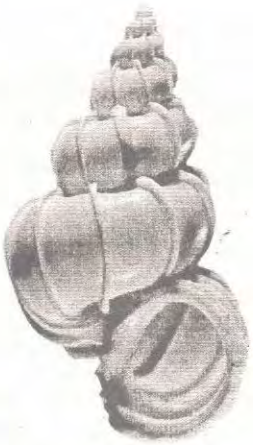

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Vol. 14, No. 3 **July — September, 2012**

INDIA versus U.S.A.

Who will Sell Basmati Rice to Iraq?

Twelve US Congressmen have fired off a letter to Iraq's Trade minister Khair Alla Babaker earlier this year pressing him to get Iraqis back on the American long-grain variety of rice. The letter said there was a 77% drop in rice sales to Iraq between 2010 and 2011, even though "not long ago, Iraq represented the largest market for US rice."

The Iraqi Grain Board has said it decided to buy cheaper basmati rice from India. Baghdad hasn't bought US rice since late 2010.

Iraq's trade ministry has said that much of the shift is a function of the Iraqi public preferring India's Basmati rice, which the US doesn't produce. There is no law keeping the US out of Iraq's rice market, but American farmers simply aren't growing the right kind of rice.

The Iraqi move comes as US farmers struggle with drought, unusual heat, rising production costs, dropping prices and a shrinking export market.

The 12 legislators are from Arkansas, California, Louisiana, Mississippi, Missouri, Texas and Virginia, the largest rice growing states in USA.

A report from Houston, USA, says that the Congress members from these States are on warpath, asking Iraq to resume buying the US long-grain rice, instead of from India. " We liberated their country for one thing", said Texas Congressman Ted Poe. "We would think they would consider the US in trade, since we spent billions of dollars not only to liberate their country, but to rebuild their infrastructure."

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Conserve the Natural Capital

An Interview with Prof. Jonathan Baillie

NARAYANI GANESH

Professor Jonathan Baillie is Director Conservation Programmes, Zoological Society of London, and an expert on species conservation. With the Rio+20 Conference underway, Baillie spoke with Narayani Ganesh on the importance of conserving even the smallest species, quantifying ecological resources—and how the oceans are similar to a huge capital endowment.

Q. Many estimates of species extinction are alarmist—aren't there millions of undiscovered species still?

A. Our understanding of actual extinction rates is not perfect. We know that 20% of mammals are threatened. We're probably looking at one -fifth of all species as being threatened. Ecosystem evaluations so tend to focus on large, charismatic species, not on small creatures that run the world. If we want sustainable agriculture, waste decomposition and oxygen in the atmosphere, it is these small creatures we need to conserve. Even fungi are essential for things like wine and chocolate. But no one considers them because they're less visible. Smaller species, especially invertebrates, seem to have 20% extinction—but we don't know this for sure.

Q. You state the rate of decline in major natural systems is linked to our own survival. Hence, quantification of value versus decline is essential. But can one assign quantifiable value to natural systems undergoing diverse and complex changes?

A. We've come up with ballpark figures to give a fair idea of what this is about. Take the seafood industry—It's worth $200 billion per annum. However, trying to value something like coral reefs is more complicated. It would include marine, cultural and genetic aspects as well as value is shoreline protection and ecotourism. We could try to figure out the relationship between that stock and value...many things cannot be quantified—but many can. The cost of deforestation wordwide could be as high as $4.5 trillion. The value of wetlands has been computed as $70 billion and the value of the seafood industry is $200 billion. This gives us an idea to work out cost-benefit analysis.

We need to measure natural capital, so we don't go beyond safe operating space. There are communities around the world that depend on fish for their primary source of protein. If they manage fisheries sustainably, the fish will continue for hundreds of years. But they're left with nothing because of over-exploitation. These are not just ecosystems therefore but survival ecosystems, especially for the poorest.

Q. Would you argue then that all commercial activity must cease?

A. No. It's about sustainable use. East Africa has very important mangroves. We're also finding oil there. So there's interest in building large harbours to export oil. But mangroves are getting endangered. If we build infrastructure destroying mangroves, fish zones will collapse. Those dependent on fish will suffer. If we go ahead with these initiatives—we did a cost-benefit analysis—then we have to make sure these do not affect natural capital or have minimal effect.

Q. Finally, your research makes a special plea for oceans—why?

A. When oceans become more acidic, there's calcium loss. This affects many species. Oceans also provide food and oxygen and absorb carbon dioxide. If the regulatory mechanism is thrown off-balance with uncontrolled warming, we could face major crisis, If you've been given a million dollars, you can either live off the interest you get on investment or blow up the principal. The ocean is huge capital—are we investing it or are we simply blowing it up?

We need to switch to more sustainable systems where growth may not be very high but will be sustainable.

Arrival of the Modern Man in the New World

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Before the arrival of the modern man (*Homo sapiens*), in the New World there were no hominids in the Americas. It is generally agreed that the modern man reached the North America about 12000 years back by crossing the Bering Strait between the easternmost part of Siberia and Alaska (Martin, 1973; Anonymous, 2009). The first humans or the paleohumans, moving into North America, reached Alaska after the last Pleistocene glaciation, which happened 15000 to 17000 years back. The first Americans came, by crossing the Bering Strait, in two separate migrations (Anonymous, *loc. cit.*).

The arrival of the first Americans has been inferred through study of the remains of the slain megafauna, such as mammoths, mastodons, ground sloths, horses, and camels, which got killed in large numbers, as they had no earlier exposure to human predators, unlike the megafauna of the Old World, where the animals had evolved defensive behaviour against human hunters (Martin, 1973).

Balter (2012) has confirmed that the earliest arriving humans or Paleo-Americans entered the Alaskan part of North America as two separate migrations. Those "kayak paddling" humans used the long chain of islands (about 2000 kms. long), of the Aleutian Archipelago, as 'stepping stones' to travel from Siberia to Alaska in Bering Sea (Fig. 1). The first migrating humans or the Paleo-Aleuts were more like Europeans than Siberians, perhaps because they were descendents of Europeans, who had migrated and settled in Siberia.

The first Americans, using the Aleutian Archipelago for their migration, have been referred to as Aleuts. The earlier maigrated Aleuts, or the Paleo-Aleuts, and the later migrated ones, or the Neo-Aleuts differed anatomically. The Paleo-Aleuts had high and narrow skull (dolichocranic), and the Neo-Aleuts had wider and rounded (brachycranic) skull. Recent molecular studies have shown that paleo- and neo-Aleuts differed genetically too (Balter, *loc. cit.*). They were also culturally different.

Descendents of the Aleuts still live in Adak and other islands of the Aleutian Archipelago, and they have their own life-style and customs. As Anonymous (2009) has pointed out, ".... first Americans later gave rise to almost all modern Native American groups of North, Central, and South America". As per this view the Red Indian natives of the Americas have been descendents of the first Americans.

Most of the present human populations in the New World have resulted from immigrations, mostly from Europe, soon after the discovery of America by Columbus in 1492.

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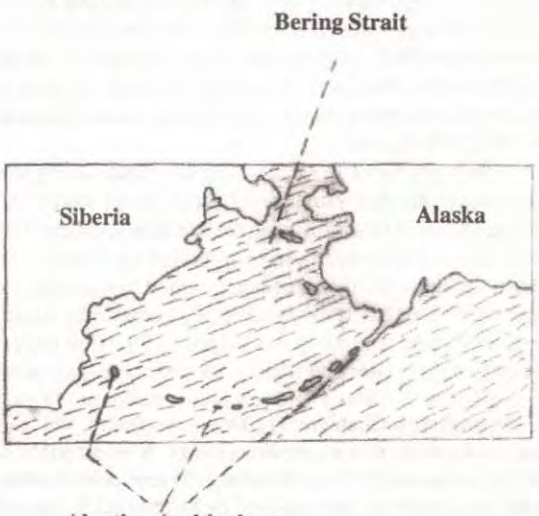

Fig. 1. - The Bering Strait with the Aleutian Archipelago (after Balter, 2012).

Butterfly Fauna of the Sanjay Gandhi National Park and Mumbai

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Introduction

Sanjay Gandhi National Park (SGNP), Mumbai (19° 18' 35" N, 72° 57' 48" E) is located in the middle of metropolitan Mumbai city, which is considered to be one of the most populated cities in the world.

The forest in SGNP is Tropical Dry Deciduous or the Southern Dry Deciduous, and is dominated by Teak *Tectona grandis*, and Bamboo *Dendrocalamus strictus*. It is located in the Sahyadri Range in the northern part of the Western Ghats. Part of it is in the adjoining district of Thane. A small portion of the Park, on the banks of the Vasai Creek is at sea level and has mangrove patches and other characteristics of a typical coastal estuarine zone. The author compiled a checklist of the butterfly fauna in SGNP, Mumbai.

Materials and Methods

Butterflies were observed opportunistically throughout the year from April 2010 to March 2012 in two representative areas of the SGNP, viz., Yeoor range which is the Thane side of the National Park and at Ovalekar Wadi Butterfly Garden which is located at the fringe of the National Park in a small village called Ovala, on the Ghodbunder Road. Some observations were taken in Borivali side of the SGNP, Mahim Nature Park, and few other areas in Mumbai outside SGNP. But the abundance given is of the trails in the two areas mentioned above, namely, Yeoor range and at Ovalekar Wadi Butterfly Garden.

Photography of the butterflies was done during the study period. No specimen was collected for this study. The photographs were identified using the available literature. The paper also includes those species reported by Patwardhan (2010) and those which were photographed by other fellow nature enthusiasts. The availability of photography equipment with many naturalists has helped up in better understanding of the occurrence of many species in the study area. A checklist of SGNP and Mumbai region enlisting 138 species by Sharma & Chaturvedi (2006) was referred, which in turn was based on various previous works. A recent publication by Rodrigues (2012) has described 153 species in Mumbai. Some species which were reported by Sharma & Chaturvedi (2006) but not found during the author's study period are marked by an asterisk and the abundance is mentioned as very rare.

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

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

Results and Discussion

A comprehensive checklist of total of 172 species of butterflies was prepared after survey in the study area during the period of two years (2010-2012). The family wise abundance of the total species found to occur in the study area is—Papilionidae: 12 species, Pieridae: 22 species, Lycaenidae: 59 species, Nymphalidae: 45 species and Hesperiidae: 34 species (see Table 1). Gaonkar (1996) had reported 208 species (present study SGNP-172, Gujarat-158) in the entire Western Ghats stretch of Maharashtra.

Thus, the diversity of butterflies in SGNP and Mumbai is far less than he has reported, obviously due to the fact that his list includes the species which are found in the southern Maharashtra also which is far down south compared to the location of the study area and has higher butterfly diversity. This goes in accordance with his finding that the diversity of butterflies decreases from south towards north, i.e., Kerala (314 species), Karnataka (316 species), Tamil Nadu (316 species), Goa (249 species), Maharashtra (208 species) and is the lowest in Gujarat (158 species) (Gaonkar, 1996).

The author hereby reports occurrence of Dark Blue Tiger *Tirumala septentrionis* which can be considered as a range extension in SGNP and in Mumbai area. It was found on many occasions both in Yeoor range and in Ovalekar Wadi Butterfly Garden. Dark Blue Tiger is mentioned as "is found in Peninsular India upto southern Maharashtra (Kehimkar, 2008)". Dull Babul Blue *Azanus uranus* was found in March 2012 near Thane, which was not reported in this area earlier. Dark Pierrot *Tarucus ananda* and Abnormal Silverline *Cigaritis abnormis* were found only once each in the Yeoor Range both on 18 March 2012. These are probably

the first records of these species in Mumbai. Dark Pierrot is seen upto Phansad Wildlife Sanctuary in Raigadh district, Maharashtra (pers. comm., Mr. Isaac Kehimkar and Mr. Nikhil Bhopale).

Acknowledgements: Thanks to Mr. Isaac Kehimkar, Dr. Amol Patwardhan and Mr. Monsoon Jyoti Gogoi for help in identification of the butterfly species by photos. Thanks to Mr. Nikhil Bhopale for sharing his observations on some species.

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Table 1. Checklist of butterflies found in SGNP, Mumbai and their abundance.

	Family	Common Name	Scientific Name	Abundance
1	Papilionidae	Spot Swordtail	*Pathysa nomius* (Esper, 1798)	C
2		Common Jay	*Graphium doson* (C. & R. Felder, 1864)	C
3		Tailed Jay	*Graphium agamemnon* (Linnaeus, 1758)	A
4		Common Bluebottle	*Graphium sarpedon* (Linnaeus, 1758)	C
5		Common Mime	*Chilasa clytia* Linnaeus 1758	U
6		Lime Butterfly	*Papilio demoleus* (Linnaeus, 1758)	A
7		Blue Mormon	*Papilio polymnestor* (Cramer, 1775)	C
8		Common Rose	*Pachliopta aristolochiae* (Fabricius, 1775)	A
9		Crimson Rose	*Pachliopta hector* (Linnaeus, 1758)	C
10		Southern Birdwing	*Troides minos* Cramer, 1779	VR*
11		Common Mormon	*Papilio polytes* (Linnaeus, 1758)	A
12		Red Helen	*Papilio helenus* Linnaeus, 1758	VR
1	Pieridae	Common Gull	*Cepora nerissa* Fabricius, 1775	A
2		Lesser Gull	*Cepora nadina* (Lucas, 1852)	VR*
3		White OrangeTip	*Ixias marianne* Cramer, 1779	C
4		Yellow OrangeTip	*Ixias pyrene* Linnaeus, 1764	A
5		Great OrangeTip	*Hebomoia glaucippe* Linnaeus, 1758	C
6		Small OrangeTip	*Colotis etrida* (Boisduval, 1836)	VR*
7		Plain OrangeTip	*Colotis eucharis* (Fabricius, 1775)	VR*
8		Common Jezebel	*Delias eucharis* Drury, 1773	A
9		Chocolate Albatross	*Appias lyncida* Boisduval, 1836	VR
10		Striped Albatross	*Appias libythea* (Fabricius, 1775)	VR
11		Common Albatross	*Appias albina* (Boisduval, 1836)	VR*
12		Plain Puffin	*Appias indra* (Moore, 1857)	VR*
13		Psyche	*Leptosia nina* Fabricius, 1793	C
14		Common Wanderer	*Pareronia valeria* (Cramer, 1776)	C
15		Common Emigrant	*Catopsilia pomona* Fabricius, 1775	A
16		Mottled Emigrant	*Catopsilia pyranthe* Latreille, 1758	C
17		Spotless Grass Yellow	*Eurema laeta* Boisduval, 1836	C
18		Common Grass Yellow	*Eurema hecabe* Linnaeus, 1758	A

19		Small Grass Yellow	*Eurema brigitta* (Stoll, 1780)	U
20		Three Spot Grass Yellow	*Eurema blanda* Boisduval, 1836	VR*
21		Small Salmon Arab	*Colotis amata* (Fabricius, 1775)	U
22		Pioneer	*Belenois aurota* (Fabricius, 1793)	U
1	Nymphalidae	Glassy Tiger	*Parantica aglea* (Stoll, 1782)	C
2		Dark Blue Tiger	*Tirumala septentrionis* (Butler, 1784)	C
3		Blue Tiger	*Tirumala limniace* Cramer, 1775	A
4		Plain Tiger	*Danaus chrysippus* Linnaeus, 1758	A
5		Common or Striped Tiger	*Danaus genutia* Cramer, 1779	A
6		Brown King Crow	*Euploea klugii* Moore, 1857	C
7		Common Indian Crow	*Euploea core* (Cramer, 1780)	A
8		Double Branded Crow	*Euploea sylvester* Fabricius, 1793	VR*
9		Common Bushbrown	*Mycalesis perseus* (Fabricius, 1775)	A
10		Dark-brand Bushbrown	*Mycalesis mineus* Linnaeus, 1758	U
11		Long-brand Bushbrown	*Mycalesis visala* Moore, 1857	C
12		Common Palmfly	*Elymnias hypermnestra* (Linnaeus, 1763)	U
13		Common Leopard	*Phalanta phalantha* Drury, 1773	C
14		Tawny Coster	*Acraea violae* (Linnaeus, 1758)	C
15		Commander	*Moduza procris* (Cramer, 1777)	C
16		Common Sailer	*Neptis hylas* Linnaeus, 1758	A
17		Short-banded Sailer	*Phaedyma columella* (Cramer, 1780)	C
18		Chestnut-Streaked Sailer	*Neptis jumbah* Moore, 1857	C
19		Common Sergeant	*Athyma perius* Linnaeus, 1758	VR*
20		Common Baron	*Euthalia aconthea* (Cramer, 1777)	A
21		Gaudy Baron	*Euthalia lubentina* (Cramer, 1777)	U
22		Baronet	*Euthalia nais* (Forster, 1771)	U
23		Common Castor	*Ariadne merione* (Cramer, 1777)	C
24		Angled Castor	*Ariadne ariadne* Linnaeus, 1763	C
25		Painted Lady	*Vanessa cardui* (Linnaeus, 1758)	U
26		Gray Pansy	*Junonia atlites* (Linnaeus, 1763)	C
27		Peacock Pansy	*Junonia almana* (Linnaeus, 1758)	A
28		Yellow Pansy	*Junonia hierta* (Fabricius, 1798)	C
29		Chocolate Pansy	*Junonia iphita* (Cramer, 1779)	A
30		Lemon Pansy	*Junonia lemonias* (Linnaeus, 1758)	A
31		Blue Pansy	*Junonia orithya* (Linnaeus, 1758)	U
32		Great Eggfly	*Hypolimnas bolina* (Linnaeus, 1758)	C
33		Danaid Eggfly	*Hypolimnas misippus* (Linnaeus, 1764)	C
34		Blue Oakleaf	*Kallima horsfieldi* Kollar, 1844	C
35		Black Rajah	*Charaxes solon* (Fabricius, 1793)	C
36		Tawny Rajah	*Charaxes bernardus* (Fabricius, 1793)	VR
37		Common Fivering	*Ypthima baldus* (Fabricius, 1775)	VR
38		Common Fourring	*Ypthima huebneri* Kirby, 1871	VR*
39		Common Evening Brown	*Melanitis leda* (Linnaeus, 1758)	C
40		Dark Evening Brown	*Melanitis phedima* (Cramer, 1780)	U
41		Bamboo Treebrown	*Lethe europa* (Fabricius, 1787)	U
42		Common Treebrown	*Lethe rohria* (Fabricius, 1787)	VR*
43		Common Nawab	*Polyura athamas* (Drury, 1773)	U

44		Anomalous Nawab	*Polyura agraria* Swinhoe, 1887	U
45		Indian Purple Emperor	*Apatura ambica* Kollar, 1844	VR*?
1	Lycaenidae	Apefly	*Spalgis epius* (Westwood, 1851)	VR*
2		Plum Judy	*Abisara echerius* (Moore, 1901)	A
3		Red Pierrot	*Talicada nyseus* Guérin, 1843	U
4		Common Pierrot	*Castalius rosimon* Fabricius, 1775	A
5		Angled Pierrot	*Caleta caleta* Hewitson, 1876	U
6		Rounded Pierrot	*Tarucus nara* Kollar, 1848	C
7		Dark Pierrot	*Tarucus ananda* (De Nicéville, 1884)	VR
8		Malayan	*Megisba malaya thwaitesi* (Horsfield, 1828)	C
9		Plain Hedge Blue	*Celastrina lavendularis* (Moore, 1877)	VR*
10		Common Hedge Blue	*Acytolepis puspa* (Horsfield, 1828)	U
11		Lime Blue	*Chilades laius* (Cramer, 1782)	U
12		Plains Cupid	*Chilades pandava* (Horsfield, 1829)	C
13		Indian Cupid	*Everes lacturnus* (Godart, 1824)	U
14		Dark Grass Blue	*Zizeeria karsandra* (Moore, 1865)	U
15		Pale Grass Blue	*Pseudozizeeria maha* (Kollar, 1848)	VR*
16		Lesser Grass Blue	*Zizina otis* (Fabricius, 1787)	U
17		Tiny Grass Blue	*Zizula hylax* (Fabricius, 1775)	C
18		Grass Jewel	*Freyeria trochylus* (Freyer, 1845)	A
19		Gram Blue	*Euchrysops cnejus* (Fabricius, 1798)	U
20		Pointed Ciliate Blue	*Anthene lycaenina* (C. & R. Felder, 1868)	U
21		Forget-me-not	*Catochrysops strabo* (Fabricius, 1793)	A
22		Pea Blue	*Lampides boeticus* (Linnaeus, 1767)	C
23		Dark Cerulean	*Jamides bochus* Stoll, 1782	C
24		Common Cerulean	*Jamides celeno* (Cramer, 1775)	C
25		Transparent 6-Lineblue	*Nacaduba kurava* (Moore, 1858)	VR*
26		Opaque 6-Lineblue	*Nacaduba beroe* (Felder & Felder, 1865)	R
27		Common Lineblue	*Prosotas nora* (Felder, 1860)	C
28		Tailless Lineblue	*Prosotas dubiosa* (Semper, 1879)	C
29		White-tipped Lineblue	*Prosotas noreia* Felder, 1868	VR
30		Dingy Lineblue	*Petrelaea dana* (de Niceville, 1884)	R
31		Indian Sunbeam	*Curetis thetis* (Drury, 1773)	VR
32		Toothed or Angled Sunbeam	*Curetis dentata* Moore, 1879	U
33		Silverstreak Blue	*Iraota timoleon* Stoll, 1790	VR
34		Leaf Blue	*Amblypodia anita* Hewitson, 1862	U
35		Large Oakblue	*Arhopala amantes* (Hewitson, 1862)	U
36		Western Centaur Oakblue	*Arhopala pseudocentaurus* (Doubleday, 1847)	VR*
37		Common Acacia Blue	*Surendra quercetorum* Moore, 1858	VR
38		Yamfly	*Loxura atymnus* (Cramer, 1782)	R
39		Monkey Puzzle	*Rathinda amor* (Fabricius, 1775)	VR*
40		Common Silverline	*Spindasis vulcanus* (Fabricius, 1775)	R
41		Long-banded Silverline	*Spindasis lohita* (Horsfield, 1829)	R
42		Common Shot Silverline	*Spindasis ictis* Hewitson, 1865	R
43		Abnormal Silverline	*Cigaritis abnormis* Moore, 1884	VR
44		Redspot	*Zesius chrysomallus* Hubner, 1819	VR
45		Tufted White Royal	*Pratapa deva* Moore, 1857	VR

46		Peacock Royal	*Tajuria cippus* (Fabricius, 1798)	R
47		Plains Royal	*Tajuria jehana* Moore, 1883	VR*
48		Orchid Tit	*Chliaria othona* (Hewitson, 1865)	VR*
49		Cornelian	*Deudorix epijarbas* (Moore, 1875)	VR
50		Common Guava Blue	*Virachola isocrates* Fabricius, 1793	R
51		Large Guava Blue	*Virachola perse* Hewitson, 1863	VR*
52		Slate Flash	*Rapala schistacea* (Moore, 1879)	U
53		Indian Red Flash	*Rapala iarbus* (Fabricius, 1787)	U
54		Indigo Flash	*Rapala varuna* Horsfield, 1829	VR*
55		Common Tinsel	*Catapaecilma major* (Druce, 1895)	VR
56		African Babul Blue	*Azanus jesous* (Guérin-Méneville, 1849)	U
57		Bright Babul Blue	*Azanus ubaldus* (Stoll, 1782)	U
58		Dull Babul Blue	*Azanus uranus* Butler, 1886	VR
59		Zebra Blue	*Leptotus plinius* (Fabricius, 1793)	A
1	Hesperiidae	Brown Awl	*Badamia exclamationis* (Fabricius, 1775)	C
2		Orange Awlet	*Bibasis jaina* (Moore, 1865)	VR
3		Orange-tail Awl	*Bibasis sena* (Moore, 1865)	R
4		Common Awl	*Hasora badra* (Moore, 1857)	U
5		Common Banded Awl	*Hasora chromus* (Cramer, 1780)	U
6		Plain Banded Awl	*Hasora vitta* (Butler, 1870)	U
7		Bevan's Swift	*Pseudoborbo bevani* (Moore, 1878)	U
8		Rice Swift	*Borbo cinnara* (Wallace, 1866)	C
9		Blank Swift	*Caltoris kumara* (Moore, 1878)	VR*
10		Straight Swift	*Parnara guttatus* (Bremer & Grey, 1852)	U
11		Conjoined Swift	*Pelopidas conjuncta* (Herrich-Schäffer, 1869)	U
12		Small Branded Swift	*Pelopidas mathias* (Fabricius, 1798)	U
13		Indian Skipper	*Spialia galba* (Fabricius, 1793)	U
14		Chestnut Bob	*Iambrix salsala* (Moore, 1865)	U
15		Vindhyan Bob	*Arnetta vindhiana* (Moore, 1883)	U
16		Indian Palm Bob	*Suastus gremius* (Fabricius, 1798)	U
17		Dark Palm Dart	*Telicota ancilla* (Herrich-Schäffer, 1869)	U
18		Pale Palm Dart	*Telicota colon* (Fabricius, 1775)	R
19		Angled Flat or Black Angle	*Tapena twaithesi* (Moore, 1881)	U
20		Golden Angle	*Caprona ransonnetti* (Felder, 1868)	U
21		Moore's Ace	*Halpe porus* Mabille, 1876	VR
22		Tamil Grass Dart	*Taractrocera ceramas* (Hewitson, 1868)	VR*
23		Common Grass Dart	*Taractrocera maevius* (Fabricius, 1793)	VR*
24		Himalayan Dart	*Potanthus dara* Kollar	VR*
25		Common Dart	*Potanthus pseudomaessa* Moore	VR*
26		Malabar Spotted Flat	*Celaenorrhinus ambareesa* (Moore, 1865)	R
27		Common Spotted Flat	*Celaenorrhinus leucocera* (Kollar, 1848)	C
28		Tricoloured Pied Flat	*Coladenia indrani* (Moore, 1865)	U
29		Common Small Flat	*Sarangesa dasahara* (Moore, 1865)	A
30		Spotted Small Flat	*Sarangesa purendra* (Moore, 1882)	A
31		Fulvous Pied Flat	*Pseudocoladenia dan* Fabricius, 1787	VR*
32		Common Redeye	*Matapa aria* (Moore, 1865)	U
33		Giant Redeye	*Gangara thyrsis* (Fabricius, 1775)	VR*
34		Grass Demon	*Udaspes folus* (Cramer, 1775)	U

A Survey of the Health of Pesticide-handling Farmers in rural Bihar

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Pesticide is a general term for substances, which are used to poison pests (weeds, insects, moulds, rodents etc.). Insecticides and rodenticides are the pesticides most dangerous to humans. Synthetic pesticides have been popular with farmers, because of their widespread availability, simplicity in application, efficacy and economic returns, but they also have huge effect on environmental conditions. Organo-chlorine insecticides are potentially toxic, highly persistent and resistant to biodegradation and they get readily accumulate in human body tissues, causing a variety of health hazards. Epidemiological studies performed during the last decade, for instance, have given conflicting results concerning a possible relation between exposure to OCPs and increased risk of breast cancer, a known estrogen-responsive neoplasia (Hoyer et al., 1998). Organochlorine insecticide residues, especially DDT and HCH have been detected in man and his environment (Banerjee et al., 1997). Organochlorine insecticides like DDT and BHC (HCH) were extensively used in Indian agriculture and public health enterprises in controlling a number of diseases, such as malaria and typhus. High levels of DDT and HCH have been reported in human blood, fat and milk sample in India (Chatterjee et al., 1980). This leads to a multitude of health problems like hypertension, elevated serum cholesterol, abnormal EEG or impairment of neuromuscular function, stimulation of drug and steroid metabolism. After India's Green Revolution started, the consumption of pesticides in India has increased several hundred folds, from 154 MT in 1954 to 88,000 MT in 2000-2001. In a multicentric study to assess the pesticide residues in selected food commodities collected from different states of our country, DDT residues Dichlorodiphenyl dichloroethylene (p,p-DDE) was found in 82% of the study sample of bovine milk, collected from 12 states (Toteja et al., 1993). A survey was conducted in Bihar to find out pesticide contamination including poly-chlorine biphenyles (PCBs) in the agricultural sprayers and its impact on their health.

Survey Area

The study targeted the agricultural area of Bihar state. All localities were selected on the basis of pesticide consumption and its use on related crop. 8 districts covering 28 villages were altogather selected. The crops grown in these areas include rice, wheat, pulses, fruits (mango), sugarcane, cotton, tobacco and some vegetables (brinjal, cauliflower, tomato, potato etc.).

Data Collection

The purpose of the survey was to identify consumption areas of harmful pesticides. All the agriculture workers selected from these areas had more than two years spraying experience. The interview questionnaire was designed to elicit details on plantation where the farmer is currently working, exposure to pesticides, precautions taken, the source of information, signs and sympotoms of illness related to pesticides exposure, technique used for pesticide spraying etc. Some signs like, tremors, skin lesions, wheezing etc, which were sometimes chronic, were found at the time of interview. Being a cross-sectional survey, details on symptoms were collected as reported by the farmers. Data collected was only with reference to the period of pesticide spraying by them.

Table 1. Particulars about the sample farmer population surveyed.

Age Group	No. of Sprayers		Total
	Male	Female	(N=69)t
20-30	06	00	06
30-40	27	03	30
40-50	18	02	20
50-60	04	02	06
60-70	06	01	07
Average=32.68	n=61	n=08	N=69

Table 2. Symptoms of illness among surveyed population (as %).

Symptoms	Sprayers (Male) (N=61)	Sprayers (Female) (N=08)	Overall (N=69)t
Excessive sweating	27.86%	25.00%	27.53%
Burning / stinging / itching eyes	33.33%	50.00%	39.13%
Numbness/ muscle weakness / muscle cramps	21.31%	37.50%	23.18%
Blurred vision	27.86%	50.00%	27.53%
Chest pain / burning feeling	42.62%	62.25%	44.92%
Shortness of breath / cough	45.90%	25.00%	43.47%
Nausea / vomiting	52.45%	75.00%	55.07%
Stomach pain / cramps / diarrhoea	44.26%	12.50%	40.57%

Total 69 agriculture workers were selected for this survey. It was decided that for the convenience of farmers, interview should be taken in the field (fore noon hours). 28 rural areas were randomly chosen for conducting the survey. The farmers were informed about the purpose of the study and their verbal consent obtained before proceeding with the interview. Each interview took about 45-60 minutes. Observations were made in the cultivated areas and technique applied where pesticides were used. The survey was carried out during the period 6th Nov. 2009 to 10th Dec. 2009.The completed questionnaire sheets were collected at the end of each day, checked, coded and stored for analysis.

Results and Discussion

The primary exposure status to pesticides was ascertained based on the pesticide-spraying farmers. Majority of sprayers were men (61, 88.4%). The average age of farmers was 32.68 years (Table 1). 23.5% of farmers received no formal schooling. These agriculture workers were involved in the cultivation of different agricultural products. Farmers (90%) reported that heavy pesticides were used in vegetable sector such as brinjal, tomato and ladies finger.

69 sprayers were interviewed using pre-tested interview questionnaire during a cross-sectional survey. More than 75% farmers sprayed themselves and therefore were directly exposed to pesticides. More than 75% of farmers used either "moderately" or "highly hazardous" pesticides. 88% did not use any form of protection, while handling pesticides. About 50% of sprayers mixed different brands of pesticides, many of which were substitutable to each other. 56% of farmers obtained information on pesticides from retail shop owners. Farmers reported the following acute symptoms: "excessive sweating" (27.53%), "burning/ stinging/ itching of eyes" (39.13%), Chest pain / burning feeling (44.92%), Stomach pain / cramps / diarrhoea (40.57%). (Table 2). Some symptoms like Chest pain/burning felling, Nausea/ vomiting, Blurred vision, Burning/ Stinging/ itching eyes etc, have higher frequency in female-sprsyers than male sprayers. But some other sympotoms like Excessive sweating, Stomach pain/ cramps/ diarrhea, Shortness of breath/ cough etc, have higher frequency in male-sprayers. 52 sprayers (75.36%) reported that they took no precaution while handling and spraying pesticides. 37 (53.62%) farmers made a cocktail of different kinds of pesticides before spraying. "Kutchi" (common name) is harmful technique used by some farmers spraying mainly in vegetable crops. It is made by straw of paddy. The risk of contamination is very high.

Supporting previous studies, it is confirmed that pesticides have harmful effect on the health of pesticide-sprayers and their families. There is need for creating more awareness among the farmers and authorities in enforcing and ensuring the use of protective gear while handling pesticides.

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Observation of New Variations on Wings and Palpi of Two Species of *Anopheles* Mosquitoes from North-West India

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Studies have been conducted on the wings and palpi of two species of genus *Anopheles* viz., *Anopheles (Anopheles) lindesayi* Giles and *Anopheles (Anopheles) peditaeniatus* (Leicester) to observe variations. As many as 6 types of variations have been observed on wings and palpi for the first time. These variations have been discussed and illustrated in this paper.

Studies on morphological variations on palpi and wings of Anophelines have been studied by number of workers like Christophers (1933); Nagpal & Sharma (1995); Kirti & Kaur (2000, 2004 and 2004a); Kirti et al. (2011). However, no worker recorded variations on palpi and wings of *Anopheles (A.) lindesayi* Giles and *A. (A.) peditaeniatus* (Leicester). Six types of variations are reported in the above species for the first time. Identification were done using the keys of Christophers (1933), Puri (1954), Wattal & Kalra (1961) and Nagpal & Sharma (1995). Comparison was also made with the identified collection of National Institute of Communicable Diseases, New Delhi.

14 specimens of *Anopheles (A.) lindesayi* and 90 specimens of *A. (A.) peditaeniatus* were collected from different localities of northwest India, during 1997-2000. Six types of morphological variations in banding pattern and size of band on palpi and ornamentation of wings were recorded and out of these variations, two on wings of *A. lindesayi* and two each on wings and palpi of *A. peditaeniatus* are reported for the first time in this communication (Tables 1, 2).

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Table 1. Morphological variations on wings of *Anopheles (Anopheles) lindesayi* .

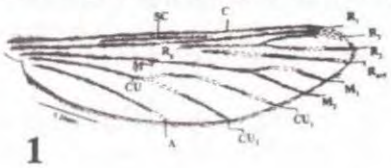
Variations No.	No. of Specimens	Collection date and Site	Variations observed
1	4	27.vi.1999, Layuaghat, Kalka	Tips of M_1, M_2 and Cu_2 pale. (Fig. 2)
2	3	14.iv.1999, Baddi Khajjiar, Chamba	Tips of R_3 and M_2 pale (Fig. 3)

* Normal wing is shown in Fig. 1.

Table 2. Morphological variations on wings and palpi of *Anopheles (Anopheles) peditaeniatus.*

Variations No.	No. of Specimens	Collection date and Site	Variations observed
		—Variations on wings—	
1	10	3.ix.1997, Patiala	Cu_1 lacking middle dark spot (Fig. 5)
2	4	8.xi.1998, Patiala	Distal half of anal vein dark. (Fig. 6)
		—Variations on palpi—	
3	13	21.ix.1997, Patiala	Basal and median dark area bearing white scales in middle; apical 1/3 of palpi totally white. (Fig. 8)
4	10	3.ix.1997, Patiala	Basal dark area totally covered with white scales; preapical dark area lacking. (Fig. 9)

* Normal wing is shown in Fig. 4 and normal palpi is shown in Fig. 7.



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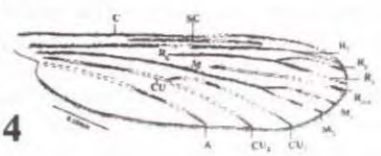

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7 8 9

Fig. 1-3. *Anopheles (A.) lindeseyi* : 1. Normal wing; 2 and 3. Wings showing variations.

Fig. 4-6. *Anopheles (A.) peditaeniatus* : 4. Normal wing; 5 and 6. Wings showing variations.

Fig. 7-9. *Anopheles (A.) peditaeniatus* : 7. Normal palpi; 8 and 9. Palpi showing variations.

Abbreviations : A: Anal vein, C: Costa, Cu : Cubitus, Cu1 : Cubitus-one, Cu2 : Cubitus-two, M: Media, M1 : Media-one, M2: Media-two, R1: Radius-one, R2: Radius-two, R3 : Radius-three, R4+5 : Radius four-plus-five, Rs : Radial sector, SC: Subcosta.

Subspecies Catalogue of the Butterflies of India (Hesperiidae)

A Synopsis

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(Contd. from Vol. 14, No. 2, p. 57)

(35) Genus ***Cyrina*** Hemming

84. *Cyrina cyrina* (Hewitson)

i. *C. c. cyrina* (Hewitson)- Assam, Sikkim, West Bengal (Darjiling).

(36) Genus ***Erionota*** Mabille

85. *Erionota acroleucus* Wood-Mason & De Niceville

i. *E. a. acroleucus* Wood-Mason & De Niceville- Andaman & Nicobar Islands (Andamans, Nicobars), Karnataka (Kolar), 'South India'.

ii. *E. a. apex* Semper - Assam, Sikkim.

86. *Erionota thrax* (Linnaeus)

i. *E. t. thrax* (Linnaeus)-Assam, Sikkim.

(37) Genus ***Gangara*** Moore

87. *Gangara lebadea* (Hewitson)

i. *G. l. andamanica* Wood-Mason & De Niceville- Andaman & Nicobar Islands (Andamans).

ii. *G. l. lebadea* (Hewitson) - Assam, Sikkim.

88. *Gangara thyrsis* (Fabricius)

i. *G. t. thyrsis* (Fabricius) - Andaman & Nicobar Islands (Andamans), Assam, Delhi, 'North-West India', H. P. (Kangra), Sikkim, South India, West Bengal (Kolkata).

(38) Genus ***Halpe*** Moore

89. *Halpe homolea* Hewitson

i. *H. h. aucma* Swinhoe - Manipur, Meghalaya (Khasi Hills, Shillong), Nagaland (Naga Hills).

ii. *H. h. filda* Evans - Sikkim.

iii. *H. h. hindu* Evans - Karnataka (North Kanara), Kerala (Travancore), 'South India', Tamil Nadu (Nilgiris).

iv. *H. h. molta* Evans - Sikkim.

v. *H. h. perfossa* South - Arunachal Pradesh (Mishmi Hills).

90. *Halpe zema* (Hewitson)

i. *H. z. zema* (Hewitson) - Assam, Sikkim.

91. *Halpe zola* Evans

i. *H. z. zola* Evans - Manipur.

(39) Genus ***Hesperia*** Fabricius

92. *Hesperia comma* Linnaeus

i. *H. c. dimila* Moore - H.P. (Lahoul), J. & K. (Ladak), Uttarakhand (Garhwal - Nilang Pass).

(40) Genus ***Hyarotis*** Moore

93. *Hyarotis adrastus* Stoll

i. *H. a. praba* (Moore) - Andaman & Nicobar Islands (Andamans), Assam, 'Bengal', H. P. (Kangra), 'North-West Himalaya', Sikkim, South India, Uttarakhand.

94. *Hyarotis microstictum* Wood-Mason & De Niceville

i. *H. m. coorga* Evans - Karnataka (Coorg, Sati River).

ii. *H. m. microstictum* Wood-Mason & De Niceville - Assam (Cachar).

(41) Genus ***Iambrix*** Watson

95. *Iambrix salsala* (Moore)

i. *I. s. luteipalpis* Ploetz - South India.

ii. *I. s. salsala* (Moore) - Assam, 'Bengal', Sikkim, Uttarakhand.

(42) Genus ***Iton*** De Niceville

96. *Iton semamora* (Moore)

i. *I. s . semamora* (Moore) - 'Bengal', Sikkim.

(43) Genus ***Koruthaialos*** Watson

97. *Koruthaialos rubecula* Ploetz

i. *K. r. cachara* Evans - Assam (Cachar), Manipur, Meghalaya (Khasi Hills), Nagaland (Naga Hills).

98. *Koruthaialos sindu* Felder

i. *K. s. monda* Evans - Assam, Manipur, Nagaland (Naga Hills).

(44) Genus ***Lotongus*** Distant

99. *Lotongus sarala* (De Niceville)

i. *L. s. sarala* De Niceville - Assam, Meghalaya (Khasi Hills).

(45) Genus *Notocrypta* De Niceville

100. *Notocrypta curvifascia* (Felder)

i. *N. c. curvifascia* (Felder) - Andaman & Nicobar Islands (Andamans), Assam, South India.

101. *Notocrypta feisthamelii* Boisduval

i. *N. f. alysos* (Moore) - Assam, 'Bengal', 'North-West Himalaya,' H. P. (Kangra, Shimla), Sikkim.

102. *Notocrypta paralysos* Wood-Mason & De Niceville

i. *N. p. asawa* Fruhstorfer - Assam, Sikkim.

ii. *N. p. mangla* Evans - Karnataka (North Kanara).

iii. *N. p. paralysos* Wood-Mason & De Niceville- Andaman & Nicobar Islands (South Andamans,

Nicobars).

(46) Genus ***Ochlodes*** Scudder

103. *Ochlodes siva* (Moore)

i. *O. s. siva* (Moore) - Assam, Meghalaya (Khasi Hills), Sikkim, Uttarakhand (Mussoorie).

104. *Ochlodes subhyalina* Bremer & Grey

i. *O. s. pasca* Evans - Assam, Meghalaya (Khasi Hills), Sikkim.

(47) Genus ***Ochus*** De Niceville

105. *Ochus subvittatus* (Moore)

i. *O. s. subradiatus* (Moore) - Assam, Sikkim.

(48) Genus ***Oriens*** Evans

106. *Oriens gola* (Moore)

i. *O. g. gola* (Moore) - Andaman & Nicobar Islands (Andamans).

ii. *O. g. pseudolus* (Mabille) - Andaman & Nicobar Islands (Nicobars), Assam, Sikkim.

(49) Genus ***Parnara*** Moore

107. *Parnara guttatus* (Bremer & Grey)

i. *P. g. mangala* (Moore) - Assam, 'Himalaya', J. & K. (Kashmir), 'North India', 'North-West Himalaya,' Uttarakhand (Kumaon).

108. *Parnara naso* Fabricius

i. *P. n. bada* (Moore) - Assam, 'Bengal', J. & K. (Kashmir), Jharkhand, Madhya Pradesh, Sikkim, South India, Kerala (Travancore).

(50) Genus ***Pedesta*** Hemming

109. *Pedesta masuriensis* (Moore)

i. *P. m. masuriensis* (Moore) - Assam, H. P. (Kulu), Sikkim, Uttarakhand (Kumaon, Mussoorie).

(51) Genus ***Pelopidas*** Walker

110. *Pelopidas agna* (Moore)

i. *P. a. agna* (Moore) - Andaman & Nicobar Islands (Andamans, Nicobars). Assam, 'Bengal', Gujarat (Kachchh), J. & K. (Kashmir), Madhya Pradesh, Odisha (Ganjam), Sikkim, South India.

111. *Pelopidas conjuncta* (Herrich-Schaeffer)

i. *P. c. conjuncta* (Herrich-Schaffer)-Assam and Central Nicobars.

ii. *P. c . narooa* (Moore) - Maharashtra (Mumbai), South India.

112. *Pelopidas mathias* (Fabricius)

i. *P. m . mathias* (Fabricius) - Andaman & Nicobar Islands (Central Nicobars), Assam, 'Bengal', J. & K. (Kashmir), Jharkhand, Madhya Pradesh, Orissa (Ganjam), Punjab, Rajasthan (Mt. Abu), Sikkim, 'South India', Tamil Nadu (Tharangambadi), Uttar Pradesh, Uttarakhand (Kumaon).

113. *Pelopidas subochracea* (Moore)

i. *P. s . subochracea* (Moore) - Assam (Cachar), 'Bengal', Manipur, Sikkim, South India, West Bengal (Kolkata).

114. *Pelopidas thrax* Huebner

i. *P. t. masta* Evans - Manipur (Imphal), Sikkim.

(52) Genus ***Pirdana*** Distant

115. *Pirdana hyela* Hewitson

i. *P. h. major* Evans - Assam, Sikkim.

(53) Genus ***Pithauria*** Moore

116. *Pithauria stramineipennis* Wood-Mason & De Niceville

i. *P. s. stramineipennis* Wood-Mason & De Niceville- Assam (Cachar), Sikkim.

(54) Genus ***Plastingia*** Butler

117. *Plastingia callineura* Felder

i. *P. c. niasana* Fruhstorfer - Assam.

118. *Plastingia margherita* Doherty

i. *P. m. margherita* (Doherty) - Assam (Cachar), Manipur, Nagaland (Nagas).

(55) Genus ***Polytremis*** Mabille

119. *Polytremis discreta* (Elwes & Edwards)

i. *P. d. discreta* (Elwes & Edwards) - Assam, Sikkim, H. P. (Shimla), 'North-West Himalaya', J. & K. to Uttarakhand.

120. *Polytremis eltola* (Hewitson)

i. *P. e. eltola* (Hewitson) - Assam, J. & K., Sikkim, 'North-West Himalaya', Uttarakhand, West Bengal (Darjiling).

121. *Polytremis lubricans* (Herrich-Schaeffer)

i. *P. l . lubricans* (Herrich-Schaeffer) - Andaman & Nicobar Islands (Andamans), Assam, 'Bengal', Bihar, Sikkim, 'South India', Karnataka (Coorg), Maharashtra (Khandesh).

(56) Genus ***Potanthus*** Scudder

122. *Potanthus confucius* (Felder)

i. *P. c. diana* Evans - Karnataka (North Kanara, Coorg), Madhya Pradesh, 'South India', Tamil Nadu (Nilgiris, Palnis).

ii. *P. c. dushta* (Fruhstorfer) - Assam, Sikkim.

iii. *P. c. nina* Evans - Andaman & Nicobar Islands (Andamans, Nicobars).

123. *Potanthus flava* Murray

i. *P. f. alcon* (Evans) - Nagaland (Naga Hills).

124. *Potanthus hetaerus* Mabille

i. *P. h. serina* Ploetz - Andaman & Nicobar Islands (Andamans).

125. *Potanthus lydia* Evans

i. *P. l. lydia* Evans - Assam.

126. *Potanthus mara* Evans

i. *P. m. mara* Evans - Assam, Sikkim, Uttarakhand

(Kumaon).

127. *Potanthus mingo* Edwards

i. *P. m. ajax* Evans - Assam.

128. *Potanthus nesta* Evans

i. *P. n. nesta* Evans - Assam, Sikkim.

129. *Potanthus palnia* Evans

i. *P. p. palnia* Evans - Assam, Karnataka (Coorg), Kerala (Thiruvananthapuram), Sikkim, 'South India', Tamil Nadu (Anaimalais, Nilgiris, Palnis, Shevaroys).

130. *Potanthus pava* Fruhstorfer

i. *P. p. pava* Fruhstorfer - Assam, Kerala (Travancore), Sikkim, 'South India', Tamil Nadu (Palnis), Uttarakhand (Mussoorie).

131. *Potanthus pseudomaesa* (Moore)

i. *P. p. clio* (Evans) - Assam, H. P. (Dharamshala, Kangra to Shimla), Sikkim.

ii. *P. p. pseudomaesa* (Moore) - Assam, Madhya Pradesh (Jabalpur), Rajasthan (Mt. Abu), South India.

132. *Potanthus trachala* Mabille

i. *P. t. ottalina* Evans - Andaman & Nicobar Islands (Andamans).

ii. *P. t. tytleri* Evans - Assam, Manipur, Sikkim.

(57) Genus ***Psolos*** Staudinger Watson

133. *Psolos fuligo* Mabille

i. *P. f. subfasciatus* (Moore) - Assam (Cachar), South India.

(58) Genus ***Quedara*** Swinhoe

134. *Quedara monteithi* (Wood-Mason & De Niceville)

i. *Q. m. monteithi* (Wood-Mason & De Niceville) - Assam (Cachar).

(59) Genus ***Scobura*** Elwes & Edwards

135. *Scobura woolletti* Riley

i. *S. w. woolletti* Riley - Manipur.

136. *Scobura cephaloides* (De Niceville)

i. *S. c. cephaloides* (De Niceville) - Manipur, Nagaland (Naga Hills).

(60) Genus ***Sovia*** Evans

137. *Sovia lucasii* (Mabille)

i. *S. l. magna* (Evans) - Manipur (Kabru, Suroifui), Nagaland (Naga Hills).

ii. *S. l. separata* (Moore) - Sikkim.

(61) Genus ***Stimula*** De Niceville

138. *Stimula swinhoei* (Elwes & Edwards)

i. *S. s. swinhoei* (Elwes & Edwards) - Assam, Meghalaya (Khasia Hills), Sikkim.

(62) Genus ***Suada*** De Niceville

139. *Suada swerga* (De Niceville)

i. *S. s. swerga* (De Niceville) - Assam, Sikkim.

(63) Genus ***Suastus*** Moore

140. *Suastus gremius* (Fabricius)

i. *S. g. gremius* (Fabricius) - Assam, 'Bengal', Madhya Pradesh, 'Himalaya', Sikkim, South India, Uttarakhand (Mussoorie).

141. *Suastus minuta* Moore

i. *S. m. aditia* Evans - Assam, Sikkim.

ii. *S. m. aditus* Moore - Andaman & Nicobar Islands (Andamans).

iii. *S. m. bipunctus* Swinhoe - Karnataka (Coorg), 'South India', Tamil Nadu (Nilgiris).

(64) Genus ***Taractocera*** Butler

142. *Taractocera ceramas* (Hewitson)

i. *T. c. atropunctata* Watson - Manipur.

ii. *T. c. ceramas* (Hewitson) - Karnataka (Coorg, Mysore), Kerala (Travancore), 'South India', Tamil Nadu (Nilgiris, Palni Hills).

iii. *T. c. media* Evans - Karnataka (North Kanara).

iv. *T. c. nicevillei* Watson - Maharashtra (Mumbai).

v. *T. c. oberthueri* Elwes & Edwards - 'South India', Tamil Nadu (Anaimalai Hills, Tiruchirapalli).

143. *Taractocera maevius* (Fabricius)

i. *T. m. maevius* (Fabricius) - "India".

ii. *T. m. sagara* (Moore) - Assam, 'Bengal', Madhya Pradesh, 'North-West India', H.P. (Kulu), Sikkim, South India, West Bengal (Darjiling).

(65) Genus ***Telicota*** Moore

144. *Telicota ancilla* Herrich-Schaeffer

i. *T. a. bambusae* (Moore) - Assam, J. & K., Madhya Pradesh, 'North West Himalaya', Odisha, Sikkim, South India, Uttarakhand (Kumaon), West Bengal (Kolkata).

145. *Telicota augias* (Linnaeus)

i. *T. a. augias* (Linnaeus) - Nagaland (Naga Hills).

146. *Telicota colon* Fabricius

i. *T. c. colon* Fabricius - 'Bengal', Gujarat (Kathiawar), Madhya Pradesh, South India, Sikkim, Uttar Pradesh, Uttarakhand (Kumaon).

ii. *T. c. kala* Evans - Andaman & Nicobar Islands (Andamans).

iii. *T. c. stinga* Evans - Assam.

147. *Telicota linna* Evans

i. *T. l. linna* Evans - Assam, Sikkim.

148. *Telicota ohara* Ploetz

i. *T. o. jix* Evans - Assam, Sikkim.

(66) Genus ***Thoressa*** Swinhoe

149. *Thoressa fusca* (Elwes)

i. *T. f. debilis* (Elwes & Edwards) - Meghalaya (Khasi Hills).

ii. *T. f. fusca* (Elwes) - Manipur, Nagaland (Naga Hills).

150. *Thoressa gupta* (De Niceville)
i. *T. g. gupta* (De Niceville) - Sikkim, Uttarakhand (Garhwal).

(67) Genus ***Unkana*** Distant
151. *Unkana ambasa* Moore
i *U. a. attina* Hewitson - India.

(68) Genus ***Zela*** De Niceville
152. *Zela zeus* De Niceville
i. *Z. z. optimus* (Fruhstorfer) - Assam, Meghalaya (Khasi Hills).

(69) Genus ***Zographetus*** Watson
153. *Zographetus ogygia* Hewitson
i. *Z. o. andamana* Evans - Andaman & Nicobar Islands (Andamans).
ii. *Z. o. ogygia* Hewitson - Assam, Sikkim.

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(Fam. Hesperiidae concluded).

Letters

I have received the last BIONOTES. Please let me know how to send my subscription for this year?

Hope all is well with you. With kind regards,

—Dr. J.R.B. Alfred,
Former Director,
Zoological Survey of India,
KOLKATA - 700 045.

●●●

Just a line to thank you for "Bionotes" 14 (1) recently received. I can not find much to comment on as regards your Subspecies List this time, noting that you are only dealing with India and not including Nepal. So taxa found here but not in India are not included [such as *Phaedyma astasia kathmandia* (Fujioka, 1970) which incidentally is still being seen in its type-locality but nowhere else ! or *Neptis yerburyi tamura*—recorded fairly extensively over C and E Nepal, so should be in Sikkim].

But what about *Polygonia agnicula* (Moore) or even *P. egea agnicula* if you like. Moore's original description (*Proc. Zool. Soc.* 1872: p. 559-60) includes "Goolmurg, N.E. Cashmere" as well as Nepal. It has also been listed in Bhutan (so should be in Sikkim) and is not rare in far N.W. Nepal, so again could be expected on the Indian side of that border.

Incidentally as you exclude Nepal, you don't really need to put in my new names of *Mesoacidalia clara shieldsi* or *Kuekenthaliella annapurnae*, as they have not been recorded outside the country [Nepal]. (I included these names thinking that a colleague of mine was writing descriptions of them, but those descriptions have not materialized.)

One final comment—Is west Bengal so devoid of Lapidoptera that a 5 years survey there in a National Park can only produce 22 butterfly species plus two moths ? and to call that "rich biodiversity"? I reckon I could find more in the centre of Kathmandu city.

—Colin Smith,
Colin.butterfly@yahoo.com
POKHARA (NEPAL).

●●●

Sub : Back issue of Bionotes

Please find enclosed a D.D. for the amount you have asked, for a copy of 'Subspecies Catalogue of the Butterflies of India' by Dr. R.K. Varshney, *Bionotes*, Vol. 13 (2), June 2011.

Please send the same to address given below :

—Sanjay Sondhi,
Titli Trust,
Rajpur Road Enclave,
DEHRADUN - 248001 (UTTARAKHAND).

●●●

Sub:- Institutional Subscription of the Newsletter "Bionotes" for the year 2012 - reg.

Ref:- Your Bill No. 317 dated 29-02-2012.

Please find enclosed herewith a Demand Draft amounting to Rs. 500/- (DD. No. 029032 dated 27/04/2012) in favour of A Biologists Confrerie Aligarh towards the Institutional Subscription of the Newsletter "Bionotes" for the year 2012, Vol 14.

Kindly arrange to send the cash receipt for the said amount at the earliest.

—Dr. C. Raghunathan
Officer-in-Charge,
Zoological Survey of India,
Andaman and Nicobar Regional Centre,
PORT BLAIR - 744 102 (ANDAMANS).

●●●

Research Notes

INFESTATION OF A LEAF-MINER, *PHYLLOCNISTIS CITRELLA* (LEPIDOPTERA: GRACILLARIIDAE) ON A TREE *PONGAMIA PINNATA* IN SOLAPUR, MAHARASHTRA

S. R. ALAND, R. V. HIPPARGI and A. B. MAMLAYYA*

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**Department of Zoology, Shivaji University, Kolhapur - 416004 (Maharashtra).*

Pongamia pinnata (Linn.) is a tree species in the pea family Fabaceae, native in tropical and temperate Asia including parts of India, China, Japan, Malaysia, Australia and Pacific Islands. The flowers are used as compost for plants requiring rich nutrients. Thhe bark can be used to make rope and it also gives a black gum that has been used to treat wounds caused by poisonous fish. The wood is said to be beautifully grained but splits easily whin sawn, thus relegation it to firewood, posts and tool handles. While the oil and residue of the plant are toxic and will induce nausea and vomiting if ingested, the fruits and sprouts, along with the seeds, are used in many traditional remedies. Juices from the plant, as well as the oil, are antiseptic and resistant to pests. In addition *P. pinnata* has the rare property of producing seeds of 25-40% lipid content of which nearly half is oleic acid. Oil made from the seeds, known as honge oil, has been used as lamp oil, in soap making and as a lubricant for a long time (Scott et al., 2008).

The citrus leaf miner, *Phyllocnistis citrella* (Stainton) is a serious pest of citrus and related plants throughout Southern Asia, Australia and East Africa (Beattie, 1993). The leaf miner begins to damage the host plant as soon as its eggs hatch. The larvae bore through the leaf epidermis, ingesting the sap and producing a chlorotic leaf patch. They also prevent young leaves from expanding, causing them to remain curled and twisted. After the miner has finished feeding, other insects such as the aphid (*Aphis gossypii* Glover) and mealybug (*Planococcus citri* Risso) may continue feeding on the damaged area. Secondary effects of leaf miner damage may also include leaf desiccation or invasion of fungi and bacteria (Achor et al., 1997).

In the present communication, report is made on incidence of leaf miner, *Phyllocnistis citrella* on *Pongamia pinnata*. In Solapur City (17°41'N 75°55'E, 457 m above MSL) a large number of white circular spots were observed on the leaves of *P. pinnata*. After careful observation, it was noticed that, it was infestation of the leaf miner. Few small tender branches were brought to the laboratory for further study. 2-12 mines were seen on a single leaf (n=100). Nearly 40 mines were examined with the help of forceps. In 13 mines last larval instars and in remaining 27 mines pupal stages of leaf miner were observed. the faecal matter was placed at the periphery of circular mine and the centeral portion was clean.

With this preliminary observation, authors conducted a survey for a week i. e. from 13.06.2012 to 19.06.2012 in the Solapur City and 20 trees were observed. The study revealed that, all the trees were heavily infested by *P. citrella*. Approximately 90-95% leaves of all trees were damaged by leaf miner. Nearl 60% leaf area was covered by the *P. citrella* mines resulting in leaf deformation, partial leaf chlorosis, necrosis and few leaves were dropped and ultimately affecting on the tree's photosynthetic capacity. 25 pupae were kept in a plasitc container of 2 litre capacity. The adults emerged after 2-3 days and they measured 3-4 mm in length. Identification was done with the help of Fletcher (1920) and Stainton (1856).

References

Achor, D. S., Browning, H. & Albrigo, L. G. 1997. Anatomical and histochemical effects of feeding by citrus leaf miner larvae (*Phyllocnistis citrella* Stainton) in citrus leaves. *J. Amer. Soc. Hort. Sci.*, 122: 829-836.

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BBC drops BC and AD

British Govt. funded BBC has recently decided to stop using the terms BC (Before Christ) and AD (Anno Domini = Year of the Lord) to be replaced by BCE (Before Common Era) and CE (Comman Era) on T.V. and radio.

THREE DIPTERAN POLLINATORS OF APPLE TREES FROM CHAMBAGHAT, HIMACHAL PRADESH

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Malus domestica (Borkh.) of the family Rosaceae is commonly known as apple, the pomaceous fruit. It is one of the most widely cultivated fruit tree, being small and deciduous, reaching 3 to 12m (9.8 to 39 ft) tall, with a broad, often densely twiggy crown. The flowers are white with a pink tinge that gradually fades, five petaled, and 2.5 to 3.5 cm (0.98 to 1.4") in diameter. In other countries during the flowering season, apple growers usually provide honeybees as pollinators to carry the pollen. Orchard-mason bees are also used in some commercial orchards.

The present paper is based on a few dipteran pollinators collected from apple trees in an apple orchard from Chambaghat, Solan distt. (H.P.). The flies were observed hovering over the flowers. Three species of dipteran flies were noted. They were active during late morning (between 9 to 11.30 a.m.) and also observed visiting flowers during the day.

Brunetti (1917, 1923), and recently Mitra et al. (2004, 2004a) and Parui et al. (2006) have dealtwith dipterans of Himachal Pradesh and nearly areas.

Order Diptera

Family Syrphidae

Subfamily Syrphinae

Tribe Syrphini

Genus *Episyrphus* Matsumura & Adachi

1917, *Episyrphus* Matsumura & Adachi, *Ent. Mag. Kyoto*, 2: 134. Type-species, *Musca balteata* De Geer

1. *Episyrphus balteatus* (De Geer)

1776, *Musca balteatus* De Geer, *Mem. Pour. serv. Hist. Ins.*, 6: 116. Type-Loc. : Europe.

Material examined : 4 ♂♂ Dist. Solan, Loc. Chambaghat, 05.iv.11, coll. T.K. Mondal.

Distribution : India : Arunachal Pradesh, Assam, Himachal Pradesh, Jammu & Kashmir, Karanataka, Kerala, Manipur, Meghalaya, Mizoram, Nagaland, Orissa, Sikkim, Tamil Nadu, Tripura, Uttarakhand, West Bengal. Elsewhere : Oriental ; Australian; Palaearctic.

Genus *Sphaerophoria* Lepeletier & Serville

1828, *Sphaerophoria* Lepeletier & Serville, *Encycl. meth. (Ins.)*, 10 (2):513. Type-species, *Musca scripta* Linnaeus.

2. *Sphaerophoria indiana* Bigot

1884, *Sphaerophoria indiana* Bigot, *Annls. Soc. ent. Fr.*, (6) 4: 99. Type-locality : Indes.

Material examined : 1♂,1♀, Dist. Solan, Loc. Chambaghat, 05.iv.11, coll. T.K. Mondal.

Distribution : India : Arunachal Pradesh, Bihar, Himachal Pradesh, Karanataka, Kerala, Maharastra, Manipur, Meghalaya, Mizoram, Sikkim, Tripura, Uttar Pradesh, Uttarakhand, West Bengal. Elsewhere : Oriental ; Palaearctic.

Family Tephritidae

Subfamily Dacinae

Tribe Dacini

Genus *Bactrocera* Macquart

1835. *Bactrocera* Macquart, *Hist. nat. Ins. Dipt.*, 2: 452, 453. Type-species, *Bactrocera longicornis* Macquart.

Subgenus *Zeugodacus* Hendel

1927. *Zeugodacus* Hendel, In Lindner, *Fliegen palaearkt. Reg.*, 49: 26, Type-species, *Bactrocera caudatus* Fabricius.

3. *Bactrocera (Zeugodacus) tau* (Walker)

1849. *Dasyneura tau* Walker, *List Dipt. colln Br. Mus.*, 4: 1074. Type-Loc: Foochow, China.

Material examined : 4 ♀♀; Dist. Solan, Loc. Chambaghat, 05.iv.11, coll. T.K. Mondal.

Distribution : India : Andaman & Nicobar Is., Arunachal Pradesh, Bihar, Haryana, Himachal Pradesh, Jammu & Kashmir, Karnataka, Maharastra, Meghalaya, Punjab, Sikkim, Tamil Nadu, Uttarakhand, West Bengal. Elsewhere : Bhutan, Myanmar, China, Taiwan, Laos, Thailand, Combodia, Vietnam, Malaysia, Singapore, Brunei, Indonesia.

Acknowledgements : The authors are indebted to the Director, Dr. K. Venkataraman, Zoological Survey of India, for his kind support and help and Dr. Animesh Bal, Scientist- 'F' for constant encouragement.

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A STUDY ON THE DENSITY OF PROSOBRANCH SNAILS IN A POND NEAR BIKANER, RAJASTHAN

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Among invertebrate animals, molluscs are found in a vast array of aquatic habitats ranging from temporary ponds and puddles to the oceans. Phylum Mollusca is a large assemblage having diverse shapes, size, habits and occupying different habitats. Among the different classes of Mollusca, class Gastropoda is the largest and most diverse, comprising of about 65,000 - 75,000 species including marine, freshwater and terrestrial forms (Annandale,1907). Prosobranch snails constitute a macroscopic invertebrate community in freshwater bodies and often subscribe to the biotectonic community. Prosobranchs, mostly herbivore, play a significant role in both grazing type of food chains. Snails of the Thar desert were enumerated by Subba Rao (1996). The present study was conducted year-round, in a desert water body i.e. Gajner pond near Bikaner (NW Rajasthan). The Gajner village is situated about 32 km SW of Bikaner.

The prosobranch snail study on Gajner pond (27° 57' and 73° 03'E; altitude 322 m MSL) was carried out for an annual cycle encompassing all the three seasons, winter, summer and monsoon from May 2009 to April 2010. The study involved monthly assessment of the prosobranch snail population diversity and density. The mud sample from pond was collected with the help of a quadrate of known dimensions (i.e., 500 cm^2), as the water was shallow. The mud from this quadrate was taken out with the help of a shovel and transferred to plastic bucket and some water was added to prepare a suspension. This was filtered through a sieve of 2 mm mesh size. The residue was transferred to an enamel tray and molluscan forms were picked up mechanically. A total of 5025 snail specimens were collected. Three forms were carefully identified and counted (Table 1). Identifications were made under stereoscopic binocular microscope or bull lens, following Subba Rao (1989). The results are expressed in terms of No./m^2.

The results reveal that the prosobranch fauna comprised three species, belongs to Prosobranchia namely *Bellamya bengalensis, Gabbia orcula* and *Digoniostoma pulchella* at Gajner pond. The total population density of prosobranch snails was found 5025 No./m^2. It showed an almost similar trend of population fluctuation being the richest in monsoon and the lowest during summer and winter (Table 1).

Maximum population density of *Gabbia orcula* i.e. 2764 No./m^2 was observed. *Bellamya bengalensis* was found to be 1193 No./m^2 and *Digoniostoma pulchella* was 1068 No./m^2. Karwasara (2007) in a nearby pond recorded four gastropod species out of which two *Gabbia orcula* and *Lymnea pseudosuccinea* were widely distributed and other two *Digoniostoma pulchella* and *Indoplanorbis exustus* were noted lesser in numbers in the same region. Singh (2000), reported two prosobranchia species *Gabbia orcula* and *Digoniostoma pulchella* in his malacological study in the Indian desert region. He also noted that population density of *Digoniostoma pulchella* and *Gabbia orcula* was found to be greater (over 90%) than that of pulmonate snails *Indoplanorbis exustus* and *Gyrulus rotula*.

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Table 1. Population Density (No./m^2) of Prosobranch Snails at Gajner Pond, Bikaner.

	Species	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	March	April	Total
1.	*Bellamya bengalensis*	0	0	328	72	120	60	40	20	28	20	117	388	1193
2.	*Gabbia orcula*	0	0	188	268	316	460	80	0	28	196	568	660	2764
3.	*Digoniostoma pulchella*	0	0	268	116	180	148	48	0	24	44	144	96	1068

FLIES COLLECTED IN A DAPHABUM EXPEDITION, ARUNACHAL PRADESH

BULGANIN MITRA and P. PARUI

Zoological Survey of India, Kolkata-700053.

A Daphabum Scientific Expedition was organised by the Geological Survey of India from November, 1969 to January, 1970, to explore the Lohit district of Arunachal Pradesh. The altitudinal range of the reserve is immense; from a low of 200m to 4,598m. Daphabum peak in the north embraces a prodigious mix of habitats, a moist bamboo forest, dense, wet evergreen jungle, moist temperate and alpine scrublands.

The present article is the outcome of the faunal exploration of Dipteran insects collected in the Daphabum Scientifc Expedition by the Zoological Survey of India party under the leadership of Dr. J.M.Julka. This report accounts for 17 species under 16 genera of 7 families of Diptera, of which 8 species under 8 genera are recorded for the first time from the state of Arunachal Pradesh. All collections were made by J.M. Julka.

Diptera fauna of Arunachal Pradech has been earlier reported by Nandi (2004), Mitra et al.,(2006) and Z.S.I. (2006).

Order Diptera

Family Tipulidae

1. *Tipula (Vestiples) himalayensis* Brunetti

1911. *Tipula himalayensis* Brunetti, *Rec,Indian Mus.*, 6:252. Type-locality : Darjeeling.

Material examined : 1♀, NEFA : Glo Howel, 3890 ft., 9, xii. 1969.

Distribution : India : Arunachal Pradesh, Uttarakhand , West Bengal. Elsewhere: Oriental; Palaearetic.

Remarks : First report from Arunachal Pradesh.

Family Sciaridae

2. *Sciara flaviseta* Brunetti

1912. *Sciara flaviseta* Brunetti, *Fauna Brit. India*, 144, Type-locality: Simla, Himanchal Pradesh.

Material examined: 1 ♀, Wakro, 17000 ft., 1.xii. 1969.

Distribution : India : Arunachal Pradesh, Himachal Pradesh. Elsewhere: Oriental.

Family Syrphidae

3. *Eristalis (Eoseristalis) himalayensis* Brunetti

1880. *Eristalis ursinus* Bigot, *Annls Soc. Ent. Fr.* (5)10: 215.

1908. *Eristalis (Eoseristalis) himalayensis* Brunetti, *Rec. Indian Mus.* 2: 70. Type-locality:"Indostan."

Material examined: 1 ♀, NEFA: Glo Howel, 3890 ft., 9.xii.1969, 1♀, Tihun Village, 1365 ft., 11. xii. 1969.

Distribution : India : Arunachal Pradesh, Himanchal Pradesh, Jammu and Kashmir, Sikkim, Uttar Pradesh and West Bengal. Elsewhere : Oriental.

4. *Episyrphus balteatus* (De Geer)

1776. *Musca balteata* De Geer, *Mem. pour. Sery. Hist. Ins.*, 6 : 116. Type-locality: Europe.

Material examened: 1 ♀, Chikrung village, 3360 ft., 18. xii.1969, 1 ♂ near Chakma village, 800 ft, 25. xii. 1969; 1♀, Tehua Village, 4160 ft., 11. xii. 1969, 1 ♀, Nakro, 1700 ft., 2.xii. 1969.

Distribution : India : Arunachal Pradesh, Assam, Himachal Pradesh, Jammu and Kashmir, Karnataka, Kerala, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura, Uttaranchal, West Bengal. Elsewhere : Oriental; Palaearctic; Australian.

5. *Syrphus torvus* Osten- Sacken

1875. *Syrphus torvus* Osten-Sacken, *Proc. Boston Soc. Nat. Hist.* 18: 139. Type-locality: Canada.

Material examined: 2 ♂♂,Chikrung village, 3360 ft., 18.xii.1969.

Distribution : India : Arunachal Pradesh, Himachal Pradesh, Sikkim, Elsewhere: Oriental, Holarctic.

Remarks : First report from Arunachal Pradesh.

6. *Rhingia sexmaculata* Brunetti

1915. *Rhingia sexmaculata* Brunetti, *Rec. Indian Mus.* 8: 166, Type-locality: Dibrugarh, India.

Material examined: 1 ♀, NEFA: Glo Howel, 3890 ft., 9.xii.1969.

Distribution : India : Arunachal Pradesh, Assam.

Remarks : First report from Arunachal Pradesh.

7. *Eristalinus (Eristalinus) obscuritarsis* de Meijere

1908. *Eristalinus (Eristalinus) obscuritarsis* de Meijere, *Tijdschr. Ent.*, 51 : 250. Type-locality: Java.

Material examined: 1 ♀, Tehua village, 4160 ft., 11. xii.1969.

Distribution : India: Arunachal Pradesh, Gujarat, Jammu & Kashmir, Karnataka, Kerala, Maharashtra, Orissa, Sikkim, West Bengal. Elsewhere: Oriental.

Remarks : First report from Arunachal Pradesh.

8. *Chrysotoxum convexum* Brunetti

1915. *Chrysotoxum convexum* Brunetti, *Rec. Indian Mus.* 9:249. Type-locality: Andarban, Garhwal district, India.

Material examined: 1♂ near Chakma village, 800 ft, 25.xii. 1969.

Distribution : India : Arunachal Pradesh, Mizoram, Uttarakhand.

Remarks : First report from Arunachal Pradesh.

9. *Melanostoma orientale* (Wiedemann)
1824, *Melanostoma orientale* Wiedemann, *Anal ecta Ent.*, :36, Type-locality : "Ind. Or."
Material examined : 1♂ 1♀, near Chakma village, 800 ft, 25. xii. 1969.
Distribution : India: Arunachal Pradesh, Himachal Pradesh, Jammu & Kashmir, Karnataka, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh, West Bengal. Elsewhere: Oriental; Palaearctic.
10. *Paragus (Pandasyopthalmus) tibialis* (Fallen)
1817, *Pipiza tibialis* Fallen, *Syrphici Sveciae*: 60.
Material examined: 1 ♂, Wakro, 1700 ft., 1.xii. 1969.
Distribution : India : Arunachal Pradesh, Bihar, H.P., Jammu and Kashmir, Kerala, Manipur, Meghalaya, Mizoram, Tripura, Uttar Pradesh, West Bengal. Elsewhere : Cosmopolitan.

Family Sepsidae

11. *Decachaetophora aenipes* (de Meijere)
1913, *Sepsis aenipes* de Meijere, *Annls hist.-nat. Mis. natn. hung.* 11:119, Type-locality: Chip-Chip Formas, Mussoorie, Uttar Pradesh, India.
Material examined: 1 ♂, Tehua village, 4160 ft., 11.xii.1969. 1 ♂, Wakro, 1700 ft., 4.xii. 1969.
Distribution : India : Arunachal Pradesh, Assam, Himachal Pradesh, Punjab, Sikkim, Uttarakhand, West Bengal. Elsewhere : Oriental, Palaearctic; Nearctic.
Remarks : First report from Arunachal Pradesh.
12. *Sepsis indica* Wiedemann
1824, *Sepsis indica* Wiedemann, *Anal ecta Ent.* : 57. Type-locality : India.
Material examined: 2 ♂♂, NEFA: Glo Howel, 3890 ft., 9.xii.1969.
Distribution : India : Arunachal Pradesh, Assam, Kerala, Maharashtra, West Bengal. Elsewhere : Oriental, Australasian.

FamilyMuscidae

13. *Musca (Musca) domestica* Linnaeus
1758, *Musca domestica* Linnaeus, *Syst. Nat.* Ed. 10, 1 : 596. Type-locality : Europe, America.
Material examined: 1 ♀, Tihun village, 4160 ft., 11.xii.1969.
Distribution : India : Arunachal Pradesh, Madhya Pradesh, Chhatisgarh etc. Elsewhere : Cosmopolitan.
14. *Musca (Setimusca) malaisei* Emden
1965, *Musca (Setimusca) malaisei* Emden, *Fauna. Brit. India.*, Muscidae 1 : 91, Type-locality : Kambaiti, Burma.
Material examined: 1 ♀♀, Tihun village, 4160 ft., 10.xii.1969.
Distribution : India : Arunachal Pradesh, Elsewhere : Oriental.
15. *Orthellia fletcheri* Emden
1965, *Orthellia fletcheri* Emden, *Fauna Brit. India. Muscidae*. 1 : 122. Type-locality : Pundalnoya, Ceylon.
Material examined: 1 ♀, Wakro, 1700 ft., 3.xii. 1969.
Distribution : India : Arunachal Pradesh, Assam, Tamilnadu, West Bengal. Elsewhere : Oriental.

Family Rhinidae

16. *Idiella mandarina* (Wiedemann)
1830, *Idiella mandarina* Wiedemann, *Aussereurop. zwifl. Insekt.* 2:350, Type-locality : China.
Material examined: 1 ♀, 1 ♂ Wakro, 1700 ft., 3.xii. 1969.
Distribution : India : Arunachal Pradesh, Madhya Pradesh & Chhatisgarh, Assam, Bihar, Gujarat, Haryana, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Orissa, Punjab, Uttar Pradesh & West Bengal. Elsewhere : Oriental.
Remarks : First report from Arunachal Pradesh.

Family Sarcophagidae

17. *Parasarcophaga (Parasarcophaga) albiceps* (Meigen)
1826, *Sarcophaga albiceps* Meigen. *Syst. Be. Schr. Zweifl. Insekt.* 5 : 22. Type-locality : Europe.
Material examined: 1 ♂, Chowkham, 800 ft., 27.xii. 1969.
Distribution : India : Arunachal Pradesh, Andaman and Nicobar Island, Andhra Pradesh, Assam, Bihar, Chhatisgarh, Chandigarh, Delhi, Goa, Gujarat, Haryana, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Mizoram, Nagaland, Orissa, Punjab, Rajasthan, Sikkim, Tamil Nadu, Uttar Pradesh & West Bengal. Elsewhere : Oriental, Palaearctic.

Acknowledgements: Authors wish to express thanks to Dr. K. Venkataraman, Director, Zoological Survey of India, for necessary facilities and encouragement. They are much obliged to Dr. K. Chandra, Scientist - 'F' and incharge of Entomology A division, for giving opportunity to study the material.

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Man's Remotest Relative Found

Norwegian scientists have found world's oldest living organism, man's remotest relative, after two decades study—a microcopic algae-eater that lives in a lake in Norway. They named it a new category *Collodictyon* because it is not an animal, plant, parasite, fungus or algae. The elusive, single-cell creature evolved a billion years ago.

INFESTATION OF FIVE STRIPPED SQUIRREL, *FUNAMBULUS PENNANTI*, IN THE FOREST NURSERIES OF JABALPUR, CENTRAL INDIA

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The five stripped squirrel *Funambulus pennanti* Wroughton is an important rodent species of India. It is abundant in orchards and gardens in north and central plains and sub-mountain regions of India. Specimens are widespread commensal, found in kitchen gardens, homes, gardens, nurseries and roadside trees as well as in forests. It is chirpy, diurnal and generally arboreal in habitat.

The five stripped squirrels are now recognized as a rodent pest species of kitchen garden and nurseries (Prakash et al., 1992; Parshad & Malhi, 1994; Paunikar & Ahmed, 2002). Two other species, *Funambulus palmarum* and *F. tristriatus* are serious pests of plantation crops such as coconut and oil palm, in the southern peninsula (Parshad, 1999).

While conducting periodical surveys in different forest nurseries and experimental fields of the Tropical Forest Research Institute, Jabalpur (M.P.), it was observed that the five-stripped squirrel has made severe infestation to the sowing and germinated seeds of number of forest trees.

The squirrels were observed to construct their nest above the ground on different tree holes and in crevices of the fencing wall, buildings, mist chambers and ploy house of the nursery, by using fragments of cloth rags, grasses, dried twigs, leaves, human hairs etc. Their activities and nesting behavior have been studied in different parts of the country (Chopra et al., 1996, 1999).

In the forest nurseries and experimental fields, the young ones and the adults of this species actively feed and damage sown and germinated seeds of various tree species, such as *Ailanthus excelsa, Albizzia* spp., *Bambusa* spp., *Cassia* spp., *Delonix regia, Dalbergia* spp., *Eucalyptus* spp., *Moringa oleifera, Pongamia pinnata* and *Tectona grandis.*

During the seed sowing and germinating time (April-May), pre-monsoon (June-July) and post-monsoon (October-November), the damaging attitude of this species increased in comparison with rest of the months. They start their activities from morning to evening but noticeable damage used to be inflicted in the nursery when no field worker was present in the vicinity between 13.00 to 14.30 hrs and after 1600 hrs up to 1800 hrs.

It was further observed that the sown seeds of *Tectona grandis* and *Eucalyptus* spp. were caused extensive damage by *F. pennanti*. They not only feed on the seeds but also disturbed and scattered the seeds. Due to their disturbing activities, the seed sowing practice has to be repeated number of times.

It was also observed that sown and germinated seed of gulmohar (*Delonix regia*) is one of the most preferred food for *F. pennanti*, as compared to other tree species. The *Ailanthus excelsa, Albizzia* spp., and *Bambusa* spp., *Dalbergia* spp., *Moringa oleifera* are also preferred, whereas *Pongamia pinnata* and *Cassia* spp. are least preferred.

The 80-100% damage was recorded in sown seeds of *Tectona grandis* and *Eucalyptus* spp.; 30-50% in *Ailanthus excelsa, Albizzia* spp., *Bambusa* spp., *Dalbergia* spp., and *Moringa oleifera, and* 15-20% in *Pongamia pinnata* and *Cassia* spp.

It has been found that ber, pomegranate and guava fruits are also infested by this rodent species. Also the medicinal plants, raised in various forest nurseries of TFRI, are susceptible to the damage caused by *F. pennanti.*

For effective management the nursery beds can be covered with 1 x 1 m wire-meshed iron nets fitted in a portable iron frame (1.15 x 0.75 x 10 meter) in order to protect the sown seeds and seedlings in the nursery beds.

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LEPIDOPTERA AND ARANEAE DIVERSITY OF SALTLAKE CITY, KOLKATA

OLIVE BISWAS, UDIPTA CHAKRABORTI, ADITYA DAS, SUJAN CHATTERJEE, SWATI DAS and BIDISHA MAHAJAN

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Bidhan nagar or Salt Lake City, as it is popularly called, is a planned satellite township in the state of West Bengal. Situated in between N 22° 58' to E 88° 42'. Other than the very old published document of Seymour Sewell (1934) on faunal study of Salt Lake, nothing has come across authors from this area.

With a view to above, a study on some arthropod group diversity was conducted by P.G. students of Vidyasagar College, Salt-lake City, Kolkata, from November, 2011 to April, 2012. The present communication reports 42 species under 32 genera of 7 families of insect order Lepidoptera and 21 species under 15 genera belonging to 8 families of Arachnid order Araneae.

Among the order Lepidoptera, the family Nymphalidae shares maximum number of species (15) followed by Lycaenidae (10), Pieridae (8), Hesperiidae (4), Papilionidae (3), Arctiidae (1) and Lasiocampidae (1). Among the order Araneae, the family Araneidae shares maximum number of species (7) followed by Tetragnathidae and Salticidae 3 species each; Pholcidae, Oxiopidae and Lycosidae 2 species each; and Hersilidae and Sparassidae one species each.

The List of species collected follows :

Class Insecta

Order Lepidoptera

Identifications were made after Kehimkar (2008).

(1) Family Hesperiidae

Spialia galba (Fabricius)
Oriens goloides (Moore)
Suastus gremius (Fabricius)
Matapa aria (Moore)

(2) Family Papilionidae

Graphium doson (C. & R. Felder)
Graphium agamemnon (Linnaeus)
Papillio polytes (Linnaeus)

(3) Family Pieridae

Eurema blanda (Boisduval)
Eurema hecabe (Linnaeus)
Catopsilia pomona (Fabricius)
Catopsilia pyranthe (Linnaeus)
Delias eucharis (Drury)
Leptosia nina (Fabricius)
Appias albino (Boisduval)
Appias libythea (Fabricius)

(4) Family Lycaenidae

Rapala manea (Hewitson)
Castalius rosimon (Fabricius)
Tarucus nara (Kollar)
Pseudozizeeria maha (Kollar)
Zizula hyalx (Fabricius)
Talicada nyseus (Guerin-Meneville)
Neopithecops zalmora (Butler)
Euchrysops cnejus (Fabricius)
Chilades pandava (Horsfield)
Chilades lajus (Stoll)

(5) Family Nymphalidae

Danaus chrysippus (Linnaeus)
Tirumala limniace (Cramer)
Euploea core (Cramer)
Melanitis leda (Linnaeus)
Elymnias hypermnestra (Linnaeus)
Mycalesis perseus (Fabricius)
Ypthima asterope (Klug)
Ypthima huebneri (Kirby)
Acraea violae (Fabricius)
Moduza procris (Cramer)
Ariadne ariadne (Linnaeus)
Ariadne merione (Cramer)
Junonia almana (Linnaeus)
Junonia atlites (Linnaeus)
Hypolimnas bolina (Linnaeus)

(6) Family Arctiidae

Argina argus (Kollar)

(7) Family Lasiocampidae

Trabala vishnou (Lefebvre)

Class Arachnida

Order Araneae

Identifications were made after Sebastian & Peter (2009).

(1) Family Pholcidae

Crossopriza lyonii (Blackwall, 1867)
Smeringopus paiiidus (Blackwall, 1885)

(2) Family Araneidae

Argiope pulchella (Thorell, 1881)
Argiope anasuja (Thorell, 1887)
Cyrtophora cicatrosa (Stoliczka, 1869)
Cyclosa hexatuberculata (Tikader, 1982)
Eriovixia laglaizei (Simon, 1877)
Neoscona bengalensis (Tikader & Bal, 1981)

Neoscona mukerjei (Tikader, 1980)

(3) Family Tetragnathidae

Leucauge decorata (Blackwall, 1864)
Leucauge pondae (Tikader, 1970)
Tetragnatha mandibulata (Walckenaer, 1824)

(4) Family Hersilidae

Hersilia savigny (Lucas, 1836)

(5) Family Sparassidae

Heteropoda venatoria (Linnaeus, 1762)

(6) Family Salticidae

Plexippus paykulli (Audouin, 1826)
Plexippus petersi (Karsch, 1878)
Telamonia dimidiata (Simon, 1899)

(7) Family Oxiopidae

Oxyopes birmanicus (Thorell, 1887)
Oxyopes shweta (Tikader, 1970)

(8) Family Lycosidae

Perdosa pseudoannulata (Bosenberg & Stand, 1906)
Perdosa birmanica (Simon, 1884)

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Medicinal Plants Threatened

Over 300 Species face Depletion

The Union Health Ministry has in a recent assessment deemed over 300 species of medicinal herbs and plants threatened by overexploitation that feeds the ayurveda industry in India and abroad.

The list includes the herbal ingredients of popular ayurvedic preparations: the Sita ashoka (*Saraca asoca*), the chief constituent of ashokarishta, used for gynaecological disorders; guggal (*Commiphora wightii*), a thorny bush that yields a gumresin used in over 100 preparations; all ten herbs used in dashamoolarishta, meant to "strengthen" the nervous and cardiac systems but used as a general tonic. Guggal is virtually extinct in India. For the last few years, we have been getting it from Afghanistan.

Replantation efforts have begun in earnest. The National Medicinal Plants Board has sanctioned conservation and plantation of guggal over 4,000 hectares of forest land in Gujarat and Rajasthan. Sita ashoka is being grown on 800 hectares in Karnataka, Orissa and Kerala. The plants that go into dashmoolarishta are being grown on some 1,100 hectares in Gujarat, Madhya Pradesh, Tamil Nadu, Karanataka, Kerala, Tripura and Andhra Pradesh.

The ministry's report lists 359 plant species of which 335 are on a "red list", which includes categories such as "endangered", "critically endangered", "vulnerable" and "near-threatened", 15 plants are deemed "severely threatened". It's a vocabulary of alarm. Few farmers care to cultivate medicinal plants, but linking them up with the industry and negotiating good prices could change this.

Over the last decade, some plants have been relocated for cultivation. For example, *Utleria salicifolia* and *Hydnocarpus pentandra*, native to the Western Ghats, are being grown in new locales in the same region; *Gymnocladus assamicus* and *Begonia tessaricarpa*, rare medicinal herbs native to Arunachal Pradesh, are being successfully grown in Sikkim, which has similar soil and climes.

Forest departments of various states have been granted assistance. Projects for setting up 29 medicinal plants conservation areas have also been implemented. 24 states have been covered under a new, Rs 630-crore National Mission on Medicinal Plants.

A special drive has also been launched to conserve and propagate high-altitude plants like Atees, Kuth and Kutki through NGOs working at the grassroots in the Himalayan regions. The ministry has also initiated some awareness programmes, such as herb gardens.

—Amba Batra Bakshi

Subspecies Catalogue of the Butterflies of India (Nymphalidae)
A Synopsis

R.K. VARSHNEY

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

(Contd. from Vol. 14, No. 1, p. 35)

(97) Genus ***Sumalia*** M.
1. *S. daraxa* (Db. & Hew.)
i. *S. d. daraxa* (Db. & Hew.) - Kumaon, Sikkim, Assam, Arunachal Pr. (Kameng, Subansiri, Tirap).
2. *S. zulema* (Db. & Hew.) - E. Himalaya: Sikkim, Assam.

(98) Genus ***Auzakia*** M.
1. *A. danava* (M.)
i. *A. d. danava* (M.) - Himachal Pr. (Simla) to Sikkim, Assam, Arunachal Pr. (Kameng, Tirap). 1500 - 8000'.

(99) Genus ***Bhagadatta*** M.
1. *B. austenia* M.
i. *B. a. austenia* M. - Assam (Margherita).
ii. *B. a. purpurascens* (Tyt.) - Arunachal Pr. (Abor Valley).

Subtribe PARTHENITI

(100) Genus ***Lebadea*** Fd.
1. *L. martha* (F.)
i. *L. m. ismene* Db. & Hew. - Assam, Manipur.
ii. *L. m. martha* (F.) - North India through Sikkim, Assam.

(101) Genus ***Parthenos*** Hüb.
1. *P. sylvia* (Cr.)
i. *P. s. gambrisius* (F.) - Bengal, Arunachal Pr. (Tirap).
ii. *P. s. nila* Evans - South Nicobars.
iii. *P. s. roepstorfii* M. - Andamans.

[Khatri (1989) has misspelt is as '*roepstorffi*'].
iv. *P. s. virens* M. - South India (Nilgiris).

(102) Genus ***Neurosigma*** But.
1. *N. siva* (Wd.) (= *doubledayi* Wd.)
i. *N. s. siva* (Wd.) - E. Himalaya: Sikkim, Assam. 4 - 5000'.

Subtibe EUTHALIITI

(103) Genus ***Abrota*** M.
1. *A. ganga* M.
i. *A. g. ganga* M. (= *jumna* M.) - Sikkim, Assam, Arunachal Pr. (Siang).

(104) Genus ***Tanaecia*** But.
1. *T. cibaritis* Hew. - Andamans, ? Nicobars.
2. *T. cocytus* F.
i. *T. c. cocytus* F. - Manipur.
3. *T. jahnu* M. (= *jahnides* Fruh.) - Sikkim.
4. *T. julii* Lesson

[Haribal et al. (1988) have shown Bougainville as author of this sp.].
i. *T. j. appiades* (Men.) (= *balarama* M.) - Kumaon, Sikkim (Mangan, Pashingdang, Legship, Gangtok), Assam.
ii. *T. j. adima* M. (= *khasiana* Swin.) - Khasi Hills.
iii. *T. j. sedeva* M. - Assam (Cachar), Manipur.
5. *T. lepidea* (But.)
i. *T. l. lepidea* (But.) - North India (Kumaon), Sikkim, Assam (N. Lakhimpur), Meghalaya (Nongpoh). Also Bastar, vide Gupta & Shukla (1987).
ii. *T. l. miyana* Fruh. - Peninsular India (Orissa, N. Kanara).

(105) Genus ***Dophla*** M.
1. *D. evelina* Stoll
i. *D. e. derma* Koll. - North India to Assam.
ii. *D. e. laudabilis* Swin. - South (Nilgiris) to Central India.

[Larsen (1987) has reported it under *Euthalia*].

(106) Genus ***Bassarona*** M.
1. *B. duda* Staudinger
i. *B. d. duda* Staudinger - Sikkim, Assam, Meghalaya.
2. *B. durga* M.
i. *B. d. durga* M. - Sikkim, ? Assam, Arunachal Pr. (Abor). 3 - 4800'.
ii. *B. d. splendens* (Tyt.) - Nagaland.
3. *B. franciae* Gray
i. *B. f. franciae* Gray - Sikkim.
ii. *B. f. rajah* Fd. - Assam.
4. *B. iva* (M.)
i. *B. i. iva* (M.) - Sikkim, Assam, Manipur.
5. *B. khama* Alpheraky
i. *B. k. curvifascia* (Tyt.) - Nagaland, Manipur.
6. *B. nara* M.
i. *B. n. nara* M. - Sikkim, Assam. 4 - 6000'.
7. *B. patala* Koll.
i. *B. p. patala* Koll. - N. Indian mountains, ? Assam.
ii. *B. p. taooana* M. - Manipur.
8. *B. recta* de N.

i. *B. r. recta* de N. - Assam.

9. *B. sahadeva* M.

i. *B. s. nadaka* Fruh. - Assam, Manipur.

ii. *B. s. sahadeva* M. - Sikkim.

10. *B. teuta* Db.

i. *B. t. teuta* Db. - Assam.

ii. *B. t. teutoides* M. - Andamans.

(107) Genus ***Symphaedra*** Hüb.

1. *S. nais* (Forster) - Peninsular India: Gujarat, Konkan, M.P. (Bastar), Jharkhand (Hazaribagh, Parasnath Hill). Also Dehra Dun and Sikkim.

(108) Genus ***Euthalia*** Hüb.

1. *E. aconthea* Cr.

i. *E. a. acontius* Hew. - Andamans.

ii. *E. a. anagama* Fruh. - Central India (Maharashtra, Bastar, Orissa) to North India (Kangra, Kumaon).

iii. *E. a. garuda* (M.) (= *merilia* Swin., *apama* Fruh.) - NE. India: Sikkim, Assam, Arunachal Pr. (Tirap).

[Sharma & Ramamurthy (2010) have corrected '*E. garuda acontius*', as '*E. g. acontis*'(sic) but remarked it with 'No record/ data deficient sp.'].

iv. *E. a. meridionalis* Fruh. - South India (North Kanara and Nilgiris).

v. *E. a. suddhodana* Fruh. - North Bengal, Sikkim.

2. *E. alpheda* Godart

i. *E. a. jama* Fruh. (= *jamida* Fruh.) - Sikkim, Assam, Manipur.

3. *E. anosia* M.

i. *E. a. anosia* M. - Assam.

ii. *E. a. saitaphernes* Fruh. - Sikkim.

4. *E. eriphylae* de N,

i. *E. e. delmana* Swin. - Assam.

5. *E. lubentina* Cr.

i. *E. l. arasada* Fruh. - South India, upto 4000'.

ii. *E. l. lubentina* Cr. (= *indica* Fruh.) - Central India (Bombay - Bengal). Also Himachal Pr.: Kangra.

6. *E. malaccana* Fruh.

i. *E. m. malaccana* Fruh. (= *caudata* Talbot) - Assam.

7. *E. merta* M.

i. *E. m. merta* M. - Assam.

8. *E. monina* F.

i. *E. m. arhat* Fruh. - Sikkim.

ii. *E. m. kesava* (M.) - North India, Assam, Arunachal Pr. (Lohit).

9. *E. phemius* (Db.)

i. *E. p. phemius* (Db.) - Sikkim, Meghalaya (Shillong, vide Radhakrishnan et al., 1989).

10. *E. telchinia* (Men.) - Sikkim, Assam, Arunachal Pr. (Siang). Also Nilgiris and Coorg.

[Moore (1897) reported it as *Kirontisa telchinia* M.].

(109) Genus ***Lexias*** Bdv.

1. *L. cyanipardus* But.

i. *L. c. cyanipardus* But. - Assam.

2. *L. dirtea* F.

i. *L. d. jadeitina* Fruh. - NE. India : Manipur.

[D' Abrera stated it as similar to *pardalis* and recorded from N. India].

3. *L. khasiana* (Swin.)

i. *L. k. khasiana* (Swin.) - Assam, Meghalaya, Arunachal Pr. (Tirap).

4. *L. pardalis* M. - North India.

Tribe PSEUDERGOLINI

(110) Genus ***Pseudergolis*** Fd. & Fd.

[D' Abrera (1985) has shown 'Felder, 1867' as author of genus].

1. *P. wedah* (Koll.)

i. *P. w. wedah* (Koll.) - NW. Himalaya: H.P. (Kulu) to Sikkim (Manul, Nanga Bridge), Arunachal Pr. (Kameng, Subansiri, Siang, Lohit).

(111) Genus ***Stibochiona*** But.

1. *S. nicea* (Gray)

i. *S. n. nicea* (Gray) - Himachal Pr. (Kangra, Kulu, Simla) to Sikkim (Mangan, Pashingdang, Legship), Assam (Sadiya Road), Meghalaya (Nongpoh), Nagaland and Arunachal Pr. (all Distt.). Upto 7000'.

[Haribal et al. (1988) have spelt author as 'Grey'].

(112) Genus ***Dichorragia*** But.

1. *D. nesimachus* (Bdv. in Cuvier)

i. *D. n. nesimachus* (Bdv. in Cuvier) - Himachal Pr. (Kulu), Sikkim, Assam, Manipur. Also Arunachal Pr. (Siang, vide Gupta & Shukla, 1988).

[D' Abrera has shown authorship of the sp. as "?Doyere (? Boisduval), 1846 in Cuvier"].

Tribe APATURINI

(113) Genus ***Rohana*** M.

1. *R. parisatis* (Wd.)

i. *R. p. atacinus* Fruh. - South India (Nilgiris).

[D' Abrera (1985) has misspelt it as '*atacinius*'].

ii. *R. p. parisatis* (Wd.) - Kumaon. Sikkim (vide Haribal et al., 1988), Assam, Arunachal Pr. (Siang, Tirap, vide Gupta & Shukla, 1988).

2. *R. parvata* M. - Sikkim, Assam, Arunachal Pr. (Lohit).

(114) Genus ***Chitoria*** M.

1. *C. sordida* M.

i. *C. s. naga* Tyt. - Naga Hills.

ii. *C. s. sordida* M. - Sikkim, ?Assam.

2. *C. ulupi* (Doh.)

i. *C. u. ulupi* (Doh.) - Upper Assam, Manipur.

[D' Abrera (1985) reports that its WSF is *florenciae* Tyt.].

(115) Genus ***Apatura*** F.

1. *A. ambica* Koll.
   i. *A. a. ambica* Koll. (= *namouna* Db.) - NW. India: Kashmir to Assam, Meghalaya. Also Arunachal Pr. (Kameng) vide Gupta & Shukla (1988).
   ii. *A. a. chitralensis* Evans - Kashmir.
2. *A. chevana* (M.) - Sikkim, Assam.

(116) Genus ***Dilipa*** M.

1. *D. morgiana* (Wd.) - NW. India (Kashmir) to NE. India (Assam).

(117) Genus ***Sephisa*** M.

1. *S. chandra* (M.)
   i. *S. c. chandra* (M.) - Sikkim (Sangkalang, vide Haribal et al., 1988), Assam, Arunachal Pr. (Kameng, Subansiri).
2. *S. dichroa* (Koll.) - NW. Himalaya: Himachal Pr., Uttarakhand (Kumaon, Garhwal). Upto 8000'.

(118) Genus ***Helcyra*** Fd.

1. *H. hemina* Hew.
   i. *H. h. hemina* Hew. - Sikkim, Assam.

(119) Genus ***Eulaceura*** But.

1. *E. manipurensis* Tyt. - Manipur.

[Evans (1932) has spelt it as '*manipuriensis*'].

(120) Genus ***Herona*** Db.

1. *H. marathus* Db.
   i. *H. m. andamana* M. - Andaman Is.
   ii. *H. m. marathus* Db. - NW. India to Assam.

(121) Genus ***Euripus*** Db.

1. *E. consimilis* (Wd.)
   i. *E. c. consimilis* (Wd.) - North India (Dehra Dun). Also Andamans.
   ii. *E. c. meridionalis* WM. - South India (Nilgiris).
2. *E. nyctelius* Db. (= *halitherses* Db.)
   i. *E. n. nyctelius* Db. - Sikkim, Assam. Also Meghalaya (Umran) vide Varshney & Chanda (1971) and Arunachal Pr. (Subansiri, Siang, Lohit) vide Gupta & Shukla (1988).

(122) Genus ***Diagora*** Snellen

1. *D. nicevillei* (M.) - Himachal Pr. (Dalhousie, Chamba) to Uttarakhand (Mussoorie).
2. *D. persimilis* (Wd.)
   i. *D. p. persimilis* (Wd.) - Himachal Pr., Orissa, Sikkim, Assam, Arunachal Pr. (Lohit). Upto 7000'.
   ii. *D. p. zella* But. - Kashmir, Simla, Kumaon.

(123) Genus ***Hestina*** Wd.

1. *H. nama* (Db.) - Uttarakhand (Mussoorie), Sikkim (Manul, Singhik, vide Haribal et al., 1988), Assam (Sadiya Road), Meghalaya (Nongpoh, Barapani, vide Radhakrishnan et al., 1989), and Arunachal Pr. (Kameng, Siang, Lohit).

(124) Genus ***Sasakia*** M.

1. *S. funebris* Leech - Nagaland.

[This genus is not covered by D' Abrera (1985)].

Subfamily CHARAXINAE

Tribe PROTHOINI

(125) Genus ***Prothoe*** Hüb.

1. *P. franck* Godart

[Wynter-Blyth (1957) misspelt it as '*franckii*'].

   i. *P. f. regalis* But. - Upper Assam, Manipur.

Tribe CHARAXINI

(126) Genus ***Polyura*** Billberg (= *Eriboea* Roeber)

[Smiles (1982) has revised the genus].

1. *P. agraria* Swin.
   i. *P. a. agraria* Swin. - South India (Nilgiris), M.P. and South Gujarat.

[Evans spelt it as '*agrarius*' and treated as a subsp. of *athamas*. Smiles (1982) raised it to species rank].

2. *P. arja* (Fd.) - Sikkim, Assam, Tripura. Also Meghalaya (Barapani) vide Radhakrishnan et al. (1989), and Arunachal Pr. (Tirap) vide Gupta & Shukla (1988).
3. *P. athamas* (Dry.)
   i. *P. a. andamanica* Fruh. - Andaman Is.
   ii. *P. a. athamas* (Dry.) (= *samatha* M.) - Kulu eastwards. Sikkim, Arunachal Pr. (Siang, Tirap).
4. *P. delphis* Db.
   i. *P. d. delphis* Db. - Sikkim, Assam.
5. *P. dolon* (Wd.)
   i. *P. d. carolus* Fruh. - North Assam.
   ii. *P. d. centralis* Rothschild - Sikkim.
   iii. *P. d. dolon* Wd. - NW. India: Kulu, Kumaon.
   iv. *P. d. magniplaga* Fruh. - Assam, Manipur. Also Meghalaya (Shillong), vide Varshney & Chanda (1971).
6. *P. eudamippus* (Db.)
   i. *P. e. eudamippus* (Db.) - Kumaon, Sikkim, Assam, Manipur.
7. *P. moori* Distant [= '*moorei*': Wynter-Blyth, 1957].
8. *P. narcaea* Hew.
   i. *P. n. aborica* Evans - North Assam: Abor Valley.
   ii. *P. n. lissainei* Tyt. - Assam: Naga Hills.
9. *P. schreiber* (Godart)

[Wynter-Blyth (1957) has misspelt it as '*schreiberi*'].

   i. *P. s. assamensis* Rothschild - Assam.
   ii. *P. s. tisamenus* Fruh. - Andaman Is.
   iii. *P. s. wardii* M. (= *Eriboea schriberi* Auct.) - South India.

(127) Genus ***Charaxes*** Ochsenheimer

1. *C. aristogiton* Fd.
   i. *C. a. aristogiton* Fd. - Sikkim, Assam, At low elevations.

[D' Abrera (1985) has misspelt it as '*aristogon*'].

2. *C. bernardus* F. (= *polyxena* Cr.)

[Smith (2010) has shown Kollar as author of this sp.].

i. *C. b. hierax* Fd. (= *agna* M., *hemana* But., *hindia* But., *naganum* Tyt.) - Uttarakhand (Garhwal, Kumaon), Sikkim, Meghalaya (Nongpoh), Nagaland, Arunachal Pr. (Tirap: Miao) vide Varshney & Chanda (1971). Also Andamans.

3. *C. durnfordi* Distant

i. *C. d. nicholii* (GrS.) - Assam.

[Sharma & Ramamurthy (2010) have misspelt it as '*durnofordi*'].

4. *C. kahruba* (M.) - NW. India: Kumaon, and Assam.

5. *C. marmax* Wd. - Kumaon, Sikkim, Darjeeling, Assam.

6. *C. psaphon* Wd.

i. *C. p. imna* But. - Peninsular India (Kanara) as far north as Calcutta, M.P. and Orissa.

[Larsen (1987) gave it as '*bernardus imna*' and reported that some authors treat *imna* as species].

7. *C. solon* F. (= *fabius* F.)

i. *C. s. raidhaka* Rhe-Philipe - Sikkim, 1800'.

ii. *C. s. solon* F. - Central to South India and Sikkim. Also Himachal Pr. (Kangra).

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(Fam. Nymphalidae concluded).

Champa Flowers
In the Ramayana

This week I sat in a car strongly scented with just one fresh *champa* flower and also read in the papers that the year's big *khon* (classical dance) production of the *Ramakien* (Thai Ramayana) will be the episode of *Jong Thanon*, or *Raamkaaj* as we would call it in Hindi.

The fact that the "Epic of Asia" never seemed to lose its grip was vivified by the intensely sweet and somehow heartbreaking scent of the *champaka*, its yellow petals like knife blades, its long buds elegantly shaped. Even its botanical name, *Michelia champaka*, was nice and a fragment, ill-learnt, of the Ramayana, came up for air :

chiribilva madhuka cha vanjula vakula tatha
champaka tilaka cha eva nagavriksha cha pushpita,

generally meaning 'How charming they look, the bilva and madhuka; and the vakula, champaka, tilaka and naga, blossoming,...' from Valmiki's Ramayana, Kishkinda Kanda, Chapter One.

We must factor in here that Rama was a prince and spoke posh even when grieving and the sad situation is that Rama and Lakshmana have just come to Pampa Lake in the Kingdom of Kishkinda and everything looks so beautiful, the breeze blows so pleasantly, the trees and flowers are so vivid and fragrant that Rama is overcome by memories of lost Sita—which raises another issue, is the role model of all *nayikas* burned by the fire of separation actually Sri Rama? Also, *champakas* grew around the cottage in Panchavati by the Godavari, so they were witness to terrible things like Surpanakha's disfigurement, the golden deer and Sita's abduction.

It's intriguing that *champakas* are worn or offered sparingly even today, just one or two, perhaps because they can take you somewhere else rather like how too much raw powdered cardamom smells of laundry detergent, I'm not sure why. Nor do I know the genesis of this Hindi fragment that also came up suddenly :

"Champa, tujh mein teen hai, roop, rang aur baas;
Karan tujh mein kya hai bhanwar na jaaye pass?"

"Champa, you have the three qualities of form, colour and scent/Why then do bees never come near you?"

Why does this sweet and beautiful flower inspire such dark chocolate thoughts?

—Renuka Narayanan
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