbranchidae		
13	*Mastacembelus armatus* (Lacepede)	Commercially important	LC
14	*Mastacembelus pancalus* (Ham-Buch)	Commercially not important	LC
	Order- Perciformes		
	Family- Ambassidae		
15	*Chanda nama* (Ham-Buch)	Commercially not important	LC
	Family- Channidae		
16	*Channa marulius* (Ham-Buch)	Commercially important	LC
17	*Channa punctata* (Bloch)	Commercially not important	LC

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A Checklist of the Resident Avifauna around the Ramakrishna Mission Boys Home, Rahara, West Bengal

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The Ramakrishna Mission Boys Home campus of Rahara is located in Barrackpore subdivision of North 24 Parganas district of West Bengal. It is situated (Latitude: 22°43' N, Longitude: 88°22' E) under Khardah municipality and within the part of area covered by Kolkata Metropolitan Development Authority.

The study was conducted during the month of September to December, 2015, in and around the Ramakrishna Mission Boys Home campus, which is approximately 2 square kilometers. The entire visual recording of avifauna was done by the help of binoculars and digital cameras. Birds were identified up to their lowest possible taxonomic category by the help of standard literature (Ali & Ripley, 1983).

It was observed during the study period that the various trees like banyan (*Ficus benghalensis*), mango (*Mangifera indica*), coconut (*Cocos nucifera*), betel nut (*Areca catechu*), debdaru (*Polyalthia longifolia*), gulmohar (*Delonix regia*), sirish (*Albizia saman*), shimul (*Bombax ceiba*), mahogany (*Swietenia mahagoni*), jamun (*Syzygium cumini*), jackfruit (*Artocarpus heterophyllus*) etc. were mostly favored by the residential avifauna for their nest building and foraging sites.

Though the study site is located within an urbanized area and very close vicinity to Khardah railway station, but still a list of 35 residential species of birds representing 20 families was recorded during the study period. A list of birds representing members including their taxonomic family, common name and scientific name is given in Table 1.

Acknowledgements: Authors gratefully acknowledge the Principal and other faculty members of the Department of Zoology, Ramakrishna Mission Vivekananda Centenary College, Rahara, Kolkata, for their kind assistance.

Table 1. Avifauna recorded at Rahara, W. Bengal.

Family and Common name	Scientific name
Family: Accipitridae	
1. Pariah Kite	*Milvus migrans govinda*
Family: Alcedinidae	
2. Common Kingfisher	*Alcedo atthis*
3. White-breasted Kingfisher	*Halcyon smyrnensis*
Family: Apodidae	
4. Swift	*Apus apus*
Family: Ardeidae	
5. Cattle Egret	*Bubulcus ibis*
6. Little Egret	*Egretta garzetta*
7. Indian Pond Heron	*Ardeola grayii*
8. Night Heron	*Nycticorax nycticorax*
Family: Capitonidae	
9. Coppersmith Barbet	*Megalaima haemacephala*
Family: Columbidae	
10. Blue Rock Pigeon	*Columba livia*
11. Indian Ring Dove	*Streptopelia decaocto*
12. Spotted Dove	*Spilopelia chinensis*
13. Yellow-legged Green Pigeon	*Treron phoenicoptera*
Family: Corvidae	
14. Indian Tree pie	*Dendrocitta vagabunda*
15. House Crow	*Corvus splendens*
16. Jungle Crow	*Corvus macrorhynchos*
Family: Cuculidae	
17. Crow Pheasant	*Centropus sinensis*
Family: Dicruridae	
18. Black Drongo	*Dicrurus adsimilis*
Family: Meropidae	
19. Green Bee Eater	*Merops orientalis*
Family: Motacillidae	
20. Large Pied Wagtail	*Motacilla maderaspatensis*
21. Forest Wagtail	*Motacilla indica*
Family: Muscicapidae	
22. Common Tailorbird	*Orthotomus sutorius*

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23. Jungle Babbler	*Turdoides striatus*
24. Oriental Magpie Robin	*Copsychus saularis*
Family: Nectariniidae	
25. Purple Sunbird	*Nectarinia asiatica*
Family: Oriolidae	
26. Black headed Oriole	*Oriolus xanthornus*
27. Indian Golden Oriole	*Oriolus oriolus*
Family: Phalacrocoracidae	
28. Little Cormorant	*Phalacrocorax niger*
Family: Picidae	
29. Lesser Golden Backed Woodpecker	*Dinopium benghalense*
Family: Ploceidae	
30. House Sparrow	*Passer domesticus*
Family: Psittacidae	
31. Rose Ringed Parakeet	*Psittacula krameri*
Family: Pycnonotidae	
32. Red Vented Bulbul	*Pycnonotus cafer*
Family: Sturnidae	
33. Common Myna	*Acridotheres tristis*
34. Jungle Myna	*Acridotheres fuscus*
35. Pied Myna	*Sturnus contra*

Letters

I thank you for sending me a copy of BIONOTES which has republished my piece on TNA [Dr. T.N. Ananthakrishnan].

You may be aware that TNA died last October.

—Dr. A. Raman
School of Agricultural and Wine Sciences,
Faculty of Science, Charles Sturt University,
Orange NSW 2800 (AUSTRALIA).

●●●

Floods in Chennai

During the floods at Chennai, we were here at our village near Tenkasi. But Prakash had problems at Chennai. He is in the Ist floor. Ground floor was into water upto 4 feet. All families in ground floor vacated. After 3 or 4 days only normal life returned. Prakash had damages in his car, bike, electricity meter, telephones etc. He spent Rs 50,000/- or so to repair them. Fortunately, there was no loss of life in their locality. Drinking water, food, electricity, mobile connections etc were not there for 24 to 48 hours. Somehow things are improving now.

Our village had rains but there was no flood. But there was flood water in the river.

—R.M. Sundaram
Retd. Joint Director (Entomology)
Directorate of National Malaria Eradication Programme,
CHENNAI - 600047.

●●●

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We are very happy to invite you to the 2nd International Conference on Environment and Ecology (ICEE 2016) during 7-9 March 2016. This international conference has been organized not only to bring out the academicians, research scientist, industrialist to a common forum but also the students of young India to make them understand their responsibility in developing our country to achieve the vision. We are very confident that this effort will surely bring out a massive change among the researchers to carry out their research activities based on clean energy and Technology.

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—Dr. A. Manimekalan
Prof., Biodiversity & Aquatic Ecology Lab.
Dept. of Environmental Sciences, Bharathiar University,
Coimbatore - 641046 (TAMIL NADU).

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

R.K. VARSHNEY

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

(Contd. from Vol. 17, No. 4, page 100)

5. *C. psaphon* Westwood, 1848
   i. *C. p. psaphon* Westwood - Sri Lanka.
   ii. *C. p. imna* Butler - India (as far north as Kanara, and east of Kolkata).
6. *C. aristogiton* Felder, 1867
   i. *C. a. aristogiton* Felder - Sikkim, Assam to Myanmar (Tenasserim).
7. *C. bernardus* Fabr., 1793 (= *polyxena* Cramer)
   [i. *C. b. bernardus* Fabr. - China, Hong Kong. Not in South Asia].
   ii. *C. b. hierax* Felder (= *agna* Moore, *hemana* Butler, *hindia* Butler, *naganum* Tytler) - Sikkim to Myanmar (Tenasserim). ? Thailand.
8. *C. solon* Fabr., 1793 (= *fabius* Fabr.)
   i. *C. s. solon* Fabr. - Central to S India [upto Sikkim].
   ii. *C. s. cerynthus* Frühstorfer - Sri Lanka.
   iii. *C. s. raidhaka* Rhe-Philipe - Sikkim/Bhutan Frontier (1,800').
   iv. *C. s. sulphureus* Rothschild & Jordan - Assam to Myanmar (Tenasserim). ? Thailand.

LIBYTHEIDAE*

(1) *Libythea* Fabr., 1807
1. *L. celtis* Laicharting, 1782
   i. *L. c. leptoides* Moore - Sri Lanka, S India.
   [ii *L. c. celtis* Laicharting - S Europe to W Himalaya, China, Japan. Not in S Asia.]
   iii. *L. c. lepita* Moore - Sikkim, Assam to N Myanmar.
2. *L. myrrha* Godart , 1819
   i. *L. m. sanguinalis* Frühstorfer (?= *myrrhina* Frühstorfer, *hecura* Früh., *thira* Früh.) - Sikkim, Assam to Myanmar, Thailand, peninsular Malaya , Indo-China, S China , ?Hong Kong, Sumatra.
   ii . *L. m. rama* Moore - Sri Lanka.
   iii. *L. m. carma* Frühstorfer - S India.
3. *L. geoffroyi* Godart
   i. *L. g.* [race] *alompra* Moore - Myanmar, Thailand, Indo-China.
4. *L. narina* Godart, 1819
   i. *L. n. rohini* Marshall - Assam to peninsular Malaya, Langkawi Is .

ACRAEIDAE*

(1) *Acraea* Fabr., 1807
1. *A. violae* Fabr., 1793 - All of India, Sri Lanka, ? Myanmar.
2. *A. issoria* Hübner, 1819 (= *vesta* Fabr. - W Himalaya to China).
   i. *A. i. issoria* Hübner - Sikkim to Assam, S China, Indo-China, Hainan.
   ii. *A. i. sordice* Frühstorfer - Central to S Myanmar (Tenasserim), Thailand (moderate to high elevations).

SATYRIDAE*

(1) *Melanitis* Fabr., 1807
1. *M.leda* Linn. - Throughout Oriental Region, sea- level to 6000'.
2. *M. zitenius* Herbst, 1796
   i. *M. z. zitenius* Herbst- Sikkim, Assam to Myanmar.
   ii. *M. z. kalinga* Moore - Southern India.
   iii. *M.z. auletes* Fruhstorfer - S Myanmar, peninsular Malaya, Thailand to Indo-China.
[3. *M. velutina panvila* Fruhstorfer - Not in S Asia, although 'panvila' is outside Kandy, Sri Lanka.]**
4. *M. phedima* Cramer, 1780
   i. *M. p. tambra* Moore - Sri Lanka, up to 3500'.
   ii. *M. p. bela* Moore (= *aswa* Moore, *ganapati* Fruhstorfer) - Assam to S Myanmar, Thailand, Indo-China.
   iii. *M. p. varaha* Moore (?= *gokala* Moore) - S India (sea level).
   iv. *M. p. galkissa* Fruhstorfer - NW India. ['Galkissa' is sinhalese name for beach of Mt. Lavinia, Sri Lanka.]**
   v. *M. p. gokala* Moore (?= *varaha* Moore, *ampa* Swinhoe) - S India, above plains to 3000'.
   [vi. *M. p. nuwara* Fruhstorfer - Philippines. 'Nuwara' is name of a Sri Lankan town Kandy.]**

(2) *Lethe* Hübner, 1819 [Food plant : bamboo]
1. *L. dura* Marshall, 1882

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* In modern prevalent classification, these families are treated as Subfamily of Nymphalidae.

** Fruhstorfer uses inappropriately Sri Lankan names for taxon occurring elsewhere.

i. *L. d. dura* Marshall - Assam, Myanmar (to Tenasserim), ? Thailand.
ii. *L. d. gammiei* Moore - NW India, Bhutan, Sikkim.
2. *L. sura* Doubleday, ?1850 - Bhutan, Assam, Myanmar (6- 9000').
3. *L. goalpara* Moore, 1865
i. *L. g. goalpara* Moore (?= *narkunda* Fruhstorfer) - N India to Assam.
ii. *L. g. kabruensis* Tytler - Manipur (Kabru).
iii. *L. g. gana* Talbot - Upper Myanmar (8000').
4. *L. tristigmata* Elwes , 1887 (= *lyncus* de Niceville) - Sikkim, ? Nepal (7- 10,000').
5. *L. violaceopicta* Poujade , 1884
i. *L. v. burmana* Tytler (=? *kanjupkula* Tytler) - NE Myanmar (Sadon), Manipur. ['Kanjupkula' is in Manipur.]
6. *L. visrava* Moore, 1865 - Bhutan, Sikkim, Assam, Myanmar. ? China.
7. *L. sidonis* Hewitson, 1868 - Nepal, Sikkim, Bhutan (8800-11,500'), Assam.
8. *L. nicetas* Hewitson, 1868 - Sikkim, Assam, Manipur, ? Myanmar (3-8000').
9. *L. maitrya* de Niceville, 1880 - NW India (foot-hills of Himalaya), Nepal, Sikkim, Bhutan.
10. *L. siderea* Marshall, 1880 - Sikkim to W China.
11. *L. nicetella* de Niceville, 1887- Sikkim (7-9000').
12. *L. atkinsonia* Hewitson - Sikkim (7-10,000').
13. *L. jalaurida* de Niceville, 1880
i. *L. j. jalaurida* de Niceville - W Himalaya foot hills.
ii. *L. j. elwesi* Moore - Nepal, Sikkim (9-12,000').
14. *L. moelleri* Elwes, 1887- Sikkim, Bhutan.
15. *L. kabrua* Tytler, 1914 - Manipur (Kabru).
16. *L. europa* Fabr., 1775
i. *L. e. nilidana* Fruhstorfer - N India to Myanmar, Thailand.
ii. *L. e. ragalva* Fruhstorfer - S India.
iii. *L. e. nudgara* Fruhstorfer - Andamans.
iv. *L. e. tamuna* de Niceville - Nicobars.
17. *L. drypetis* Hewitson, 1868 (?= *todara* Moore) - Sri Lanka, S India (sea level to 7000'), rare at low elevations due to shrinkage of bamboo forests.
18. *L. daretis* Hewitson, 1868 - Sri Lanka (6- 8000').
19. *L. dynaste* Hewitson, 1868 - Sri Lanka (1200-8000').
20. *L. rohria* Fabr., 1787
i. *L. r. rohria* Fabr. (= *dyrta* Felder) - N India.
ii. *L. r. neelgheriensis* Guerin - S and Central India.
iii. *L. r. yoga* Fruhstorfer - Sri Lanka.
21. *L. sinorix* Hewitson, 1878
i. *L. s. sinorix* Hewitson - Sikkim, Bhutan, Assam, Myanmar (to Karen Hills). ? Thailand.
22. *L. baladeva* Moore, 1865 - Sikkim, Bhutan, Assam.
23. *L. kansa* Moore, 1857
i. *L. k. kansa* Moore - Sikkim.
ii. *L. k. zeugitana* Fruhstorfer - Assam, Manipur.
iii. *L. k. vaga* Frushtorfer - S Myanmar, Thailand.
24. *L. verma* Kollar, 1844
i. *L. v. verma* Kollar - NW India.
ii. *L. v. sintica* Fruhstorfer - Sikkim, Assam.
iii. *L. v. stenopa* Fruhstorfer - Myanmar, Thailand to Indo-China, S China, Hainan.
25. *L. confusa* Aurivillius, 1898
i. *L. c. confusa* Aurivillius - N India.
ii. *L. c. apara* Fruhstorfer - S Myanmar, Thailand to Indo-China, Hong Kong, Hainan.
iii. *L. c. gambara* Fruhstorfer - Sikkim, Assam.
26. *L. insana* Kollar, 1844
i. *L. i. insana* Kollar (= *procris* Leech, *dinarbas* Hewitson) - NW India, Bhutan, Sikkim, Nepal, Assam to Indo-China (7- 9000').
27. *L. brisanda* de Niceville, 1886 - Bhutan, Assam, NE Myanmar.
28. *L. sadona* Evans, 1932 - NE Myanmar (Sadon).
29. *L. minerva* Fabr., 1775
i. *L. m. tritogeneia* Fruhstorfer - Myanmar and Thailand.
30. *L. chandica* Moore, 1857
i. *L. c. chandica* Moore (= *namura* Fruhstorfer) - NW India to peninsular Malaya, Sumatra.
31. *L. mekara* Moore, 1857
i. *L. m. mekara* Moore - N India, Sikkim.
ii. *L. m. zuchara* Fruhstorfer (?= *crijnana* Fruhstorfer) - Assam to Tenasserim and Indo China.
32. *L. distans* Butler, 1870 - Bhutan, Sikkim, Assam to Myanmar.
33. *L. vindhya* Felder, 1859 (?= *ladesta* Fruhstorfer) - Bhutan, Sikkim, Assam to W China.
34. *L. scanda* Kollar, 1844 - Bhutan, Sikkim, Assam, Myanmar and W China (6-8,500').
35. *L. serbonis* Hewitson, ?1878 (= *teesta* Talbot, *bhutya* Talbot, *naganum* Tytler) - Bhutan, Sikkim, Assam to W China.
36. *L. latiaris* Hewitson, 1863 - Sikkim, Bhutan, Assam.
i. *L. l. perimele* Fruhstorfer - S Myanmar.
37. *L. gulnihal* de Niceville, 1887
i. *L. g. gulnihal* de Niceville - Bhutan to N Myanmar.
ii. *L. g. peguana* Moore - Central to S Myanmar. ? Thailand.
38. *L. bhairava* Moore, 1857 - Bhutan, Assam (5-6000').
39. *L. philemon* Fruhstorfer, 1902 Stat. rev. - N Myanmar,

N Indo China. ? Assam.
40. *L. ramadeva* de Niceville, 1887 - Sikkim, Bhutan.
41. *L. andersoni* Atkinson, 1871 - Assam [Meghalaya: Cherrapunji], Upper Myanmar, W China.
42. *L. margaritae* Elwes, 1882 - Bhutan, Sikkim [and Darjeeling : Tukvar].
43. *L. naga* Doherty, 1889 - Assam, Manipur [? Nagaland].
44. *L. gemina* Leech (= *gafuri* Evans, *zaitha* Fruhstorfer) - Assam (Naga Hills). [Essentially a Chinese sp.].

(3) *Parantirrhoea* Wood-Mason, 1881 [Monobasic]
1. *P. marshalli* Wood-Mason, 1881- S India (Coorg, Thiruvananthapuram, moderate elevations). [Threatened with extinction.]

(4) *Cyllogenes* Butler, 1868
1. *C. janetae* de Niceville, 1887
i. *C. j. janetae* de Niceville - Sikkim, Bhutan, W Bengal and Bangladesh.
ii. *C. j. fascialata* Smiles - Assam (Naga Hills), Manipur.
2. *C. suradeva* Moore, 1857 - N India, Sikkim, Bhutan.

(5) *Coelites* Westwood, 1850
1. *C. nothis* Westwood, 1850
i. *C. n. adamsoni* Moore - Assam ['Najaland' lapsus calami], Myanmar.
2. *C. epiminthia* Westwood, 1851
i. *C. e. binghami* Moore - S Myanmar (Tenasserim, Ataran Valley).

(6) *Neope* Moore, 1866
1. *N. bhadra* Moore, 1857 (?= *khasiana* Moore) - Sikkim, Assam to S Myanmar (Tenasserim), 3-4,500'.
2. *N. armandii* Oberthur, 1879 - Assam, ? Sikkim, ? Bhutan. [Palearctic sp.]
3. *N. pulaha* Moore, 1857
i. *N. p. pulaha* Moore (=? *pulahoides* Moore) - Bhutan, Sikkim, Assam to S Myanmar (Tenasserim).
4. *N. pulahina* Evans, 1923 - Bhutan, Sikkim, ? Assam.
5. *N. yama** Moore, 1857
i. *N. y. yama* Moore (?= *yamoides* Moore) - N W India to Assam, Myanmar (6-7000').
6. *N. muirheadi** Felder, 1862
i. *N. m. bhima* Marshall - Myanmar (Shan States to Tenasserim).

(7) *Neorina* Westwood, 1850
1. *N. hilda* Westwood, 1850 - Sikkim, Bhutan, Assam, ? N Myanmar (7-9000').
2. *N. patria* Leech, 1891
i. *N. p. westwoodi* Moore - Assam (Khasia Hills) [Meghalaya].
3. *N. crishna* Westwood, ?1851
i. *N. c. archaica* Fruhstorfer - S Myanmar (Tenasserim, Ataran Valley).

(8) *Mandarinia* Leech, 1889
1. *M. regalis* Leech, 1889
i. *M. r. baronesa* Fruhstorfer - Myanmar, Indo China.

(9) *Orinoma* Gray, 1846
1. *O. damaris* Gray, 1846
i. *O. d. damaris* Gray - NW India to Assam, N Myanmar.
ii. *O. d. harmostus* Fruhstorfer - S Myanmar (Tenasserim).

(10) *Ethope* Moore, 1866
1. *E. himachala* Moore, 1857 - NW India to Assam, Myanmar, Thailand (Chiangmai).
2. *E. diademoides* Moore, 1879
i. *E. d. diademoides* Moore - Myanmar, Thailand.

(11) *Rhapicera* Butler, 1867
1. *R. moorei* Butler, 1867 - Sikkim, Bhutan.
2. *R. satricus* Doubleday, 1849 - NW India to Assam. [Also Bhutan and Sikkim].

(12) *Chonala* Moore, 1893
1. *C. masoni* Elwes, 1883 - Sikkim, ?Bhutan.

(13) *Penthema* Doubleday, 1848
1. *P. lisarda* Doubleday, 1845
i. *P. l. lisarda* Doubleday - ?Bhutan, Sikkim, Assam.
ii. *P. l. mihintala* Fruhstorfer - Myanmar (Chin Hills).
2. *P. binghami* Wood-Mason, 1818 (?=*mimetica* Lathy) - Myanmar, Thailand (Korat).
3. *P. darlisa* Moore, ?1880
i. *P. d. darlisa* Moore - ?Assam to S Myanmar (Tenasserim).

(14) *Erites* Westwood, 1851
1. *E. angularis* Moore, 1879
i. *E. a. angularis* Moore - Central to S Myanmar, Thailand, peninsular Malaya.
2. *E. falcipennis* Wood-Mason & de Niceville, ?1886 - Manipur.
3. *E. medura* Horsfield, 1829
i. *E. m. rotundata* de Niceville - Myanmar, N Vietnam. ?Thailand.

(15) *Ragadia* Westwood, 1851
1. *R. crito* de Niceville, 1890 - Bhutan, ?Sikkim, Assam.
2. *R. crisilda* Hewitson - Assam to S Myanmar, Thailand. ?Indo China.
3. *R. critolaus* de Niceville, 1893 - S Myanmar (Tenasserim). ?Thailand.

(16) *Orsotriaena* Wallengren, 1858
1. *O. medus* Fabr., 1775
i. *O. m. medus* Fabr. - N India to Thailand.
ii. *O. m. mandata* Moore - Sri Lanka and S India.

* These both species are placed in *Patala* Moore, by Varshney, 2010. *Genera of Indian Butterflies*, p. 27.

(17) *Mycalesis* Hübner, 1818

1. *M. oroatis* Hewitson, 1864
   i. *M. o. ustulata* Distant (=? *surkha* Marshall) - S Myanmar, peninsular Malaya, Sumatra.
2. *M. mystes* de Niceville, ? 1894 - N India to Thailand.
3. *M. francisca* Stoll, 1780 - S China to NW India.
   i. *M. f.* race *santana* Moore - Manipur, Assam, Myanmar.
4. *M. anaxioides* Marshall, 1883 - Myanmar to peninsular Malaya.
5. *M. anaxias* Hewitson, 1864
   i. *M. a. anaxias* Hewitson - S India to Sikkim, Assam.
   ii. *M. a. aemate* Fruhstorfer - Myanmar, ? Thailand.
6. *M. manii* Doherty, 1886 - Nicobar Is.
7. *M. radza* Moore, 1878 - Andaman Is.
8. *M. adamsonii* Watson, ?1907 (?= *deficiens* Fruhstorfer) - Myanmar, Thailand.
9. *M. orseis* Hewitson, 1864
   i. *M. o. nautilus* Butler - Assam to peninsular Malaya.
10. *M. gotama* Moore, 1857
    i. *M. g. oculata* Moore - Assam to N Viet Nam, and S China.
11. *M. malsarida* Butler, 1868 (?= *inopia* Fruhstorfer) - Assam (Khasia and Naga Hills). ? Viet Nam.
12. *M. mestra* Hewitson, 1864
    i. *M. m. mestra* Hewitson - Assam.
    ii. *M. m sadona* Tytler - N Myanmar (Sadon).
    iii. *M. m. vetus* Fruhstorfer - Sikkim, Bhutan (5-7000').
13. *M. suaveolens* Wood-Mason, 1883
    i. *M. s. suaveolens* Wood-Mason - Sikkim, Bhutan (up to 3200').
14. *M. heri* Moore, 1857 - NW India, ?Sikkim.
15. *M. nicotia* Hewitson, ?1850
    i. *M. n. nicotia* Hewitson - NW India to Assam (Khasia Hiils) [Meghalaya].
    ii. *M. n. nudgara* Fruhstorfer - S Myanmar (Tenasserim).
16. *M. misenus* de Niceville, 1901 - Sikkim, Assam.
17. *M. mamerta* Stoll, 1780
    i. *M. m. malsara* Moore - NW India to Myanmar. ? N Thailand.
    ii. *M. m. davidsoni* Moore - S India (Trichinopoly).
    iii. *M. m. bethami* Moore - Central India.
18. *M. watsoni* Evans, 1912 - Assam, Manipur, Myanmar.
19. *M. lepcha* Moore, 1880
    i. *M. l. lepcha* Moore - NW India, Nepal, ? Bhutan, ? Assam.
    ii. *M. l. kohimensis* Tytler - Upper Myanmar.
20. *M. adolphei* Guerin, 1843 - S India (Nilgiri Hills, 5-6000').
21. *M. oculus* Marshall, 1880 - S India (Trichinopoly, Travancore, sea level to 4000').
22. *M. visala* Moore, 1857
    i. *M. v. visala* Moore (? = *neovisala* Fruhstorfer) - N and Central India, Sikkim, Assam, Myanmar. ? Thailand, Indo China.
    ii. *M. v. subdita* Moore - Sri Lanka, S India.
    iii. *M. v. andamana* Moore - Andamans.
23. *M. perseoides* Moore, ?1896 - Myanmar, Thailand, peninsular Malaya, Langkawi Is., Indo China.
24. *M. intermedia* Moore, 1892 - Myanmar, Thailand, peninsular Malaya, Langkawi Is., Indo China.
25. *M. igilia* Fruhstorfer, 1909 - S India (Coorg, Mysore etc.).
26. *M. mineus* Linn., 1758
    i. *M. m. mineus* Linn.- Central and N India, Assam, Nepal, Myanmar, Thailand to Indo China.
    ii. *M. m. polydecta* Cramer - S India, Sri Lanka.
    iii. *M. m. nicobarica* Moore - Nicobar Is.
27. *M. evansii* Tytler, 1814 - Manipur, Myanmar.
28. *M. perseus** Fabr., 1775 - Throughout the region.
    i. *M. p. perseus* Fabr. - India (excluding south) to China, Taiwan.
    ii. *M. p. typhlus* Fruhstorfer - Sri Lanka, S India.
29. *M. rama* Moore, 1892 - Sri Lanka.

[30. *M. horsfieldi* Moore, 1892 - Not reported from the Indian region.]

31. *M. mnasicles* Hewitson, 1864
    i. *M. m. perna* Fruhstorfer - Myanmar, peninsular Malaya, Thailand, Indo China.
32. *M. anaptia* Moore, 1857
    i. *M.a. anaptia* Moore - Assam (Naga Hills), to peninsular Malaya, Sumatra, Belitung.
33. *M. patiana* Eliot, 1969 - N India through Myanmar to peninsular Malaya, Sumatra, Borneo.
34. *M. patnia* Moore, 1857
    i. *M. p. patnia* Moore - Sri Lanka.
    ii. *M. p. junonia* Butler - S India (Nilgiris to 3000').

(18) *Ypthima*** Hübner, 1818

1. *Y. asterope* Klug, 1832
   i. *Y. a. burmana* Evans - Manipur, Myanmar, ? Thailand.
   ii. *Y. a. mahratta* Moore - NW India to Assam.
2. *Y. ceylonica* Hewitson, 1864
   i. *Y. c. ceylonica* Hewitson - Sri Lanka.

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* Very similar to *mineus* and sometimes with *visala*. De Niceville suggested that interbreeding may be going on in between *perseus* and *mineus*—D' Abrera.

**According to D' Abrera (1985) this section is most incomplete and extremely tentative.

ii. *Y. c. huebneri* Kirby - NW India to peninsular Malaya, Langkawi Is., Singapore, Thailand.

3. *Y. inica* Hewitson, 1864 - Central and NW India to Assam.

4. *Y. cantlei* Norman, 1958 - Assam (Kangpokpi, 4000').

5. *Y. indecora* Moore, 1883 - NW India.

6. *Y. similis* Elwes & Edwards, 1893 (?= *yoma* Evans) - Assam, Manipur, Myanmar.

7. *Y. affectata* Elwes & Edwards, 1893 - Assam, Manipur.

8. *Y. sobrina* Elwes & Edwards, 1893 - Assam.

9. *Y. philomela* Linn., 1763 - India, Myanmar, ? Thailand, Java, Sumatra, ? peninsular Malaya.

10. *Y. baldus* Fabr.

i. *Y. b. baldus* Fabr. - India to Indo China, Myanmar (Tenasserim), Thailand.

11. *Y. singala* Felder, 1868 - Sri Lanka.

12. *Y. striata* Hampson, 1888 - S India (Nilgiri Hills).

13. *Y. avanta* Moore, 1875 - India to Myanmar (Tenasserim) to S China.

14. *Y. chenu* Guerin, 1843 - S India (Nilgiri Hills).

15. *Y. ypthimoides* Moore, 1881- S India (3-5000').

16. *Y. lycus* de Niceville, 1889 (?=*lycoides* Watson) - Assam, Bhutan, Sikkim and Tibet [*lycoides* Watson is from Tibet].

17. *Y. nareda* Kollar, 1844

i. *Y. n. nareda* Kollar - W Himalaya.

ii. *Y. n. newara* Moore - Nepal, Bhutan, Sikkim, Assam (3-5000').

iii. *Y. n. sarcaposa* Fruhstorfer - Myanmar, Thailand, Indo China, SW China.

iv. *Y. n. fusca* Elwes & Edwards - Assam.

18. *Y. watsoni* Moore, ?1895 - Assam, Manipur, Myanmar.

19. *Y. methora* Hewitson, 1865 - Sikkim, Assam.

20. *Y. persimilis* Elwes & Edwards, 1893 - Bhutan, Assam, Manipur.

21. *Y. dohertyi* Moore, ?1895 - Central and S Myanmar.

22. *Y. savara* Grose-Smith, ?1886 (?=*tonkiniana* Fruhstorfer) - Myanmar to Indo China.

23. *Y. evansi* ?subsp. Eliot (Ms.) [Eliot's species named in figure but not in text by D' Abrera] - Myanmar (N Shan States).

24. *Y. nikaea* Moore, 1875 - W Himalaya, Nepal.

25. *Y. sakra* Moore, 1857

i. *Y. s. sakra* Moore - Sikkim, Bhutan.

ii. *Y. s. austeni* Moore - Assam, Myanmar ['Buram' error for Burma in D'Abrera].

iii. *Y. s. matinia* Fruhstorfer - NW India.

26. *Y. iarba* de Niceville, 1895

i. *Y. i. iarba* de Niceville - Myanmar, Sumatra, ? peninsular Malaya.

27. *Y. megalia* de Niceville - Myanmar (N Shan States). [probably a seasonal form of an undescribed taxon—Eliot Ms.]. [Taxa unknown to me—D' Abrera].

(19) *Zipaetis* Hewitson, 1863

1. *Z. saitis* Hewitson, 1863 - S India (900-3500', Nilgiri Hills).

2. *Z. scyllax* Hewitson, 1863 - Sikkim to Myanmar (Tenasserim). ? Thailand.

(20) *Elymnias** Hübner, 1818

1. *E. panthera* Fabr.

i. *E. p. mimus* Wood-Mason - Nicobars.

2. *E. dara* Distant & Pryer

i. *E. d. daedalion* de Niceville - Myanmar (Tenasserim), ? Thailand.

3. *E. patna* Westwood, 1851

i. *E. p. patna* Westwood - NW India to Assam, Myanmar, ? Thailand.

4. *E. hypermnestra*** Linn., 1763 - Entire Oriental region, except Philippines and Sulawesi.

i. *E. h.* race *fraterna* Butler - Sri Lanka.

5. *E. caudata* Butler - S India.

6. *E. cottonis* Hewitson - Andaman Is.

7. *E. obnubila* Marshall & de Niceville - Myanmar (including Mergui archipelago).

8. *E. nesaea* Linn., 1764 - Sikkim to Sundaland.

i. *E. n. timandra**** - Sikkim/Assam.

ii. *E. n. cortona**** - Myanmar.

iii. *E. n. apelles**** - Lower Myanmar, Thailand, Langkawi Is.

9. *E. malelas* Hewitson, ?1865 (?=*nilamba* Fruhstorfer) - NW India, Sikkim.

10. *E. casiphone* Hübner

i. *E. c. saueri* Distant - Myanmar, peninsular Malaya, Thailand, Langkawi Is.

11. *E. singhala* Moore, 1875 - Sri Lanka*****.

12. *E. peali* Wood-Mason, ?1883 - Assam (Margherita).

13. *E. penanga* Westwood, 1851

i. *E. p. chelensis* de Niceville - Assam to Myanmar (Tenasserim). ? Thailand.

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* It needs total revision and overhaul : D'Abrera (1985).

**It resembles *Danaus chrysippus* (or *D. genutia*) in some localities, in others its ♀ resembles *Euploea* sp.: D' Abrera.

***author(s) of subspecies not mentioned.

****See the excerpt at the begnning of this series (*Bionotes*, vol. 17, no. 2, p. 39).

14. *E. vasudeva** Moore, 1857 (?=*thycana* Wallace, *burmensis* Moore, *oberthuri* Fruhstorfer) - Sikkim, Assam to Myanmar (Tenasserim), Thailand. ? Indo China.
15. *E. esaca* Westwood, 1851
i. *E. e. andersonii* Moore - S Myanmar (Mergui).

AMATHUSIIDAE**

"Here too, for structural reasons, the modern approach is to regard this group as a subfamily Amathusiinae, of the family Nymphalidae. The early stages of this group are, however, unlike the Nymphalidae, but are closest to the Satyridae from which they differ in the larvae being covered with long tufts of hair. They are crepuscular in habit (unlike the sun loving Nymphalidae) and defer from the Satyridae by their large wings being all out of proportion to their small bodies. In this work I prefer to regard the Amathusiidae*** as a distinct family. Food-plants: Palmaceae".—D'Abrera

(1) *Faunis* Hübner, 1819
1. *F. canens* Hübner
i. *F. c. arcesilas* Stichel - Sikkim to Myanmar, Thailand, peninsular Malaya, Singapore, Langkawi Is., Sumatra.
2. *F. eumeus* Drury
i. *F. e. incerta* Staudinger - Myanmar to Indo China.
3. *F. assama* Westwood, 1858 - Assam (Khasia-Jaintia Hills) [Meghalaya].
["I suspect *assama* as most NW race of *eumeus*"—D'Abrera].

(2) *Melanocyma* Westwood, 1858
1. *M. faunula* Westwood, 1850
i. *M. f. faunula* Westwood - ?S Myanmar, peninsular Malaya, Thailand.
ii. *M. f. faunuloides* de Niceville - N Myanmar (Chin Hills).

(3) *Aemona* Hewitson, 1868
1. *A. amathusia* Hewitson, 1867
i. *A. a. amathusia* Hewitson - Bhutan, Assam, Manipur, Myanmar.
2. *A. lena* Atkinson
i. *A. l. karenina* [? author] - Myanmar (Karen Hills).
ii. *A. l. haynei* Tytler - N Myanmar (Maymyo).

(4) *Xanthotaenia* Westwood, 1858
1. *X. busiris* Westwood (Food plant: wild ginger plants).
i. *X. b. busiris* Westwood (?=*sadija* Fruhstorfer) - S Myanmar (Tenasserim), Thailand, peninsular Malaya, Sumatra.

(5) *Stichophthalma* Felder, 1862
1. *S. camadeva* Westwood, 1848
i. *S. c. camadeva* Westwood - Sikkim.
ii. *S. c. camadevoides* de Niceville - Assam, Manipur, N Myanmar.
iii. *S. c. amyclas* Brooks - Myanmar (Arrakan Hill Tracts).
2. *S. godfreyi* Rothschild, 1916 - Myanmar (Victoria Point). [Probably a local or seasonal form of *S. cambodia* Hewitson —D'Abrera].
3. *S. sparta* de Niceville, 1889
i. *S. s. sparta* de Niceville - Manipur. ?Assam.
ii. *S. s. evansi* Tytler - NE Myanmar (Sadon).
4. *S. nourmahal* Westwood, 1851 (=*nurinissa* de Niceville) - Bhutan, Sikkim, Assam. ?N Myanmar. ["I do not support the view that Bhutan population described as *nurinissa* de N. is a seprate race."—D'Abrera].

(6) *Amathusia* Fabr., 1807
["This group comprises about a dozen magnificent but confusingly similar species..... most confusing are: *phidippus* with *gunneryi* and *utana* with *friderici*".—D'Abrera].
1. *A. andamanensis* Fruhstorfer, 1899 - Andaman Is.
2. *A. friderici* Fruhstorfer, 1904
i. *A. f. friderici* Fruhstorfer - Central Myanmar to Tenasserim.
3. *A. phidippus* Linn , 1763
["One of the commonest butterflies in the Region" "...is very common wherever coconut palm grows."—D'Abrera] - Myanmar to Indo China, Sundaland, Philippines and Sulawesi.
Races include - i. *chersias* Fruhstorfer - King Is., Mergui in Myanmar.
ii. *adustatus* Fruhstorfer - Myanmar, Thailand, etc.

(7) *Amathuxidia* Staudinger, 1887
1. *A. amythaon* Doubleday, 1847
i. *A. a. amythaon* Doubleday - ? Sikkim, Assam, Myanmar (to Tenasserim).

(8) *Zeuxidia* Hübner, 1826
1. *Z. masoni* Moore, 1879 - Myanmar (to Tenasserim), Mergui Archipelago (Kadun Kyung).

(9) *Thaumantis* Hübner, 1826
1. *T. diores* Doubleday, 1845
i. *T. d. diores* Doubleday - Sikkim, Assam, Myanmar. ? N Thailand, ? N Viet Nam.

(10) *Thauria* Moore, 1894
1. *T. aliris* Westwood, 1858
i. *T. a. intermedia* Crowley - Myanmar.

(To be continued)

* It appears to be a fair copy of the pierid *Delias pasithoe* —D'Abrera.

**In modern prevalent classification, this group is included within family Nymphalidae.

***D'Abrera is inconsistant in using 'Amathusiidae' (as in his contents and in the text) and 'Amathusidae' (as in the title). The former is correct.

Research Notes

PREDATION OF THE LARVA OF COMMON EMIGRANT BUTTERFLY, *CATOPSILIA POMONA*, BY A STINK BUG, *PODISUS MACULIVENTRIS*, IN SOLAPUR, MAHARASHTRA

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Butterflies stand as an ideal theme for ecological learning in landscapes (Thomas & Malorie, 1985). Butterflies play vital roles in the pollination and in the study of community ecology (Pollard, 1991). Butterflies act as abiotic indicator for environmental evaluation (Sakuratani & Fujiyama, 1991) and are used for forecasting climate change brunt. The butterflies are very responsive with changes in the microclimate and habitation (Erhardt, 1985). The butterfly *Catopsilia pomona* Fabr., is a member of the family Pieridae : Order Lepidoptera, commonly found in India, which feeds on *Cassia* species (Kunte, 2000).

The spined soldier bug, *Podisus maculiventris* (Say), is a medium sized predatory stink bug, that preys on a wide variety of other arthropods, especially larval forms of Lepidoptera and Coleoptera (Mukherji & LeRoux, 1965). The adult has a prominent spine on each shoulder. This stink bug is the most common predatory bug in North America and ranges from Mexico, the Bahamas and parts of the West Indies, north into Canada. It has also been introduced into other countries as part of classical biological control programme (De Clercq, 2008).

The present observation was made while studying the diversity of bugs in and around Solapur City of Maharashtra, during June to Nov. 2015. While observing the bugs on 15.11.2015, authors sighted that one bug is inserting its proboscis in the middle part of a larva. After careful observation the larva was identified as that of *Catopsilia pomona* and the bug as *Podisus maculiventris*. The duration of insertion and sucking of inside tissues material lasted for about one and half hours. Later on the body of larva was reduced in size and became almost half.

P. maculiventris is a generalist predator with a broad host range, reportedly attacking about 90 insect species belonging to eight orders, including several important economic pests. Reported as prey include the larvae of Mexican bean beetle, European corn borer, diamondback moth, corn earworm, beet armyworm, fall armyworm, cabbage looper, imported cabbageworm, Colorado potato beetle, velvet bean caterpillar, and flea beetles. When its prey is scant, the spined bug may feed on plant juices, but this feeding is not reported to cause plant damage (De Clercq, 2008).

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'Homo naledi'

Two new studies describing the structure and function of the *Homo naledi's* hand and foot indicate the species may have been uniquely adapted for both tree climbing and walking as dominant forms of movement. The research was conducted by a team of scientists associated with the University of the Witwatersrand in South Africa.

The *H. naledi* foot shares many features with a modern human foot, indicating it is well-adapted for standing and walking on two feet.

DIVERSITY OF ROVE BEETLES FROM KANGRA, HIMACHAL PRADESH (COLEOPTERA : STAPHYLINIDAE)

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Kangra is a popular district of the state Himachal Pradesh, India. Dharamshala is the administrative headquarters of the district. It is home of Masroor Rock Cut Temple, also known as Himalayan Pyramids, a wonder of the world . The Kangra District of Himachal Pradesh is situated in the Western Himalaya, between 31°2 to 32°5 N and 75° to 77°45 E. The district has a geographical area of 5,739 km. which constitutes 10.31% of the geographical area of the State.

The members of the family Staphylinidae are commonly known as rove beetles. It is one of the largest family of the superfamily Staphylinoidea distributed throughout the world. 30,000 species are known from the world, of which more than 3000 species are recorded so far from India.

The present work is based on the collections brought from district Kangra by different survey parties of the Zoological Survey of India, Calcutta. The study is based on 22 examples, comprising 4 species under 2 genera.

Order : Coleoptera
Family : Staphylinidae
Subfamily : Paederinae
Tribe : Paederini

1. ***Paederus kuluensis*** Bernhauer

1914. *Paederus kuluensis* Bernhauer, *W.Z.B.*, 64 : 99.

1931. *Paederus kuluensis* : Cameron, *Fauna Br. India, Col.: Staph.*, 2: 55.

Material examined: India: Himachal Pradesh, Kangra, Gaggal,12 exs, 27.iii.2011, Animesh Bal & party coll.

Diagnostic characters: Head and elytra blue, thorax and abdomen red, head is narrow and strongly retracted behind and longer. The elytra finely and equally punctured. Length 9.5 mm.

Distribution: India: Himachal Pradesh, Uttarakhand.

2. ***Paederus basalis*** Bernhauer

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

1931. *Paederus basalis*: Cameron, *Fauna Br. India, Col.: Staph.*, 2: 54.

Material examined: 34 exs., India: Himachal Pradesh, Kangra, Gaggal, 2 exs., 27.iii.2011, Animesh Bal & party coll.

Diagnostic characters: Head and elytra blue, thorax and abdomen red, the base of the 1st segment visible and last two segments black. Antennae, palpi, and legs black. Length 9.5 mm.

Distribution: India: Himachal Pradesh, Uttarakhand.

3. ***Cryptobium rosti*** Schub.

1908. *Cryptobium rosti* Schub., *D.E.Z.*,: 622.

1931. *Cryptobium rosti* : Cameron, *Fauna Br. India, Col.: Staph.*, 2: 249-250.

Material examined: 2 exs, India: Himachal Pradesh, Kangra, Dharmshala, 1 ex., 15.vii.2014, V.D. Hegde & party coll.

Diagnostic characters: Black, head oval, antennae red. Femora yellow, the tibiae and tarsi reddish. Length 8 - 9 mm.

Distribution: India: Himachal Pradesh, Uttarakhand.

4. ***Cryptobium spectabile*** Kraatz

1859. *Cryptobium spectabile* Kraatz, *Arch. Naturg.* 25, I,:118.

1931. *Cryptobium spectabile*: Cameron, *Fauna Br. India, Col.: Staph.*, 2: 233-234.

Material examined: 5 ex, India: Himachal Pradesh, Kangra, Palanpur, 2 exs., 16.vii.2014, V.D. Hegde & party coll.

Diagnostic characters: Larger, with broader head and more coarsely punctured thorax, elytra, and abdomen. The punctuation of head more or less umbilicate.

Distribution: India: Himachal Pradesh, Bihar, Uttarakhand, Northern India.

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'Parwal' to Control Diabetes

If you are a diabetic, don't worry as leaves of *"Trichosanthes dioica"* or parwal or 'paatal' can rescue you.

Researchers at the Department of Chemistry, Allahabad University, have shown that the extract prepared by the leaves of parwal brings down the blood glucose level (BGL) by over 32%.

The findings have been published in an international journal, *Pharmaceutical Biology*, in England.

The aim of the study was to screen the glycemic attributes of an aqueous extract of leaves of parwal. This evidence indicates that extract of *"Trichosanthes dioica"* leaves has good hypoglycemic potential along with a high anti-diabetic profile.

FIRST RECORD OF THE ICHTHYOFAUNAL DIVERSITY OF KANTELI STREAM, KALISINDH RIVER, DISTRICT JHALAWAR, RAJASTHAN

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The state of Rajasthan is wellknown for its diverse topography and drainage system. Western part is famous for the Thar Desert, whereas eastern and southern parts are known for the Aravalis. Many hill streams are present in southern Rajasthan. Jhalawar district lies in the south-eastern part of Rajasthan, at the edge of the Malwa plateau. It has rocky, but water-laden verdant settings, unlike much of Rajasthan. The Aravali hills crosses the region, roughly dividing the plains of Hadoti from the Malwa plateau. Jhalawar is drained by several rivers, giving it a fertile look. The largest river flowing through the area is Kalisindh, which flows through Jhalawar to join the Rajasthan's largest river, Chambal. Kanteli stream is an important part of the drainage basin. These riverine systems are known for rich aquatic faunal diversity. The Ichthyofaunal diversity of this stream is however, still unknown. While surveying the faunal diversity of Silehgarh region in Jhalawar district, during 2014, Kanteli stream was assessed for its fish faunal diversity.

Fishes were collected mainly by using cast & gill nets. The fishes were preserved in 10% formalin for further studies and later identified following standard literarture and Froese & Pauly (2014).

Dubey & Mehra (1959) have described 71 species of fishes from Chambal. Ridhi et al. (2012) have recorded 22 species of fish from Madhya Pradesh portion and Banyal & Kumar (2013) have recorded 54 species of fish from Rajasthan portion of river Chambal. Gupta & Kulshreshta (1985) have recorded 57 species of fish from Jhalawar district, whereas Banyal & Kumar (2015) have reported 17 species of fish from Kalisindh river.

No major account is available showing the fish fauna from Kanteli stream. In this context, Kanteli stream was surveyed, near to Silehgarh town (N 24° 14.659'and E 075° 50.714'). Following species of fishes were identified from the total fish catch:

Class: Actinopterygii
Order: Cypriniformes
Family: Cyprinidae
Genus: *Systomus* McClelland
1. *Systomus sarana* (Hamilton, 1822)
Genus : *Labeo* Cuvier
2. *Labeo boggut* (Sykes, 1839)
Genus: *Salmophasia* Swainson
3. *Salmophasia bacaila* (Hamilton, 1822)
Genus: *Garra* Hamilton
4. *Garra gotyla gotyla* (Gray, 1832)
Genus: *Rasbora* Bleeker
5. *Rasbora daniconius* (Hamilton, 1822)
Order: Siluriformes
Family: Bagridae
Genus: *Mystus* Scopoli
6. *Mystus bleekeri* (Day, 1877)
Order: Perciformes
Family: Ambassidae
Genus: *Chanda* Hamilton
7. *Chanda nama* Hamilton, 1822
Family: Gobiidae
Genus: *Glossogobius* Gill
8. *Glossogobius giuris* (Hamilton)

Systomus sarana was maximum in catches.

Removal of bed material of the main stream for stone crushers and illegal fishing were rampant during the period of study. Its water was also utilised illegally for irrigation. Conservation measures should be taken up by the authorities.

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

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A PRELIMINARY REPORT ON THE LEPIDOPTERA FAUNA OF NANDED, MARATHWADA REGION, MAHARASHTRA

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Lepidoptera (butterflies and moths) is undoubtedly the most conspicuous insect Order having colorful and beautiful insects. Most of them possess distinctive color patterns. Butterfly fauna has been studied extensively from taxonomic viewpoint (Robbins & Opler, 1997). Ecologically they are important in the ecosystem and some species are known as pollution indicators also. Reproduction of many plants depend on butterflies for their pollination through symbiotic relation. Reduction in number or total loss of any of the species may affect the survival of the plants. As pollinators of many cultivated and wild plants, butterflies and moths play a vital role in human economy and even sustaining the greenery. Many of them are serious crop pests and are responsible for heavy loss. Lepidoptera is the second largest and most important Order of the insect pests.

The present study was undertaken to record the diversity of Lepidoptera fauna of Nanded city.

Material and Methods

Nanded city is located in southern part of India (19.15°N 77.30°E). The city is divided into two parts: old Nanded (20.62 Km^2) and new Nanded (31.14 Km^2). Annual average temperature is Max. 40.2°C. and Min. 12.1°C, while annual rainfall is 928.90 mm.

This study was mainly conducted in the campus of N.E.S Science College, Nanded and some surrounding areas within the city. Butterflies and moths were recorded by random periodical survey throughout the year i.e. from October 2014 to October 2015.The specimens were field identified by direct sighting and or using photographic evidence (Das et al., 2012). The specimens were photographed from different angles using digital camera Nikon Coolpix L830 (Zoom 34X 16.0 Megapixel) and Nikon Coolpix S3500 (Zoom 7X Megapixel 20.1). The photographs so obtained were compared with those found in the works of Kehimkar (2008, 2015), Kunte (2000), Gadhikar et al. (2015), Gaonkar (1996) and Sharma (2012). No live or dead specimen were collected from the field.

Results and Discussion

The Family-wise percentile status of the Lepidopteran fauna reported in the present study is as follows : Nymphalidae - (15 spp) - 39.47, Pieridae - (6 spp) - 15.78, Papilionidae - (5 spp) - 13.15, Lycaenidae - (3 spp) - 7.89, Noctuidae - (3 spp) - 7.89, Sphingidae - (2 spp) - 5.26, Erebidae - (1sp.) - 2.63, Crambidae - (1 sp.) - 2.63, Saturniidae - (1 sp.) - 2.63 , Hesperiidae - (1sp.) - 2.63.

A total of 38 Lepidoptera species were identified belonging to ten families (Table 1). This report indicates that family Nymphalidae dominates (39.47%) followed by Pieridae (15.78 %) and Papilionidae (13.15%) in the Lepidoptera fauna of Nanded city. Authors intend to continue further surveys of the area in future and reveal more species. The data recorded in this paper may serve as a baseline for further study and conservation of valuable Lepidoptera fauna. The data may also help to raise a butterfly garden in this area.

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Table 1. A preliminary list of the Lepidoptera found in Nanded city, Maharashtra.

Family	Scientific Name	Common Name	Found on
BUTTERFLIES			
Nymphalidae	*Acraea terpsicore* Linnaeus 1768	Tawny coster	*Cosmos* species
	Ariadne ariadne Linnaeus 1763	Angled caster	*Tragia cannabina*
	Ariadne merione Cramer 1779	Common castor	
	Danaus chrysippus Linnaeus 1758	Plain Tiger	*Tridax procumbens* (L.)
	Euploea core Cramer 1780	Common Indian Crow	*Tagetes patula* (L.)
	Euthalia nais Forester 1771	Baronet	
	Hypolimnas misippus Linnaeus 1764	Danaid eggfly	*Tagetes patula* (L.)
	Ixias marianne Cramer 1779	White Orange tip	
	Junonia atlites Linnaeus 1763	Gray pansy	*Zaphyranthes ajax*
	Junonia hierta Fabricius 1798	Yellow pansy	
	Junonia lemonias Linnaeus 1758	Lemon pansy	*Cosmos* sp.
	Junonia orithya Linnaeus 1764	Blue pansy	
	Melanitis leda (Linnaeus , 1758)	Common evening brown	*Cosmos* sp.
	Tirumala limniace (Cramer, 1775)	Blue Tiger	*Turnera ulmifolia* (L.)
Papilionidae	*Graphium agamemnon* Linnaeus 1758	Tailed Jay	*Antigonon leptopus* (Hook. & Arn.)
	Graphium doson C&R Felder1864	Common Jay	*Antigonon leptopus* (Hook. & Arn.)
	Pachliopta aristolochiae Fabr., 1775	Common rose	*Lantana camara* (L.)
	Papilio demoleus Linnaeus 1758	Lemon butterfly	*Catharanthus roseus* (L.) G.Don
	Papilio polytes Linnaeus 1758	Common mormon	*Jacqemontia coerulea* (L.)
Pieridae	*Catopsilia pomona* Fabricius 1775	Lemon emigrant	*Hibiscus rosasinensis* (L.)
	Catopsilia pyranthe (Linnaeus) 1758	Mottled emigrant	*Cassia fistula* (L.)
	Cepora nerissa Fabricius 1775	Common gull	*Catharanthus roseus* (L.) G. Don
	Delias eucharis Drury 1773	Indian Jezebel	Jasmine flowers
	Eurema hecabe Linnaeus 1758	Common Grass yellow	*Tridax procumbens* (L.)
	Euthalia aconthea Hewitson 1874	Common Baron	Decaying custard apple fruit
Lycaenidae	*Talicada nyseus* Guerin 1843	Red Pierrot	*Jasminum sambac*
	Chilades lajus lajus Stoll, 1780	Indian Lime Blue	*Duranta* plant
	Chilades pandava Horsfield 1829	Plains cupid	*Wedelia trilobata* Creeping Daisy
Hesperiidae	*Udaspes folus* Cramer 1775	Grass Demon	-
MOTHS			
Noctuidae	*Achaea janata* Linnaeus 1758	Castor semilooper	-
	Asota ficus Fabricius 1775		-
	Eudocima materna Linnaeus 1767	Fruit Piercing moth	-
Erebidae	*Amata passalis* Fabricius 1781	Sandalwood Defoliator	-
Sphingidae	*Acherontia styx* Westwood 1847	Death's head moth	-
	Daphnis nerii Linnaeus 1758	Oleander Hawkmoth	-
Crambidae	*Palpita vitrealis* Rossi 1794	Olive tree Pearl	-
Saturniidae	*Antheraea mylitta* Drury 1773	Tussar moth	-

AVIAN DIVERSITY IN SOME AREAS OF NORTH DUM DUM MUNICIPALITY, KOLKATA

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Diversity of birds has been studied at two wards (ward no. 24 and 34) of North Dum Dum Municipality, during the period of October 2012 to May 2014. Ward no. 24 is semi-urban area having some small water body, very little grassland and some small orchard, whereas ward no. 34 has rural landscape with larger water bodies, crop fields, grazing fields and some large orchard. Observation were done in the dawn between 6.00 A. M. to 9.30 A. M. and in the dusk between 04.00 P. M. to 06.00 P. M. and sometimes in the night. Identification of birds has been done as per Ali (2002) and Grimmett et al. (2011).

A total of 33 species of birds belonging to 21 families were recorded during the entire study period (Table 1). Based on the frequency of observation, birds are classified as abundant (observed more than 75%), regular (30% to <75%) and rare (< 30%). It has been observed that avian diversity is much higher at ward no. 34 than that of ward no. 24. From the present study it can be concluded that diverse vegetation supports better avian diversity. But rapid urbanization in this area leads to habitat destruction which will have adverse impact on avian diversity.

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Table 1. Avian diversity of North Dum Dum Municipality, Kolkata.

	Common Name	Scientific Name	Family	Habitat	Status	Ward No.24	Ward No.34
1.	House Crow	*Corvus splendens*	Corvidae	Human habitation	Abundant	+	+
2.	Jungle Crow	*Corvus macrorhynchos*	Corvidae	Human habitation, orchard	Rare	-	+
3.	Indian Tree-pie	*Dendrocitta vagabunda*	Corvidae	Orchard	Regular	+	+
4.	Common Myna	*Acridotheres tristis*	Sturnidae	Human habitation	Abundant	+	+
5.	Pied Myna	*Gracupica contra*	Sturnidae	Human habitation, grassland	Abundant	+	+
6.	Jungle Myna	*Acridotheres fuscus*	Sturnidae	Human habitation, grassland	Rare	-	+
7.	Indian Pond Heron	*Ardeola grayii*	Ardeidae	Water body	Abundant	+	+
8.	Cattle Egret	*Bubulcus ibis*	Ardeidae	Grassland	Abundant	+	+
9.	Little Egret	*Egretta garzetta*	Ardeidae	Water body	Regular	-	+
10.	Lesser Goldenbacked Woodpecker	*Dinopium benghalense*	Picidae	Orchard	Abundant	+	+
11.	White-breasted Kingfisher	*Halcyon smyrnensis*	Alcedinidae	Water body	Abundant	+	+
12.	Small blue Kingfisher	*Alcedo atthis*	Alcedinidae	Water body	Rare	-	+

13. Red-vented Bulbul	*Pycnonotus cafer*	Pycnonotidae	Human habitation, orchard	Abundant	+	+
14. Asian Koel	*Eudynamys scolopacea*	Cuculidae	Orchard	Abundant	+	+
15. Brainfever Bird	*Hierococcyx varius*	Cuculidae	Orchard	Rare	-	+
16. Greater Coucal	*Centropus sinensis*	Cuculidae	Orchard	Regular	-	+
17. Small Bee-eater	*Merops orientalis*	Meropidae	Human habitation, orchard	Rare	-	+
18. Rose- ringed Parakeet	*Psittacula krameri*	Psittacidae	Orchard	Regular	+	+
19. House Sparrow	*Passer domesticus*	Ploceidae	Human habitation	Rare	+	+
20. Black Drongo	*Dicrurus macrocercus*	Dicruridae	Human habitation, orchard	Regular	+	+
21. Common Tailorbird	*Orthotomus sutorius*	Muscicapidae	Orchard	Abundant	+	+
22. Oriental Magpie Robin	*Copsychus saularis*	Muscicapidae	Human habitation, orchard	Regular	+	+
23. Jungle Babbler	*Turdoides striatus*	Muscicapidae	Orchard	Regular	-	+
24. Spotted Dove	*Streptopelia chinensis*	Columbidae	Human habitation, orchard	Abundant	+	+
25. Blue rock Pigeon	*Columba livia*	Columbidae	Human habitation	Abundant	+	+
26. Coppersmith Barbet	*Megalaima haemacephala*	Capitonidae	Orchard	Rare	-	+
27. Brown Shrike	*Lanius cristatus*	Laniidae	Orchard	Rare	-	+
28. White-breasted Waterhen	*Amaurornis phoenicurus*	Rallidae	Water body	Regular	-	+
29. Black Kite	*Milvus migrans*	Accipitridae	Human habitation	Rare	+	+
30. Purple Sunbird	*Nectarinia asiatica*	Nectariniidae	Orchard	Rare	-	+
31. Black-headed Oriole	*Oriolus xanthornus*	Oriolidae	Orchard	Regular	-	+
32. White wagtail	*Motacilla alba*	Motacillidae	Grassland	Rare	-	+
33. Little cormorant	*Phalacrocorax niger*	Phalacrocoracidae	Water body	Regular	-	+

Anthropocene: The Age of Humans

People are changing Earth so much, warming and polluting it, that many scientists are turning to a new way to describe the time we live in. They're calling it the Anthropocene —the age of humans.

Though most non-experts don't realize it, science calls the past 12,000 years the Holocene, Greek for "entirely recent." But the way humans and their industries are altering the planet, especially its climate, has caused an increasing number of scientists to use the word "Anthropocene" to better describe it.

RANGE EXTENSION OF A MOTH, *GLOTTULA ORIENTALIS* HAMPSON, FROM MADHYA PRADESH

S. SAMBATH

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The Madhav National Park is situated in the district Shivpuri on the northern fringe of the central highlands of India, and one of the oldest National Parks of Madhya Pradesh. It forms a part of the upper Vindhyan hills, which encompass over an area of about 355 sq.kms. Geographically, it lies between 25°20' 45" to 25°36' 63" N latitude and 77°38' to 77°56' E longitude. Madhav got the status of a National Park in 1958. This park is having two perennial water bodies viz., Sakhya Sagar and Madhav Sagar, which provide shelter, protection and nourish both the flora and fauna. In addition to these water bodies, big nallas like Tunda Bhakra, Bhurakho and Amdar exist. These nallas dry up during the summer but retain water pools at a few places throughout the summer.

The flora of this park is categorised as northern tropical dry deciduous mixed forest. Among the major tree species of this park, *Anogeissus pendula* (kardhai) is dominated in varying proportion followed by *Anogeissus latifolia* (dhaora), *Boswellia serrata* (salai) and *Acacia catechu* (khair). The underneath flora is dominated by *Zizyphus xylocarpa* (ber), *Aegle marmelos* (bel), *Holarrhena antidysenterica* (kora), *Lantana camara* (lantana) and *Carissa spinarum* (karonda).

The fauna of this national park consists of leopard, wild dog, wolf, jackal and hyena which are major carnivores, and chital, sambar, nilgai, chinkara, chowsingha and rarely the barking deer which are among the herbivores. Jungle cat, palm civet, small Indian civet, otter, fox, porcupine, hare are also reported. The Madhav National Park is acting as a breeding site for large number of migratory birds who visit the area during winter. Over 227 species of birds have been listed from here (Dwivedi, 2003).

While conducting faunistic surveys between 2012 and 2014, light trap was installed inside the park (near Forest Rest House) just after the sunset. The light trap was operated between sunset and sunrise for the collection of nocturnal insects. While collecting nocturnal insects with the help of light trap, single specimen of *Glottula orientalis* Hampson was collected on 11.iii.2013 along with other insects.

The genus *Glottula* Guenee, 1837 (Noctuoidea: Noctuidae: Glottulinae) is widely distributed in Europe, South Africa, Mauritius, throughout India, Myanmar and Sri Lanka. Genus *Glottula* represents two species viz., *Glottula dominica* Cramer, 1780 and *G. orientalis* Hampson, 1894. *G. dominica* Cramer is reported from continental India, Madhya Pradesh (Indore), Indonesia, Mauritius, South Africa and Sri Lanka (Cotes & Swinhoe, 1886-89; Hampson, 1894).

The perusal of literature reveals that the existence of *Glottula orientalis* Hampson is reported in Nilgiri district of Tamil Nadu alone. Hence, the *G. orientalis* Hampson constitutes a new locality record for Madhya Pradesh and has extended its range of distribution. *G. orientalis* Hampson, a rare species of moth has been observed during the course of study. It is likely that with intensive surveys/explorations the species may be reported from other parts of India.

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Conference

XIV ISSIS Meeting at Catania, Italy
13-16th June, 2016

The XIV International Symposium on Scale Insect (Coccoidea) Studies is announced.

To be held at Dipartimento di Agricoltura, Alimentazione ed Ambiente, June 13th-16th 2016, at Via Santa Sofia, 100, Catania (Italy).

Contact: *l.larosa@meccongress.it*

Organizers: Mec Congress Srl - Via Gorizia 51, Catania, Ct 95128 (Italy).

Website: http://www.issis 2016.org/

Black Pepper Production is Down

India may lose its current Third position

Inclement weather will once again crimp the production of black pepper, one of the top export earning spices of India, in 2015-16. The International Pepper Community (IPC), an inter-governmental organisation of pepper producing countries in the world, has projected the Indian black pepper output to touch 53,000 tonnes, down by 12,000 tonnes from previous year.

Indian black pepper production had dropped to 37,000 tonnes in 2014 before rising to 65,000 tonnes in the current year. With Brazil and Sri Lanka increasing there output in the last three years, India is in danger of losing its current third position behind Vietnam and Indonesia.

The 43rd annual session of IPC that concluded at Mysuru, forecast a surplus output globally for 2016, due to increased production in Vietnam and Sri Lanka. The global pepper production has been pegged at 413,710 tonnes, up by 6,555 tonnes from last year. The output of Vietnam is slated, to rise 10,000 tonnes to 1.4 lakh tonnes. IPC has also projected higher global exports for the year. Pepper exports are expected to touch 312,535 tonnes, an increase of 18,000 tonnes over last year.

"Drought and untimely rains in major pepper growing areas of Kerala and Tamil Nadu are the major reasons for the decline in production. Certain areas in Karnataka also suffered a damage due to pest attack," said Spices Board chairman A. Jayathilak, who is also the current IPC chairman.

According to Jayathilak, the global carry forward stock in 2016 would be lower by around 17,000 tonnes because of higher export and increased consumption. As for India, the carry forword stock for next year will be as low as 2,598 tonnes compared with 9,598 tonnes in the current year.

As a result of lower output, the import projection for India has been scaled up to 11,500 tonnes for 2016 by IPC, an increase of 1,500 tonnes from 2015. India exported 21,450 tonnes of pepper valued at Rs 1,200 crore in 2014-15.

The domestic pepper prices have soared to over Rs 700 per kg at present.

—P. K. Krishnakumar

Views

The State of Indian Science

Creating a better climate for research and inovation is a must for India's development

Vice-President Hamid Ansari has highlighted the dearth of scientific temper in the country. His comments come just as the 2016 Indian Science Congress has drawn many laments on the state of Indian Science. In fact, for the last two years, presentations on topics such as the invention of airships in ancient India have created a disappointing, disturbing image. In a damning indictment, Nobel laureate Venkatraman Ramakrishnan has descibed the Congress as a circus where very little science is discussed.

While it can be argued that the Congress should be open to diverse streams, such openness can't come at the cost of a genuine scientific ethos. As Ansari has observed, intolerance towards attempts to separate belief from scientifically verified facts leads to the occult being dubbed as scientific. Plus, there's empirical evidence to suggest that the roots of Indian Science are worryingly weak. The country is yet to achieve its goal of spending atleast 2% of GDP on scientific research. Around 59% of secondary schools don't have an integrated science laboratory. And according to 2013 figures Indians filed only 17 patents per million population compared to 4.451 in tiny South Korea.

These metrics stand at odds with government policies like Make in India. As pointed out by Nobel winning physicist David Gross, attempts at manufacturing high-end products in India won't yield the desired benefits unless backed by sustained investment in basic science—right from school level to higher education. That not a single Indian institute of higher learning figures in the top 100 ranking of world universities is a poor comment on the quality of education and research in the country. An even greater tragedy is that most Indian students today consider the sciences only as academic streams to high-paying corporate careers. Overall, the science pedagogy is poor and the scientific temper diluted.

The state of Indian science is actually a direct reflection of India's general education woes. Lack of meritocracy in educational institutions shows up in poor research. Focus on producing degree holders kills innovation. Against this backdrop, a framework for audit of scientific departments as suggested by Prime Minister Narendra Modi is just the first step. What's required next is an overhaul of science education to create an environment that encourages research and innovation. Only then can Indian scientists meaningfully contribute towards the development goals of the country.

(Editorial in *The Times of India*).

New Publications

Book Reviews

(1)

The Buffalo Soldiers of North India

HIMALAYA BOUND: AN AMERICAN'S JOURNEY WITH NOMADS IN INDIA, by Michael Benanav. HarperCollins India. 224 pp. Price Rs 339.

India is blessed with a large number of "animal cultures" whose lives revolve around the welfare of their livestock. We are fortunate that this book by Michael Benanav provides an intimate insight into the way of life and situation of one of them. An American photographer and writer with a penchant for nomadic people, Benanav, in 2009, joined an extented Van Gujjar family as they migrate from their winter camp in the Shiwalik Hills to their summer pastures in the Govind National Park in Uttarakhand. It is a deeply personal account that allows you to participate in the enormous hardships and insecurity that these buffalo nomads experience. Their customary grazing circuit puts them into conflict with the Forest Department that does not seem to have clear rules, so that the nomads are not sure by which route they will be able to reach their pastures in the mountains.

As is the rule throughout India, the authorities neither officially prohibit nor grant permission to migrate to, and use the pastures, taking money for grazing fees but without issuing any receipts. For the Van Gujjars, this creates enormous hassle and uncertainity. But move they must because the buffaloes cannot survive the hot summers in the lowlands and have an innate urge to migrate. The Van Gujjar are basically just following them and in order to ensure the welfare of their herds, they tolerate the enormous physical stress and constant exposure to the elements.

But besides the trials and tribulations, there is also joy, as expressed by Jamila, one of the protagonists: "Many people think we are fools for not settling in the villages. But look at what we have! We go with the weather, so now we're heading where the air is cool, where you can get a good night's sleep, when down below it is too hot. We go where there is plenty of water while down below people will be fighting for it. We don't have to deal with mosquitoes or malaria... we believe what is good for our buffaloes is also good for us..."

Especially moving are the passages about the close and intimate relationship between the people and their buffaloes. The Van Gujjar love their animals and look at them as family members —they never eat them and traditionally do not send them for slaughter. This relationship is illustrated beautifully by an inset of spectacular colour photographs, one of them showing four Van Gujjar men carrying a buffalo yearling with a broken leg up the mountain, like a queen on a palanquin. Michael's photographs provide evidence of this human-animal relationship that is in such stark contrast to factory farming and that reminds me of the close relationship between the Raika of Rajasthan and their camels.

Adapting their lives to the needs of their buffaloes, the Van Gujjar, like many other nomadic pastoralist groups in India, manage to produce food in tune with nature and without requiring any of the usual agricultural inputs such as fertilizer, fuel and machinery. It is sad that this is not being recognized by policy makers, and forest officials continue to violently oppose the idea of livestock grazing, even refusing to implement India's Forest Rights Act. Animal husbandry officials, on the other hand, pursue western visions of livestock development that will ultimately lead towards factory farming and lack appreciation of the kind of natural and ecological livestock keeping customarily pursued by India's animal cultures. As nomadic livestock keepers such as the Van Gujjar actually produce a vast proportion of the country's milk and meat, it will undermine national food security if all of them are made to settle.

Himalaya Bound is a travelogue in the real sense , but also much more. It is an important testimony to a way of life— and a way of interacting with animals—that is unfortunately under a lot of pressure not only in India but in many other countries in Asia and Africa. I wish there were many more books like it! Don't miss this unique and immensely readable tale about people at India's margins that do more for animal welfare than anybody else.

—Ilse Kohler-Rollefson

(2)

Women's Guide to Healthcare

JELLY BELLY, EVERY WOMAN'S GUIDE TO GOOD HEALTH AND HAPPINESS, by Aparna Santhanam. Publisher: HarperCollins. Price: Rs 250.

Written by Dr Aparna Santhanam, India's leading dermatologist and wellness expert, the book is every woman's guide to wellness and happiness. The idea is simple: We spend a lot when we fall sick. What if we invest some time and resources now so that we don't fall sick in the first place?

The author shares stories about her friends and patients who go through various medical conditions during different stages of their lives and how they overcome those troubles. From mood swings and hair fall to heart problems and cancer, we get an in-depth analysis of what, why and how it happens.

For instance, belly bulge is a common problem among women these days, but that doesn't mean it's okay to have one. Yes, we must accept and love ourselves for who we are and how we look, but this should not be an excuse to ignore underlying health problems. We all need to know and understand our bodies well. The importance of having a social life, listening to stories of people who have survived serious diseases in the past and sharing your feelings has also been discussed in the book. Go and read this book, for it has the answer to several of your health queries.

—Khushboo Shukla

(3)

Of Mists, Fires and Pekoe

RUNGLI RUNGLIOT, by Rumer Godden, Published by Speaking Tiger, 176 pp. Price Rs. 299.

Rungli Rungliot is a tea apparently christened by a Buddhist monk who was mesmerised by one sip—though that is an advertising spin on the actual story of a lama who halted the flooding Teesta waters with a command. The tea takes its name from the garden where it grows, just below Darjeeling. Some readers might remember that it is now in the hands of the struggling Duncan Goenka Group. Rungli Rungliot is in some senses their flagship garden, the one which houses tea tourists in search of nostalgia.

Rumer Godden spent a year in Rungli Rungliot during World War II. Isolated from the theatre of war and trying to cope with a difficult marriage, she sat secluded in an office or an arbour of lemon trees and wrote, looking out across the tea bushes to a space of clouds and water. She learnt to separate shades of white as the sunlight passed through the rooms of her bungalow or at the red in the girl's hair ribbon, and the mingling of red, pink and brown in her complexion, or a dog's coat that is the colour of autumn marigolds. Starlight in the sky and on the hills during Diwali, briefly glimpsed, the crackle of the logs in the fire, logs brought by the woodcutter employed by her section of the garden—all these sights and sounds are part of her story.

For her it was an almost Zen-like retreat. Chinglam was the furthest of the bungalows in the garden, connected to the manager's house across the valley only by telephone. In the beginning, she had the Swiss governess Giovanna for adult company, but at 26 Giovanna needed to find her own world and Godden sent her away.

Rungli Rungliot is Godden's journal of the time she spent in Chinglam, a quiet life ruled by the passing of the seasons and the changing fruits and flowers. She describes the people she had to interact with in her day-to-day life, the Munshi whose pony she bought, the bread runner whose son was conscripted—one of the 36 people from the garden sent on war duty—the dogs and the night soil and the tea-pickers. In a sense, a collection of Indian miniatures.

Godden's daughters wandered the waterfalls or went to the factory below their cottage and had themselves weighed after the picked leaves had been put away and the pickers paid for the day. Godden describes the withering process, muses over the poetry of names like Flowery Orange Pekoe and talks of the tea year with its two cycles, the pruning and the growing.

She marvels at the fact that the garden was profitable enough to finance a suspension bridge for the Rungjeli section and that, despite the war and the inflation it caused, W, the manager, was forecasting an increased harvest that year. She described him as a benevolent ruler presiding over sports day, distributing cash bonuses and doing all the things that garden managers continue to do.

Occasionally, visitors from the outside would ask her whether she ever went to the 'Club', but Godden never did—she was too busy focusing on her work and achieving wholeness as a writer rather than being a superior 'koi hai'. The bungalow and the garden put a different perspective on life and marked a new period in her writing career.

Many readers may wonder why Godden's book reads like a loose collection of snippets, but she was in actuality writing notes to herself rather than putting together any kind of narrative flow. It records animals, flowers, servants and children.

Originally called *Thus Far and No Further, Rungli Rungliot* was first published in 1961. Ruskin Bond has chosen it as one of his personal favourites because of its sense of place and simplicity of style. Godden captures a cycle of life that some people are lucky enough to experience still.

—Anjana Basu

(4)

Pocket Guide on the British Butterflies

BRITAIN'S BUTTERFLIES: A FIELD GUIDE TO THE BUTTERFLIES OF BRITAIN AND IRELAND, 3rd edition. By David Newland, Robert Still, Andy Swash & David Tomlinson. 2015. 240 pp., Paperback. Price £17.95, $25.95. Published by Princeton University Press, New Jersey (U.S.A.) and Oxfordshire (U.K.). ISBN: 978-0-691-16643-8.

This is a recent updated third edition, which is offered as a fully revised version of a book on British butterflies. Its first edition was published in 2002 and second edition in 2010. This edition has 600+ colour photograhs, 10 line illustrations and 76 maps.

It is a beautifully designed photograhic field guide, where on the left side page are given the description of species, distribution map and other information in short, and on

the opposite right side page, colour photographs, two or three, depicting complete upper and underside of both sexes and the habitat. Hence, by opening a single page the reader gets all desirable information in brief and visual picture of that species.

The left side page information includes species's commom name and present valid scientific name (without author & year), status of abundance, wing-span of both sexes, a small map of Britain & Ireland showing the distribution, a seasonal chart showing month-wise occurrence of adults, eggs, caterpillar (larva) and chrysalis (pupa), and hints on where to look for it. The morphological diagnosis, behaviour, biology+breeding, ecology and notes on food plant are given alongwith.

Photographs on the right hand side page are arranged on stunning colour plates. All have been taken in nature. In some cases various forms and other abberations are shown. Photographs of eggs, caterpillar and chrysalis are included on these plates or given in the last pages. Over 600 colour photographs in all are given.

It is a pocket-sized photo guide, with easy to use format, which will be very useful to the beginners and also in some ways to the experts, to identify any species they may encounter. *BBC Wildlife Magazine* has appreciated the clear text and page design of this book.

The book reports that 1,65,000 species of Lepidoptera are known from all over the world, of which 440 species of butterflies occur in Europe. 81 species have been found to occur in Britain and Ireland, but some are accidental (vagrant), some former resident and some migrant and some are now extinct. This book reports 59 species (only) that breed regularly or are migrant in Britain and/or Ireland. This is conspicuously a small number in comparison to India from where 1,318 species have been reported recently [Varshney & Smetacek (Ed.) 2015. *A Synoptic Catalogue of the Butterflies of India*]. But, unfortunately, we do not have any such good field guide on the Indian butterflies.

In the beginning and end of this book, there are pages filled with several other information related with the British butterflies. It is indeed a beautiful and informative book, published under the 'WILD*Guides* series'.

—R.K. Varshney

HONEY

Here are the ways honey can help your system:

Good for the nerves: Honey replenishes the minerals that are needed for nerve conduction. Its antioxidant property helps regenerate nerves. This ultimately helps to improve the memory.

Good digestive aid: Honey is a mild laxative. When combined with ginger, it becomes an intestinal antibacterial. It is also good for liver problems.

Recipe: Grate ginger. Add it to two glasses of boiling water. Let the water reduce to half. Once off the flame, add a teaspoon of honey, stir and consume warm. Do not boil or heat the honey.

Good for weakness and anaemia: Add dates and pomegranate seeds to honey.

Good for coughs and upper respiratory infections: For dry cough, mix a teaspoon, both of ginger juice and honey, with a pinch of powdered black pepper.

Good for detoxification: Add honey to warm lemon water and consume on an empty stomach early in the morning.

Warning

Honey that is heated, boiled or cooked turns toxic.

Never mix honey with an equal amount of ghee or butter. Ayurveda warns that this combination is highly toxic too.

It shouldn't be given to infants under one year, because their digestive lining and immune system is immature and may be overwhelmed with the bacterial infection carried with honey.

—Shikha Sharma

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