

A Check List of Butterflies of Rajshahi University Campus, Bangladesh

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Abstract: The butterflies of the Rajshahi University campus have been collected and identifying since 1991. A total of 88 species under 56 genera and 10 families were identified. The number of identified species and their percentage were recorded family wise as: Nymphalidae (21, 23.86%), Pieridae (20, 22.73%), Papilionidae (13, 14.77%), Danaidae (10, 11.36%), Lycaenidae (9, 10.23%), Satyridae (8, 9.09%), Hesperidae (4, 4.54%); and those of the families Acraeidae, Amathusidae and Riodinidae (1, 1.14%). There were 24 very common, 23 common, 25 rare and 16 very rare species.

Key words: Butterfly, Rajshahi University campus.

Introduction

Among the beautiful creatures, butterflies attract the attention of peoples of different age and status. These insects play an essential role as pollinators and thus serve as a vital factor in fruit and crop production. The eggs, caterpillars and adults of butterflies are also important links of the food chain. Butterflies are important indicators of forest health and the healthiness of the environment. The sensitivity of butterflies to the climatic changes, make a significant difference in their breeding patterns and habitat ranges (Dennis, 1993). For this reason most of the butterfly species exhibit different morphs related to the season. As they are very much vulnerable to the changes in climatic conditions, they can act as early warning sign for the environment. A rich butterfly diversity was collected from a selected area within few days indicates the availability of suitable microhabitats (Smart, 1975), so the population and diversity of butterflies are carefully monitored worldwide.

The insect order Lepidoptera is shared by the butterflies and the moths. The order contains about 165,000 known species, of which about 20,000 are the butterflies (Smart, 1975; Powell, 2009). Robbins & Opler (1997) reported the total number of butterfly species as 28,000. Lepidopterists classified the species under 15 families (Smart, 1975; Parker, 1982), but Gray (1961) placed the butterflies in only five families, and the other families are kept as sub-families. However, in some literature and in Larsen (2004) families like Danaidae and Satyridae were treated as sub-families of Nymphalidae. Presently, the lepidopterists are using 'GloBIS' (Global Butterfly

Information System) for the classification of the butterflies, which is a universally accepted taxonomic framework for these insects.

Butterflies inhabit various environmental conditions (Robbins & Opler, 1997). The diversity and abundance of butterflies are rich in the tropical areas, especially in the tropical rainforests. Bangladesh with its humid tropical climate and unique geographic location is generally known to be rich in butterfly fauna (Larsen, 2004; Chowdhury & Hossain, 2011). The authors also stated that Bangladesh in general and its eastern part in particular, in the past acted as the gateway of South Asian insect fauna to the greater part of eastern, northern and southern part of India. Larsen (2004) and Dasgupta (2006) commented that the butterfly species found in West Bengal should also be present in Bangladesh.

Works on the identification and recording of the butterfly species have been reported since a long time from different geographical regions of the world. Beccaloni *et al.* (2007) published the Global Lepidoptera Index. The Indian butterflies were first accounted by Horsfield & Moore in 1858. Moore published 10 volumes on Indian Lepidoptera from 1890 to 1907, and the last three volumes were finalized by Swinhoe (1909-1913). The Indian butterflies were thereafter identified, listed and described by Marshall & De Niceville (1882), De Niceville (1885, 1886, 1890 a,b,c), Rhe-Philipe (1910), Antaram (1924), Bell (1920), Evans (1932), Roy (1932), Gladman (1947), Sanders (1955), Wynther-Blyth (1957), Kunte (2000) and Larsen (2002). However, D'Abbrera (1982, 1984 & 1986) published works on the butterflies of Indo-

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Oriental and Oriental regions focusing on the Indian species. Recently, Kunte *et al.* (2013) published a pictorial list of the butterflies of India.

The scenario of butterfly diversity of neighbouring countries of Bangladesh and those of the Southeast Asian countries had also been published, *viz.*, Bengal and West Bengal (Moore (1865; Rothney, 1882; Sanders, 1944, 1955; Sevastopulo, 1944,1946), Madhya Pradesh (Gupta & Shukla, 1987), Burma (Watson, 1888, 1891, 1897; Adamson, 1905, 1908), Thailand (Pinratana, 1981-1986), Southeast Asian Islands (Tsukada, 1982-1991), Sikkim (Haribal, 1992), Malaysia (Eliot, 1992), Nepal (Smith, 1994), the Philippines (Treadaway, 1995), Ceylon (D'Abrera, 1998), Hong Kong (Bascombe *et al.* 1999) and Pakistan (Chaudery *et al.* 1966; Roberts, 2001).

Published reports on the butterfly fauna of Bangladesh are scanty, though a fairly good number of butterflies were listed from the Khasia Hills of Assam and Sylhet, and published during the period from 1840 to 1910 (Larsen, 2004). Hope (1843) reported some rare species from Sylhet. Swinhoe (1893, 1896) published papers on the butterflies of Khasia Hills. Parsons & Cantlie (1948) and Cantlie (1952, 1956) reported more than 700 species of butterflies from the Khasia and Jainta Hills covering altitudes from 150-3,000 metres. Before 1971, very few reports were published, which provided useful information on the butterflies of Bangladesh region (Alam, 1962; Ameen & Chowdhury, 1968; Chaudery *et al.*, 1966). Later on works have been done on the forest butterflies of Bangladesh by Zethner & Chowdhury ((1971), Baksha & Choudhury, 1983, 1985), Chowdhury & Mohiuddin (2003), Shahjahan *et al.* (2008) and Islam *et al.* (2007, 2011). Anonymous (1998, 2000) reported butterflies of Bangladesh. List of butterflies have also been published by Alam & Raushan Ulla (1995) and Hossain *et al.* (2003) from the campuses of Chittagong University and Jahangirnagar University respectively. Larsen (2004) published a checklist of the butterflies of Bangladesh. Recently, Chowdhury & Hossain (2011) published a pictorial handbook of butterflies of Bangladesh.

The campus of the University of Rajshahi, popularly known as RU campus, despite of the roads and buildings, is well known for its natural beauty. The campus includes all types of habitats that can support the butterfly fauna (Anonymous, 1991, 2012; Goni, 1991; Pervin, 2005; Roy, 2005). Haque (1991) collected butterflies from

another confined area, the Rajshahi Central Park. The present paper provides a list of butterflies of the RU campus along with their habitats. The status of the collected species among the Bangladesh fauna, as found in the literature is also provided.

Materials & Methods

Collection area: Butterfly specimens were collected from different habitats of the RU campus. Ten different butterfly habitats were identified in the campus, e.g., crop and grass lands, shady grass land, areas covered with dense shrubs and vines, open woodland (scattered trees of different species, vines and grassy patches beneath the trees), dry uncultivated land without grass or herbs, flower garden, beside ponds, mulberry orchard, and Indian plum garden of the Department of Zoology. Sampling was done in each of these habitats.

Sampling frequency: Each of the habitats was visited four times a week. Sampling was done alternately one day in the morning between 10-12 am, and the other day in the afternoon between 3-5 pm. Occasional visits to the habitats were done for half an hour in the morning (7-7.30 am), noon (1-1.30 pm) and evening (5.30-6 pm), especially in the summer days. Intense sampling and field study were carried more or less throughout the year from 1991-2013, but from 2000 just casual observations were made from November to the end of January. During these three winter months, sometimes the grass lands and the uncultivated crop lands were visited from 7-8 am. Sampling or field visits were avoided during the rainy or cloudy days. After 2005 butterfly habitats were occasionally visited to record the identified species, and searching for new species if any.

Sampling procedure: Butterfly nets were used to collect them while in flight or at rest. Soft fine-meshed net was used to make the bag, which was tied with light round ring-like frame of one foot radius. A wooden handle was attached to the ring or frame. Length of the handle was made according to the collectors' choice. Short handled net is easy to sweep, whereas with long handled nets the flying butterflies are easy to collect. The collected specimens were kept carefully in plastic containers and the mouth was covered with perforated lids.

After 13 years (since 2000) of butterfly collection, photographs of them were taken. If there was any unknown specimen only in that case, live butterfly

was caught. Photographs were taken with digital cameras.

Curing, stretching and preservation: After collection the specimens were taken to the laboratory of the Zoology Department. The collected specimens were then placed in large mouthed glass jars. To kill the butterflies, 3-4 cotton balls soaked in 2% chloroform or ether were kept inside the glass jars. Mouth of the jar was covered with air tight lids.

The dead butterflies were stretched on stretching boards with the help of insect pins and small paper pieces. The pin was inserted through the thorax in between the front wings. The wings, legs and abdomen were stretched and arranged in proper position. The wings were kept straight with a piece of paper covering the wings and pinned on either side.

After stretching, the butterflies were kept in fly and ant proof netted cupboard for drying at room temperature. Dried butterflies were arranged in drawers properly labeled with specimen number, date and time of collection, and habitat. Few naphthalene balls were added in each drawer for protecting the butterflies from any infestation. The drawers were then inserted in the insect cabinet and preserved.

Preservation of data: Field data of each collection were recorded thereafter in a register book (up to 2002) and in computer (after 2002). Digital photographs of the butterflies are in the record in which the date and time of the collections are recorded.

Status of the butterfly species: The collected species were categorized into one of the four categories based on the classification given by Tiple *et al.* (2006, 2007). However, the category 'not rare' as found in these articles, was not taken into consideration in the present observation. The butterflies were categorized as **very common** (VC) when they were seen in every visit and at any time of the day; **common** (C) are those species which were seen more or less at each sampling day and at some definite times; **rare** (R) species are those which were not seen every year; and **very rare** (VR) are those were seen less than 20 times in long 22 years of the study.

Identification of butterflies: The collected specimens were identified on the examination of their morphological characters according to Talbot (1975). Identification of the genera and species

were confirmed from the photographs provided in Smart (1975), Larsen (2004), Dasgupta (2006), Chowdhury & Hossain (2011) and Kunte *et al.* (2013). The common English names of the butterfly species were taken from Larsen (2004), Chowdhury & Hossain (2011) and Kunte *et al.* (2013); the Bangla names were given as found in Dasgupta (2006) and Chowdhury & Hossain (2011).

Observations & Discussion

The list of butterflies of the RU campus is presented in Table 1. There found a total of 88 different species under 56 genera and 10 families. The number of identified species was actually 85, and the rest three were identified up to the generic level. The unidentified species were of the genera *Danaus*, (Danaiidae), and *Chylosyne* and *Helcyra* (Nymphalidae). The number of the identified species and their percentage were recorded according to family as: Nymphalidae (21, 23.86%), Pieridae (20, 22.73%), Papilionidae (13, 14.77%), Danaiidae (10, 11.36%), Lycaenidae (9, 10.23%), Satyridae (8, 9.09%), Hesperiiidae (4, 4.54%); and those of the families Acraeidae, Amathusidae and Riodinidae (1, 1.14%). Islam *et al.* (2011) recorded 158 species from Savar area including a part of Jahangirnagar University and Atomic Energy Research Establishment (AERE) campuses. In their record the dominant family was Lycaenidae with 47 species, followed by Hesperiiidae (32 species), Pieridae (22 species) and Nymphalidae (19 species). The forest species were dominated in their study area. Butterfly diversity is strongly related to the availability of food plants for the larvae which are very species specific, and those of the adults (Vickery, 1988).

The habitats from where the butterflies were collected are mentioned in Table 1, and species status is shown in Tables 1 & 2. A total of 16 very rare species were collected from the campus. During 22 years of butterfly sampling these species were collected or photographed less than 20 times. Five very rare, five rare and seven very common species of pierids were observed. The common butterflies numbered to nine under the family Nymphalidae. Among the two species of Riodinidae found in Bangladesh (Chowdhury & Hossain, 2011) only one species was recorded from the campus and this was rarely observed during the study period.

Table 1. Checklist of butterflies of Rajshahi University campus

Family	Scientific Name	Common English Name	Bangla Name	Habitat	Status
Danaidae	1. <i>Danaus chrysippus</i> (Linnaeus)	Plain Tiger	Tamot	Brightly sunlit grassland with mixed vegetation	VC
	2. <i>Danaus genutia</i> Cramer	Striped/Common Tiger	Baghballa	Flower gardens, Flowering bush and vines	VC
	3. <i>Danaus melanippus indicus</i> (Fruhstorfer)	White Tiger	Sushama	Bushes and vines	R
	4. <i>Danaus</i> sp.			Flower gardens, Flowering bush and vines	R
	5. <i>Danaus plexippus</i> Linnaeus	Monarch Butterfly		Flower gardens	VR
	6. <i>Euploea core core</i> (Cramer)	Common Crow	Kauwa	Brightly sunlit grassland with mixed vegetation	VC
	7. <i>Euploea sylvester montana</i> Talbot	Double-banded Crow		Grassland, Winter crop land	R
	8. <i>Parantica aglea aglea</i> (Stoll)	Glassy Tiger	Shetalkuchi	Moist shadow areas with grass and herbs	C
	9. <i>Tirumala (Danaus) limniace leopardus</i> (Butler)	Blue Tiger	Himolkuchi	Brightly sunlit grassland with mixed vegetation	C
	10. <i>Tirumala (Danaus) choaspes</i> Butler			Brightly sunlit grassland with mixed vegetation	VR
Papilionidae	11. <i>Chilasa (Papilio) clytia clytia</i> (Linnaeus)	Common Mime	Khagra	Brightly sunlit grassland with mixed vegetation, Flower garden	C
	12. <i>Chilasa (Papilio) clytia dissimilis</i> (Linnaeus)	Common Mime (dissimilis form)		Brightly sunlit grassland with mixed vegetation, Flower garden	C
	13. <i>Chilasa epycides</i> (Hewitsen)	Lesser Mime	Khagra chari	Bushes and vines, Grassland	R
	14. <i>Graphium agamemmon agamemmon</i> (Linnaeus)	Tailed Jay	Chaitok	Bushes and vines, Grassland	R
	15. <i>Graphium doson axion</i> (Felder & Felder)	Common Jay	Minji	Bushes and vines, Grassland	R
	16. <i>Graphium sarpedon</i> (Linnaeus)	Common Blue-bottle/Blue Triangle		Moist shadowed grassy areas	VR
	17. <i>Pachliopta aristolochiae</i> (Fabricius)	Common Rose	Alte	Half shadowed Grassland with mixed flowering vegetation	VR
	18. <i>Pachliopta hector</i> (Linnaeus)	Crimson Rose	Alsindura	Grassland, Cropland, over bushes and medium sized trees	C
	19. <i>Papilio demoleus demoleus</i> (Linnaeus)	Lime	Ruru	Brightly sunlit Grassland with mixed vegetation	VC
	20. <i>Papilio polytes romulus</i> Cramer	Common Mormon	Kalim	Flower gardens, Flowering plants	C
	21. <i>Papilio polymnestor</i> (Cramer)	Blue Mormon	Barun Pakha	Flower gardens, Flowering bush and vines	R
	22. <i>Papilio helenus helenus</i> Linnaeus	Red Helen	Chanda	Flower gardens, Flowering bush and vines	VC
	23. <i>Papilio janaka</i> Moore			Brightly sunlit Grassland with mixed vegetation	VR
Pieridae	24. <i>Appias libythea olferna</i> Swinhoe	Striped Albatross	Dhul Kapash	Brightly sunlit Grassland with mixed vegetation, Flower garden	VC
	25. <i>Appias lalage lalage</i> (Double Day)	Spot Puffin		Open area near water body	VR
	26. <i>Appias lyncida eleonora</i> (Boisduval)	Chocolate Albatross	Khairi Kapash	Wet areas under trees	R
	27. <i>Ascia monuste</i> Linnaeus	Great Southern White		Brightly sunlit Grassland with mixed vegetation	VR
	28. <i>Catopsilia florella</i> (Fabricius)	African Emigrant/Common Vagrant		Brightly sunlit Grassland with mixed vegetation, flowering crop land	VR
	29. <i>Catopsilia pomona</i> (Fabricius)	Common Emigrant	Pairachil	Grassland, Crop land, Bushes and vines	VC
	30. <i>Catopsilia pyranthe</i> (Linnaeus)	Mottled Emigrant	2 different morphs, Chit Paira	Grassland, Crop land, Bushes and vines	VC
	31. <i>Colias eurytheme</i> Boisduval	Orange Sulphur		Grassland, Crop land	VR

Family	Scientific Name	Common English Name	Bangla Name	Habitat	Status
Pieridae	32. <i>Colotis amata</i> Boisduval	Topaz		Grassland, Flower garden	VR
	33. <i>Delias descombesi descombesi</i> (Boisduval)	Red-spot Jezebel	Konka	Flower garden	R
	34. <i>Delias eucharis</i> (Drury)	Common Jezebel	Hartoni	Shady Grassland with mixed vegetation	VC
	35. <i>Eurema andersoni</i> Moore	One-spot Yellow Grass		Flower garden, Shrubs around trees	R
	36. <i>Eurema blanda silhetana</i> (Wallace)	Three-spot Grass Yellow		Shady Gardens and Grassland, Grassy roadside	VC
	37. <i>Eurema hecabe</i> Moore	Common Grass Yellow	Halud	Grassland with mixed vegetation, Flowering orchards and garden	VC
	38. <i>Ganduca harina assamica</i> Moore	Tree Yellow	Tal Pakha	Open Woodland	C
	39. <i>Leptosia nina nina</i> (Fabricius)	Psyche	Phurus	Grassland, Bushes	VC
	40. <i>Pieris brassicae</i> Gray	Large Cabbage White		Grassland, Winter Crop land	R
	41. <i>Pieris canidia</i> (Evans)	Indian Cabbage White	Sarin	Grassy roadside, Grassy land beside ponds	C
	42. <i>Pieris rapae</i> Linnaeus	Small Cabbage White		Grassland, Winter Crop land	C
	43. <i>Valeria (Paneronia) valeria hippia</i> (Fabricius)	Common Wanderer	Taller	Brightly sunlit Grassland with mixed vegetation	R
	Nymphallidae	44. <i>Anartia jatrophae</i> Linnaeus	White Peacock		Brightly sunlit Grassland with mixed vegetation, Gardens
45. <i>Argynnis (Speyeria) aglaja</i> (Linnaeus)		Dark Green Fritillary		Brightly sunlit Grassland with mixed vegetation	R
46. <i>Argynnis (Speyeria) hyperbius</i> (Fabricius)		Indian Fritillary	Rupsha	Brightly sunlit Grassland with mixed vegetation	R
47. <i>Ariadne ariadne pallidior</i> (Fruhstorfer)		Angled Castor	Kan Morche	Grassland with mixed vegetation	C
48. <i>Ariadne merione</i> (Cramer)		Common Castor	Morchepata	Bushes and vines	VC
49. <i>Chylosyne</i> sp.				Bushes and vines	R
50. <i>Euthalia aconthea garuda</i> Moore		Common Baron	Bhushanda	Grassland with mixed vegetation	C
51. <i>Helcyra</i> sp.					R
52. <i>Hypolimnas bolina</i> (Linnaeus)		Great Eggfly	Jamui	Brightly sunlit Grassland with mixed vegetation	C
53. <i>Hypolimnas misippus</i> Linnaeus		Danaid Eggfly	Jamchanda	Flower garden, Bushes and vines	VC
54. <i>Junonia almana</i> (Linnaeus)		Peacock Pansy	Noyan	Flower garden	VC
55. <i>Junonia atlites</i> (Linnaeus)		Grey Pansy	Chandnori	Flower garden, Bushes and vines	VC
56. <i>Junonia lemonias</i> (Linnaeus)		Lemon Pansy	Ushum	Brightly sunlit Grassland with mixed vegetation	VC
57. <i>Junonia orithya</i> Linnaeus		Blue Pansy	Tooa	Flower garden, Bushes and vines	C
58. <i>Maniola jurtina</i> (Linnaeus)		Meadow Brown		Flowering shrubs and vines	C
59. <i>Mycalesis perseus</i> (Fabricius)		Common Bushbrown	Janglabira	Grassland	C
60. <i>Neptis clinia susruta</i> Moore		Clear Sailor		Trees, Bushes and vines	R
61. <i>Nymphalis xanthomelus</i> (Denis & Schiffermuller)		Scarce Tortoiseshell		Shadowed bushes and grassland	VR
62. <i>Phalantha phalantha phalantha</i> (Drury)		Common Leopard	Chita	Brightly sunlit Grassland with mixed vegetation	VC
63. <i>Symphaedra mais</i> Forster		Baronet	Moram	Grassland with mixed vegetation, Bushes	C
64. <i>Vanessa cardui</i> (Linnaeus)		Painted Lady	Binti	Flower garden, Bushes and vines	C

Family	Scientific Name	Common English Name	Bangla Name	Habitat	Status
Lycaenidae	65. <i>Castalius rosimon rosimon</i> Fabricius	Common Pierrot	Tilaiya	All habitats except open wood	VC
	66. <i>Catochrysops strabo</i> Fabricius	Forget-me-not	Rittam/Ringtam	Grassland, Bushes and vines	R
	67. <i>Chilades laius</i> (Cramer)	Lime Blue	Tura	Flowering Orchards and shrubs	C
	68. <i>Curetis thetis</i> Drury	Indian Sunbeam	Jhinuk Palash	Grassland, Flower garden	VR
	69. <i>Hypolycaena erylus</i> Godart	Common Tit	Tongsha	Moist areas under trees	C
	70. <i>Spindasis lohita</i> Moore	Long-banded Silverline	Roopatatia	Open woodland	R
	71. <i>Tarcus callinara</i> Butler	Spotted Pierrot		Grassland, Shrubs, Flower garden	C
	72. <i>Zizzeria maha</i> Kollar	Pale Grass Blue	Dhupi	Grassland, Shrubs	VR
73. <i>Zizula hylax</i> (Fabricius)	Tinny Grass Blue	Tinni	Shadowed grassland and garden, Flowering vegetation	R	
Hesperiidae	74. <i>Ceratrachia flava semilikensis</i> Hew			Shadowed grassland, open wood	VR
	75. <i>Hasora badra badra</i> Moore	Common Awl	-	Orchards and bushy shrubs	R
	76. <i>Parnara guttatus mangala</i> Moore	Straight Swift	Nilbijuri	Garden, Bushes, Cropland	VC
	77. <i>Sarangesa dashoratha</i> Moore	Common Small Flat	Jirani	Shadowed grassland, open wood	R
Satyridae	78. <i>Elymnias hypermnestra tinctoria</i> Moore	Common Palmfly	Khairchak	Garden, Bushes, Trees	VC
	79. <i>Lethe sidonis</i> Hewitson	Common Wood Brown		Shady areas under bushes and trees	C
	80. <i>Melanitis leda ismene</i> (Cramer)	Common Evening Brown	Sanjhla	Brightly sunlit Grassland with mixed vegetation	VC
	81. <i>Melanitis zitenius zitenius</i> (Herbst)	Great Evening Brown		Moist areas under trees and bushes	C
	82. <i>Mycalesis perseus</i> (Fabricius)	Common Bush Brown	Janglabira	Grassland	C
	83. <i>Ypthima baldus baldus</i> (Fabricius)	Common Fivering	Panchbundi	Grassland	R
	84. <i>Ypthima ceylonica</i> Hewitson	White Fourcing	Char bundi	Grassland under shrubs	R
85. <i>Ypthima inica</i> Hewitson	Lesser Threering		Grassland	VR	
Acraeidae	86. <i>Acraia violae</i> (Fabricius)	Tawny Coaster	Harinchara	Grassy patches in open woodland	VC
Amathusidae	87. <i>Discophora sondaica zal</i> Westwood	Common Duffer	Kotkote	Grassy patches in open woodland	VC
Riodinidae	88. <i>Emesis (Papilio) mandana</i> Cramer	Variable Emesis		Grassland under shrubs	R

Table 2. Species status of butterflies of the RU campus

Family	Status by number (N=85)				Total no. of species (%)
	Very common	Common	Rare	Very Rare	
Danaidae	3	2	3	2	10 (11.36)
Papilionidae	2	4	4	3	13 (14.77)
Pieridae	7	3	5	5	20 (22.73)
Nymphalidae	6	8	5	2	21 (23.86)
Lycaenidae	1	3	3	2	9 (10.23)
Hesperiidae	1	-	2	1	4 (4.54)
Satyridae	2	3	2	1	8 (9.09)
Acraeidae	1	-	-	-	1 (1.14)
Amathusidae	1	-	-	-	1 (1.14)
Riodinidae	-	-	1	-	1 (1.14)
Total no. of species	24	23	25	16	88

Identification of butterflies up to species level is difficult chiefly due to their polymorphic nature (Scoble, 2009; Allen *et al.*, 2011). Many of these insects have sexual dimorphism, for example *Eurema hecabe* (Common Grass Yellow). The sexes of this species differ in colour and size. A number of butterfly species have different morphs for dry and rainy seasons, for example *Appias libythea olferna* (Stripped Albatross), and even for different localities of their geographic range (Smart, 1975; Chowdhury & Hossain, 2011). Some of the butterfly species are mimic to other species of the same order, and some others are quite indistinguishable without examining the finer structural characteristics like genitalia (Nielsen, 1989). The seasonal changes have great influence on butterfly morphs (Yata, 1974).

Yamasaki (1978) and Yata & Tanaka (1979) reported that the day-length also affects the morph of *Catopsilia pyranthe* (Mottled Emigrant) and *C. pomona* (Common Emigrant). Mahdi *et al.* (2010, 2011) reported that heat or cold shock to the developing stages of butterflies can affect their wing colour pattern.

Larsen (2004) reported that there are 427 species of butterflies in Bangladesh (range 500-550). Chowdhury & Hossain (2011) reported only 179 species in their book (Table 3). Among the 15 families no representatives of five families, viz., Megathynidae, Libytheidae, Ithomiidae, Brassiolidae and Morphidae were found in the RU campus, and even in Bangladesh as published by Chowdhury & Hossain (2011).

Table 3. Comparative statement on species diversity (by number) of butterfly families of RU campus with those of the World, India and Bangladesh

Family	World Wide	¹ India	¹ West Bengal	² Bangladesh	² SHC & MH	RU campus	Distribution
Danaidae	3000			20	12	10	Tropical & Sub-tropical
Papilionodae	2500	107	39	70	23	13	World wide
Pieridae	2000	109	39	35	17	20	World wide
Nymphalidae	6000	520	178	100	47	21	World wide
Lycanidae	6000	450	125	110	38	09	World wide
Hesperiidae	3500	320	71	70	23	04	World wide
Satyridae	3000			35	14	08	World wide
Riodinidae	1000			04	02	01	World wide
Acraeidae	200	02		01	01	01	Africa, India
Amathusiidae	80			05	02	01	Indo-Australia

Note: ¹ After J. Dasgupta (2006), ² After S.H. Chowdhury & M. Hossain (2011)

In comparison to the total number of butterflies of Bangladesh, the butterfly fauna of the RU campus (303.80 hectare) is quite rich and it represented each of the 10 families present in Bangladesh. A few specimens remained unidentified because of the confusing wing colour patterns. Studies on the wing colour patterns of different families of butterflies collected from the RU campus, are continuing for better understanding of their polymorphism and mimicry, and thus for their correct identification (Akhter, 2012; Tasnin, 2012). In this context, the identification of a very rare species of the Danaidae, *Danaus plexippus*, the Monarch Butterfly, is a confusing one. During this 22 years of study, only four specimens of the Monarch Butterfly were collected and photographed. In most of the literature, it was found that the Monarchs are great migrants but did not reach the Indian sub-continent and Southeast Asia. After a detailed examination and studying the sexual and seasonal polymorphism of butterflies, at last it was decided to include the

specimen in the list as *D. plexippus*. However, a few literature reported that *Danaus plexippus* is available in the Indian sub-continent and Sri Lanka (Talbot, 1975).

The habitats of the RU campus should be conserved to sustain the biodiversity. Many countries now conserving their biodiversity, and to conserve the butterflies several attempts have taken (Vickery, 1998; Brereton, 2010). To conserve the butterflies of the RU campus the following conservation steps should be undertaken immediately:

- i) Plantation of the flowering plants and preservation of the existing natural flora;
- ii) Cleaning and cutting of grass outside the faculty and residential areas must be prohibited;
- iii) Some patchy areas at the side of water bodies should be kept together with wild vegetations;

- iv) Unjudicious cutting of tree branches, shrubs and cleaning up of the herbs should be stopped;
- v) Minimizing the use of chemical pesticides in the crop fields, especially for the cruciferous crops;
- vi) Use of chemical fertilizers should be minimized to save the soil-inhibiting pupae of butterflies;
- vii) Campaigning to develop the concern for conservation of habitats and biodiversity is very essential, among the students, employees and other people who have access to the campus.

All these activities will succeed if the University Authority takes part in protecting the habitat and biodiversity of the campus.

The role of faunal survey undoubtedly plays a pivotal role in the economy of a country (Chowdhury, 2009), is inclusive and future comprehensive studies are very much to be directed in this line.

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