

## Conservation Assessment and Management Plan Workshop for Freshwater Biodiversity of Pakistan, 13-17 December, 2004

A Conservation Assessment and Management Plan (C.A.M.P) workshop for Freshwater Biodiversity for Pakistan was organised by the IUCN Pakistan in association with CBSG South Asia, South Asian Invertebrate Specialist Group and Zoo Outreach Organisation from 13-17 December 2004. The objective of the workshop is to assess the status of selected freshwater fauna such as Fishes, Crustaceans (crabs), Molluscs (snails), and Odonates (dragonflies and damselflies) in the wild. Dr. Abdul Latif Rao, Country Representative, IUCN Pakistan, Dr. B. A. Wani, Inspector General, Ministry of Forests, Government of Pakistan, Dr. Kashif M. Sheikh, Head, IUCNP and Sally Walker, Convenor, CBSG South Asia were on the dias for the inaugural function. Short presentations were given by them and also by Dr. Nasim Akhtar, Dy. Dir. General, Animal Sciences Institute (Freshwater Resources and its Conservation in Pakistan), Sanjay Molur, Co chair, Reintroduction Specialist Group, South and East Asia and Red List Specialist, and by Dr. B.A. Daniel, Co chair, South Asian Invertebrate Specialist Group.

The IUCN SSC Freshwater Biodiversity Programme identified the groups such as Freshwater fishes, Crustaceans (crabs), Molluscs (snails), and Odonata (Dragonflies & Damselflies), so the participants agreed to prioritise these groups of their five day assessment.

Before dividing into working groups information of a well-known species, the Himalayan Maseer (*Tor macraleupatus*) of the Family Ciprinidae, was tried and a taxon data sheet was filled in as an example with all participants contributing information. During the five day workshop apart from fishes, 9 crabs, 41 molluscs, 27 dragonflies and 32 damselflies were assessed.

On the last day of the workshop a plenary discussion was held to review the assessments of endemic fishes that had been done and to discuss which special issue working groups would be formed. The following issues and other issues were discussed by the plenary group: legislation, policy, management, human factor, habitat management, impact of exotic species, protection of native species, research, etc. Some topics were selected after the remaining species were assessed and Working Group exercises held. The reports of the Working Groups were presented before the Valedictory Ceremony. The complete report of the workshop is in the process of its publication. The list of invertebrates assessed in the CAMP workshop is given below:

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### List of some invertebrate species assessed at the Freshwater Biodiversity CAMP in Islamabad, Pakistan, IUCNP

#### Odonates of Pakistan

##### Suborder: Zygoptera

*Neurobasis chinensis*  
*Rhinocypha hilaryae*  
*Rhinocypha immaculata*  
*Rhinocypha quadrimaculata*  
*Rhinocypha trifasciata*  
*Rhinocypha unimaculata*  
*Bayadera indica*  
*Aciagrion hisopa*  
*Agriocnemis dabreui*  
*Agriocnemis pygmaea*  
*Ceriagrion cerinorubellum*  
*Ceriagrion coromandelianum*  
*Ischnura aurora*  
*Ischnura forcipata*  
*Ischnura elegans*  
*Ischnura senegalensis*  
*Pseudagrion decorum*  
*Pseudagrion hypermelas*  
*Pseudagrion laidlawi*  
*Pseudagrion rubriceps*

*Pseudagrion spenci*

*Rhodischnura nursei*

*Calicnemis eximia*

*Copera marginipes*

*Elatoneura nigerrima*

*Lestes thoracicus*

*Lestes umbrina*

#### Odonates of Pakistan

##### Suborder: Anisoptera

*Anax immaculifrons*

*Anax parthenope*

*Anax nigrolineatus*

*Cordulegaster brevistigma*

*Macronida cingutala*

*Anormogomphus kiritschenko*

*Gomphidia t. nigrum*

*Ictinogomphous angulosus*

*Acisoma panorpoides*

*Crocothemis erythraea*

*Crocothemis servilia*

*Diplacodes trivialis*

## Pakistan species assessed

*Neurothemis tullia tullia*  
*Orthetrum glaucum*  
*Orthetrum brunnum brunnum*  
*Orthetrum chrysostigma luzonicum*  
*Orthetrum sabina*  
*Orthetrum t. triangulare*  
*Orthetrum pruinatum neglectum*  
*Orthetrum anceps*  
*Palpopleura s. sexmaculata*  
*Pantala flavescens*  
*Rhyothemis v. variegata*  
*Sympetrum commixtum*  
*Sympetrum fonscolombii*  
*Sympetrum haematoneura*  
*Sympetrum meridionale*  
*Tramea basilaris*  
*Trithemis aurora*  
*Trithemis festiva*  
*Trithemis pallidinervis*  
*Zyzomna petiolatum*

## Crabs of Pakistan

*Cardisoma cornifex*  
*Sartoriana blanfordi afghanensis*  
*Sartoriana blanfordi blanfordi*  
*Potamon fluvialitis*  
*Potamon gedrosianum*  
*Potamon gedrosuanum waziristanis*  
*Potamon ibericus*  
*Potamon spinigera*  
*Potamon sydneyi*

## Molluscs of Pakistan

*Bythinia stenothyroides*  
*Gabbia orcula*  
*Buliminus dextrosinistra*  
*Babylonia spirata*  
*Corbicula alberti*  
*Corbicula regularis*  
*Corbicula striatella*  
*Littorina (Littorinopsis) scabra scabra*  
*Lymnaea (P.) acuminata f. patula*  
*Lymnaea (P.) acuminata f. rufescens*  
*Lymnaea (P.) acuminata f. chlamys*  
*Lymnaea auricularia*  
*Lymnaea gedrosiani*  
*Lymnaea horae*  
*Lymnaea luteola*  
*Lymnaea pinguis*  
*Pugilina cochlidium*  
*Gyraulua convexisculus*  
*Gyraulus euphraticus*  
*Indoplanorbis exustus*  
*Physa acuta*  
*Physa gyrinus*  
*Telescopium telescopium*  
*Cerithidea (Certhideaesilla) cingulata*  
*Tibia fusus*  
*Thiara (Melanoides) tuberculata*  
*Euchelus asper*  
*Euchelus atratus*  
*Euchelus circulator*  
*Trochus stellatus*  
*Parreysia (Radiatula) caerulea*  
*Parreysia (P.) corrugata var. nagpoorensis*  
*Parreysia favidens*  
*Parreysia (Radiatula) pachysoma*  
*Parreysia (Parreysia) wynegungaensis*  
*Lamellidens corrianus*  
*Lamellidens marginallus*  
*Viviparus crassa*  
*Bellamya bengalensis*  
*Bellamya dissimilis*  
*Bellamya naticoides*

## A Preliminary Investigations of Butterfly Diversity of Sardar Patel University Campus, Vallabh Vidyanagar, Gujarat

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There are about 1500 species of butterflies occurring in the Indian subcontinent (Gay *et al.*, 1992), consists of both Palearctic and Oriental forms (Evans, 1932; Wynter-Blyth, 1981; D'Abrera, 1985), which vary greatly in colours, size and habitats, from the traffic island gardens in the middle of busy roads to the verdant forests. They hold an important place in the web of life, being closely associated with plantlife. Our wealth of butterflies is truly great and varied. Majority of them are harmless, and an indispensable members of nature, which are responsible for bringing about the cross-pollination of most of the flowers (Mani, 1995; Uniyal and Mathur, 1998).

Butterflies show distinct pattern of habitat utilization. The nature of vegetation is the important factor, which determines the dependence and survival of a species on a particular habitat. Several species of butterflies are exclusively forest dwellers, and their presence or absence serves to monitor the ecological changes in habitat, warning us about the deteriorating environment. Being highly sensitive to change in the environment, they are easily affected by even minor perturbations in the habitat. Thus they have been considered as indicators of environmental quality and the health of an ecosystem (Rosenberg *et al.*, 1986). The presence of butterflies emphasizes the availability of the larval food plants in great abundance. Most butterflies have specific habitat requirements. There is an intimate association between butterflies and plants. Thus the distribution of butterflies is exclusively dependant upon the availability of their food plants (Feltwell, 1986).

In present time, as a result of rapid decline in forest cover and vegetation, and the consequent depletion of their habitat, the very existence of these lovely creatures has been threatened. The situation has been exacerbated by the increasing use of chemical fertilizers and pesticides (Gay *et al.*, 1992). Among insects, butterflies are explored extensively all over the world. Though, the total collection is small, they are important in the light of further explorations, which would aid in framing conservation strategy (Khatri, 1998). Till now, no any previous study had been carried out to explore the butterfly diversity of the campus area of Sardar Patel University, Vallabh Vidyanagar, Gujarat. The present investigation is an outcome of a pilot survey of butterfly diversity.

**Vallabh Vidyanagar** (25°34'N; 72°54'E) with a human population of around 35,000 is an unique educational township, built and developed as a centre for higher education in rural surroundings. It is about 2 kms from Karamsad, the hometown of Late Shri Sardar Vallabhbai Patel, and 5 kms from Anand, the Milk City of India, which is on Baroda - Ahmedabad railway line in the heart of Anand district of Gujarat. The township became functional in June 1947 and the Sardar Patel University started functioning in 1956. The lush green campus of the university spread over 8 kms radius covering Vallabh Vidyanagar, Bakrol, Karamsad and Anand, a quiet and peaceful place, away from urban distractions, is an ideal place for study of biodiversity elements. The campus area harbours various plant species e.g. *Albizia lebeck*, *Ailanthus excelsa*, *Azadirachta indica*, *Caesalpinia pulcherrima*, *Cassia auriculata*, *Cassia fistula*, *Ficus bengalensis*, *Ficus religiosa*, *Mangifera indica*, *Pithecelobium dulce*, *Spathodea campanulata*, *Terminalia catapa*, *Thespesia populnea*, etc. and thousands of Rose ringed parakeets (*Psittacula krameri*) along with other birds like Sparrows, Mynahs, Kites, Babblers, Warblers, Weaver birds, Water hens, Ibises, Egrets and small Waders.

The present study was carried out to know the existing diversity of butterflies in and around campus area of Sardar Patel University. The visits were made from August 2003 to June 2004 on monthly basis. For this, various areas like gardens, parks, plantation plots, educational premises, sports complexes, library buildings and vicinity of human habitations were surveyed. All butterflies sighted were identified and recorded. The identifications were based on direct visual observations and confirmed with the help of published nature guides (Gay *et al.*, 1992; Mani, 1995). Not any kind of captures of butterflies were made to obey the ethics of a conservationist.

The status of each documented species was categorized on the basis of frequency of number of sightings of species and number of individuals recorded per visit. The individuals of species sighted more than 10 times per visit were given abundant status, and 5 to 10 times were categorized as common, while individuals of species documented less than 5 times per visit were grouped as rare.

Table 1 shows checklist of butterflies present during the present investigation. In total, 35 species of butterflies represented by 22 genera belonging to 6 families were recorded from the campus area, which exhibits 1:3.6:5.8 ratio of family, genus and species. Of which, maximum number (11) of species belongs to family Pieridae, which form almost 31.43% of the total recorded species, followed by family Lycaenidae with 7 species (20%), family Papilionidae with 5 species (14.29%) and 4 species (11.43%) represented by family Danaidae. While only one species (2.86%) of butterfly was recorded from family Satyridae.

Nearly 48.57% of species were found very common with frequent sightings; and about 28.57% were found abundant, while 22.86% of species were found rare with infrequent sighting. A detailed investigation is a prime requisite for a methodical evaluation of butterfly diversity and factors accountable for their prevalence in the campus area.

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**Table. A Checklist of Butterflies of Sardar Patel University Campus, Vallabh Vidyanagar, Gujarat**

<b>Papilionidae</b>		
Common Rose	<i>Pachiliopta aristolochiae</i>	C
Crimson Rose	<i>Pachiliopta hector</i>	C
Lime Butterfly	<i>Papilio demoleus</i>	A
Common Mormon	<i>Papilio polytes</i>	C
Blue Mormon	<i>Papilio polymnestor</i>	R
<b>Pieridae</b>		
Common Zezebel	<i>Delias eucharis</i>	C
Indian Cabbage White	<i>Artogeia canida</i>	A
Pioneer	<i>Anaphaeis aurota</i>	C
Common Gull	<i>Cepora nerissa</i>	C
White Orange Tip	<i>Ixias marianne</i>	C
Yellow Orange Tip	<i>Ixias pyrene</i>	C
Great Orange Tip	<i>Hebomoia glaucippe</i>	R
Common Wanderer	<i>Pareronia valeria</i>	C
Common Emigrant	<i>Catopsilia pomona</i>	A
Mottled Emigrant	<i>Catopsilia pyranthe</i>	R
Common Grass Yellow	<i>Eurema hecabe</i>	A
<b>Lycaenidae</b>		
Zebra Blue	<i>Syntarucus plinius</i>	C
Pale Grass Blue	<i>Zizeeria maha</i>	A
Grass Jewel	<i>Freyeria trochilus</i>	R
Gram Blue	<i>Euchrysops cnejus</i>	A
Common Cerulean	<i>Jamidas celeno</i>	C
Red Peirrot	<i>Talicauda nyseus</i>	R
Common Peirrot	<i>Castalius rosimon</i>	C
<b>Danaidae</b>		
Plain Tiger	<i>Danaus chrysippus</i>	A
Striped Tiger	<i>Danaus genutia</i>	C
Blue Tiger	<i>Tirumala limniace</i>	R
Common Crow	<i>Euploea core</i>	C
<b>Satyridae</b>		
Common Evening Brown	<i>Melanitis leda</i>	R
<b>Nymphalidae</b>		
Joker	<i>Byblia ilithyia</i>	A
Common Castor	<i>Ariadne merione</i>	C
Common Leopard	<i>Phalautia phalautia</i>	R
Blue Pansy	<i>Junonia orithya</i>	A
Peacock Pansy	<i>Junonia almana</i>	A
Baronet	<i>Symphaedra nais</i>	C
Tawny Castor	<i>Acraea terpsicore</i>	C

## Collection of Microheterocera: a newer method

As the name suggests, *Microheterocera* includes all of the very small forms where the wingspan varies from 5-20 mm. More than one quarter of the world's 165,000 named *Lepidoptera* species is Microlepidoptera indicating the significance of this group constituting a substantial share of the planet's biodiversity (Robinson *et al.*, 1994). Being tiny insects, conventional trapping techniques are not effective for collecting these moths for scientific study. Hence, attempts were made to refine collection techniques for these insects and the results are presented here.

Usually, collection of Lepidoptera is done using light traps, which was found to be unsatisfactory for Microlepidoptera due to trampling of small moths by larger insects. Moreover, Microlepidoptera generally flutter around the lamp and tend to remain on the outer surface of the trap rather than falling inside the collecting chamber. Based on these observations, we found that the best method of collecting Microlepidoptera was to attract them at night to an illuminated vertical white sheet. The sheet measuring 70cm x 55 cm touches the ground where it can be anchored with stones. The light source we used was an 18-watt CFL (Compact Fluorescent Lamp) powered by a 12-watt car battery. *Microheterocera*, which rest over the white sheet, were collected in a separate

vial, to avoid trampling by other insects. The only disrupt is that we have to stay for the insect collection for 3-4 hrs. however, it shows advent effect that we can study more on its behavioural aspects while resting. The most appropriate collecting period is usually after sunset for about 3 to 4 hrs. although sporadic occurrence of moths may be observed throughout the night. Insects collected, were freezed in a chiller rather than killing using a chemical like benzene or chloroform. Use of a killing agent, usually decolourizes or render the specimens to become stiff. Freezing the specimens from about 12 to 14 hrs was found to give best results. The greatest advantage of collecting moths using the above method is that the moths are not damaged by larger insects, and the specimens remain intact with the colour and body markings unaffected, which is helpful in taxonomic studies.

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**Zootaxa** 713: 1–47 (2004)

**A revision of the *Varta-Stymphalus* generic complex of the leafhopper tribe Scaphytopiini (Hemiptera: Cicadellidae) from the Old World**

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**Abstract**

The genus *Varta* Distant (type species: *Varta rubrofasciata* Distant) is often treated as a junior synonym of *Stymphalus* Stål (type species: *Platymetopius rubrolineatus* Stål). Several species from the Oriental region have been misidentified either as *S. rubrolineatus* (Stål) or as *S. rubrostriatus* (Horváth). All these species are treated here as belonging to the *Varta-Stymphalus* generic complex and are analyzed. The genus *Stymphalus* is redefined to include only the type species, *S. rubrolineatus* (Stål), and the genus is restricted to the Afrotropical region. The genus *Varta* is more widespread and is distributed in the Oriental and Palaearctic regions. The following new taxa are described and their distributions given in parentheses. *Shivania* gen. nov., *S. serrata* sp. nov. (type species; Kenya); *Varta bifida* sp. nov. (Thailand), *V. japonica* sp. nov. (Japan and S. China), *V. longula* sp. nov. (Australia and Papua New Guinea), *V. sympatrica* sp. nov. (S. China), *Vartalapa* gen. nov., *V. curvata* sp. nov. (China: Fujian), *V. malayana* sp. nov. (Malaysia), and *V. robusta* sp. nov. (type species; Laos and Thailand); *Vartatopa* gen. nov., *Vartatopa bifurcata* sp. nov. (type species; Thailand); *Xenovarta* gen. nov., *X. acuta* sp. nov. (type species; S. China), *X. ankusha* sp. nov. (China: Guangdong), *X. compressa* sp. nov. (Sabah), *X. cylindrica* sp. nov. (Cambodia and Vietnam), and *X. harpago* sp. nov. (Sabah and Laos). *Stymphalus modesta* Linnavuori is transferred to the genus *Shivania*. *Platymetopius rubrovittatus* Matsumura and *Deltocephalus rubrolineatus* Motschulsky are transferred to the genus *Varta* and the former is considered a valid species. All taxa are described and illustrated. Keys to the included genera and species are also provided.

**Zootaxa** 663: 1–8 (2004)

**Taxonomic studies on Indian *Tropobracon* Cameron (Hymenoptera: Braconidae: Braconinae), with descriptions of two new species**

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**Abstract**

The paper deals with the Indian species of *Tropobracon* Cameron (Hymenoptera: Braconidae: Braconinae). Two new species, namely, *Tropobracon hayati* Haider sp. nov. and *Tropobracon shafeei* Haider sp. nov., are described, while *Tropobracon comorensis* Achterberg and *Tropobracon infuscatus* Achterberg are reported for the first time from India. Material pertaining to *T. luteus* Cameron are also recorded and a key to the Indian species is given.

**Zootaxa** 620: 1–7 (2004).

**A new species of *Ameroseius* (Mesostigmata : Ameroseiidae) from the Indian Thar Desert**

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**Abstract**

*Ameroseius dipankari* sp. nov. collected from the Indian Thar Desert is described and illustrated in this work. *A. dipankari* shows affinities with *A. eumorphus*.

**Zootaxa** 578: 1–48 (2004)

**A revision of the deltocephaline leafhopper genus *Scaphoideus* (Hemiptera: Cicadellidae) from the Indian subcontinent**

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**Abstract**

The species of the genus *Scaphoideus* Uhler (type species: *Jassus immistus* Say) from the Indian subcontinent (including Pakistan, India, Sri Lanka, Nepal, Bhutan, and Myanmar) are revised and a key is included. All taxa treated are redescribed and illustrated. The following 16 new species of *Scaphoideus* are described: *S. asymmetricus* sp. nov. (India: Karnataka), *S. bicoloratus* sp. nov. (India: Karnataka, Kerala), *S. bifidus* sp. nov. (India: Uttar Pradesh, West Bengal), *S. hirsutus* sp. nov. (India: West Bengal), *S. inequalis* sp. nov. (India: Karnataka), *S. jogensis* sp. nov. (India: Karnataka, Kerala), *S. kirti* sp. nov. (India: Karnataka, Kerala), *S. lamellaris* sp. nov. (Myanmar: Nam Tama Valley), *S. malaisei* sp. nov. (Myanmar: Kambaiti), *S. sculptellus* sp. nov. (Sri Lanka), *S. sculptus* sp. nov. (India: Karnataka, Kerala, Tamil Nadu), *S. spiculatus* sp. nov. (Myanmar: MishmiHills, Nam Tama Valley), *S. trilobatus* sp. nov. (Myanmar: Kambaiti), *S. varna* sp. nov. (Myanmar: Bhamo), *S. vaticus* sp. nov. (Myanmar: Bhamo), and *S. zhangii* sp. nov. (India: Meghalaya, West Bengal). *S. brachycephalus* Distant 1918, *S. nutans* Distant 1918 and *S. pallifrons* Distant 1918 are treated as junior synonyms of *S. elegantulus* Melichar 1903, syn. nov.; and *S. polymitus* Distant 1918 is treated as a junior synonym of *S. russus* Distant 1918, syn. nov.

**Zootaxa** 484: 1-4 (2004)

***Discothyrea sringerensis* (Hymenoptera: Formicidae) a new ant species from India**

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**Abstract**

*Discothyrea sringerensis* sp. nov. is described and is the first record of this genus from South India. The other known species of *Discothyrea* are scattered within the tropics and the temperate zones of the world. Based on workers, *D. sringerensis* is most similar to the species described from Malaysia and Australia characterised by 10-segmented antennae.

**Zootaxa** 447: 1–18 (2004)

**Revision of *Phaelota* Jacoby (Coleoptera: Chrysomelidae)**

**with descriptions of three new species**  
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**Abstract**

The genus *Phaelota* Jacoby is redescribed and differentiated from the genera *Acrocrypta* Baly, *Chabria* Jacoby and *Schenklingia* Heikertinger and Csiki. Three new species of *Phaelota* namely *P. jacobyi*, *P. sindhoori* and *P. vaishakha* from south India are described and

illustrated. A key for adult identification and host plant data are provided.

**Zootaxa** 403: 1-11 (2004)

**Two new species of the genus *Cheiroseius* Berlese, 1916 (Ascidae: Mesostigmata) from the Indian Thar Desert**

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**Abstract**

Two new species, *Cheiroseius rajasthanicus* and *C. ovalis* collected from the Thar Desert of Rajasthan, are described and illustrated in this work along with their affinities. The genus is being recorded for the first time from the Thar Desert. A key to differentiate the five Indian species is provided.

**Zootaxa** 875:1-5 (2005)

**On the identity of *Dysis excellens* Crotch (Coleoptera: Coccinellidae: Coccinellini), a little known Oriental lady beetle**

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**Abstract**

*Dysis excellens* Crotch (Coleoptera: Coccinellidae), a little known Oriental species, is transferred to *Oenopia* Mulsant (comb. nov.) and redescribed in detail with illustrations of the male and female genitalia. A lectotype is designated. This species is recorded for the first time from India (Nagaland).

**Zootaxa** 295: 1-7 (2003)

**A new species of the genus *Antennoseius* (Ascidae : Mesostigmata) from India**

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**Abstract**

*Antennoseius orientalis* sp. nov. is described along with illustrations and a key to the Indian species of the genus is provided.

**Zootaxa** 325: 1-5 (2003)

**A new species of the genus *Protoplotina* Miyatake (Coleoptera: Coccinellidae) from India**

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**Abstract**

*Protoplotina nigrosuturalis* sp. n. and *Protoplotina* near *vietnamica* Miyatake are reported from India. This is the first record of this genus from India.

**Zootaxa** 808: 1-4 (2005)

**Description of a new species belonging to the genus *Leofa* Distant (Hemiptera: Cicadellidae: Deltocephalinae: Stenometopiini) from India\***

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**Abstract**

A new species, *Leofa mushroomi*, belonging to the genus *Leofa* Distant (Hemiptera: Cicadellidae: Deltocephalinae: Stenometopiini) from India is described and illustrated. A key to the Indian species of *Leofa* is included.

**Zootaxa** 925: 1-10 (2005)

**A new locality and host for *Pseudione minimocrenulata* Nierstrasz & Brender à Brandis, 1931 (Crustacea: Isopoda: Bopyridae) in the Indian Ocean, with comments on the identity of the type specimens**

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**Abstract**

Three parasitized specimens of *Munida andamanica* Alcock, 1894, including one with a double infestation, from the Indian Ocean off Mozambique were found to contain bopyrid isopods referable to *Pseudione minimocrenulata* Nierstrasz & Brender à Brandis, 1931. This represents a new host species and locality for the parasite which has been reported only twice before from the Kei Islands (Indonesia) and Madagascar. Both sexes of *P. minimocrenulata* are redescribed and illustrated. Examination of type material revealed that the type series contains isopod pairs of two different species. The female from the Kei Islands is selected as lectotype to fix the identity of the species, while the pair from the U.S. Virgin Islands is identified as *P. confusa maxillipedis* Bourdon, 1972.

**Zootaxa** 966: 1-8 (2005)

**A new species of *Longitarsus* (Coleoptera: Chrysomelidae) feeding on Chinese potato, *Plectranthus rotundifolius* (Lamiaceae) in southern India**

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**Abstract**

*Longitarsus serrulatus*, a new species feeding on *Plectranthus rotundifolius* (Lamiaceae) in Kerala, India, is described and illustrated. Host plant data and ecological information are provided.

**Zootaxa** 1002: 59-64 (2005)

**A new species of *Argeiopsis* Kensley, 1974 (Crustacea: Isopoda: Bopyridae: Argeiinae) from the northern Arabian Sea**

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**Abstract**

A parasitized specimen of *Microprosthemata validum* Stimpson (Stenopodidea) from the Arabian Sea off Pakistan was found to bare a pair of bopyrid isopods referable to the genus *Argeiopsis* Kensley, 1974. Although damaged, these specimens clearly represent a new species that is only the second in the genus. This new species is described and illustrated and a discussion of previous records of the type species *A. inhacae* is given.

K. Thulsi Rao<sup>1</sup>, B.E. Yadav<sup>2</sup>, M. Sudhakar<sup>1</sup>, S. M. Maqsood Javed<sup>1</sup> and I. Siva Rama Krishna<sup>1</sup>

An interesting colour banded specimen of *Scolopendra hardwickei* was collected from the Shikharam locality of Nagarjunasagar Srisailam Tiger Reserve, near boulder just after rains at night on 4.6.2004 by K. Thulsi Rao and team. After examination it found to be mature male.

**Biometry:** It indicates its length 18 cm upto the 21<sup>st</sup> tergite (fig. 1). Antennae were black coloured having 17 segments. Cephalic plate was black smooth posteriorly and anteriorly rounded at corners. Maxillipedes and mouth parts were black with 6 minute teeth on the wide plate. 2-19 pairs of walking legs were pale yellowish with 20<sup>th</sup> pair and anal legs black. Walking legs have 2 claw spurs and one tarsal spur of the latter lacking on 20<sup>th</sup> pair. Tergites 3 onwards up to 20<sup>th</sup>, with pair of median longitudinal sutures. Sternites from 2<sup>nd</sup> onwards with pair of submedian longitudinal sutures up to 19<sup>th</sup> complete; on 20<sup>th</sup> indicated only basally. Lateral tergal margination present on tergites from 8<sup>th</sup> onwards. 21<sup>st</sup> tergite distinctly rounded with posterior corners concave. Anal leg prefemur ventrally without spines, 4 spines were present from lateral inner side of anal leg prefemur. Coxopleura with numerous pores with two apical spines at one on left side.

**Colour Variation:** Though *Scolopendra hardwickei* has the characteristic colour pattern giving remarkably banded appearance it is observed some variations in this pattern. In the present specimen yellow colour segments are having more brownish yellow colour than the specimen from Tamil Nadu and Maharashtra which are distinctly yellowish. In the specimens from Tamil Nadu, 2<sup>nd</sup> tergite is black, while with present one, first 3 tergites are uniformly yellowish. From 8<sup>th</sup> tergite onwards tergites are alternately black and yellow including 19<sup>th</sup>. Anal legs are uniformly blackish brown in the present specimen, but are reddish yellow on prefemur and femur (fig. 3). After prolong preservation in rectified spirit the colour fades out.

**Sex:** A white mass of penis was clearly observed (fig. 2). Although it is male specimen, in contrast to Jangi & Dass (1984) observation, anal leg prefemur, femur and tibia are not flat, and not marginated, as were in *S. morsitans* Linn. and *S. Amazonica* (Bucherl).

**Distribution:** India: Andaman Nicobar Islands, Madhya Pradesh, Andhra Pradesh, Maharashtra, Gujarat, Tamil Nadu, West Bengal (Khanna, 2001) Anaikatty (Rathinasabhapathy & Daniel, 1997).

This species show discontinuous geographical distribution, e.g. in Andhra Pradesh (Nallamalai hills) and Andaman

Nicobar Islands it found plenty in number while less in Tamil Nadu, rarely occurring in Maharashtra and absent in Kerala, but collected from border i.e. Anaikatty, Coimbatore. It shows tendency towards inhabiting drier part of the region.

Being entamophagus it is a friend of farmers and hence this species should be protected from unnecessary killing, and must be conserved.



#### *Scolopendra hardwickei* Newport

1. Total Length 18 cm, yellow colour segments having more brownish yellow colour (Dorsal view),
2. A white mass of penis (Ventral view),
3. Anal legs (ventral view) are uniformly blackish brown.

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#### A Novel Butterfly Garden, Peechi, Kerala

##### Conservation of Invertebrates through Captive Breeding: A study with reference to butterflies.

KFRI Research Report No. 206. February, 2001.

Techniques have been standardised to setup butterfly garden under a programme sponsored by the Ministry of Environment and Forest, Government of India. Small and large gardens can be set up by careful introduction of appropriate butterfly host plant and by creating butterfly habitats that are locally available. Technical detail of this programme is discussed in the KFRI's Research Report 220.

#### ABSTRACT

Butterfly gardens and butterfly houses are ideal means by which visitors can observe butterflies in a recreated environment. In this study, attempts were made to standardise methodologies for augmenting local butterfly fauna in order to maintain them in recreated habitats – both indoors and out doors – which has application *in situ* and *ex situ* conservation programmes. *In situ* propagation of butterflies was achieved by establishing a butterfly garden in a 0.5 ha of moist deciduous forest patch in the KFRI Campus at Peechi, Kerala, India. Based on the habitat preferences of various species, the area was landscaped so as to create different butterfly habitats. As a result of host plant introduction and habitat management, there was a tremendous

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## International Conference on Biodiversity of Insects: Challenges Issues in Management and Conservation (BIMC)

**Date:** 30th January - 3rd February 2006

**Venue:** Department of Zoology, Bharathiar University, Coimbatore Tamil Nadu

### Conference themes:

- Insect Conservation and Taxonomy
- Biodiversity and Molecular Systematics of Insects
- Biodiversity and Management of Agricultural Insects.
- Biodiversity, Management and Conservation of Forestry Insects.
- Biodiversity and Management of Medical and Veterinary Insects.
- Biodiversity and Biotechnological Advancement in Insects.

### Background of the conference

The world is currently facing its greatest ever biodiversity crisis. Insects and plants are becoming extinct because of habitat loss, over-hunting, pollution, overpopulation and the threat of global climate change. So it is becoming important that the world has professionals equipped with the necessary skills to understand and manage biodiversity of insects, which must ensure that resources are conserved for the future while taking into account the needs of the growing human population, and the pressures for its development.

They need a variety of skills including a working knowledge of ecology of insects, wildlife conservation of insects, population biology of insects, taxonomy and systematics of insects, environmental studies, legislation and the interactions between people. This kind of programme provides you with the knowledge and expertise to make an effective contribution to the programme to save the world's biodiversity and of recent biotechnology aspects of insects.

Biodiversity is one of the important corner stones of sustainable development. Insects comprise the largest group of organisms. Apart from being the major species of all organism, they also play a critical role in the functioning of all ecosystems.

Moreover, Insect pest continue to be a major constraints to agricultural production and forestry as well as in medical and veterinary science. Use of synthetic pesticides cause some unfortunate consequences such as environmental pollution, pest resistance and toxicity to other non-target organisms including human beings. Integrated Pest Management (IPM), a sustainable approach to managing pests by combining biological, cultural, physical and chemical tools, reduces economic, health and environmental risks. There is an increasing awareness of environmental problems and widespread pest resistance, which pose a sever threat to management programmes based on conventional synthetic insecticides. Hence, management of insects by biological means without disturbing the environment is of paramount importance.

We are happy to inform that this International Conference on Biodiversity of Insects will be organized under the auspices of the Department of Zoology, Bharathiar University, and Coimbatore, India. The present conference will provide a suitable venue for interaction of researchers working in the areas of biodiversity of insects with different disciplines such as Conservation and Management Strategies.

### Time Lines

Submission of Abstracts - 25<sup>th</sup> October, 2005

Payment of Registration fee - 25<sup>th</sup> October, 2005

Request for Hotel Reservation - 15<sup>th</sup> November, 2005

Submission of Full paper - 30<sup>th</sup> November, 2005

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### Continuation from page 6. *Butterfly garden*

increase in the butterfly population. During the first half of the project, 4509 sightings of butterflies belonging to 43 species were recorded. In the second half, 5993 sightings of butterflies belonging to 50 species have been recorded. Altogether, 10502 sightings of butterflies belonging to 56 species were recorded during the thirty months study period. These included eight species that are endemic to the Western Ghats and 10 species having protected status under the Indian Wildlife Act.

The relationship between the occurrence of different butterflies and the weather conditions was also studied. For many butterflies, an average temperature ranging between 25-26°C was the most favourable followed by 23-25°C and 27-29°C. Similarly, atmospheric humidity ranging between 80-100 percent was the most preferred range followed by 60-80 percent. With regard to daily rainfall, 50mm was the most favourable level followed by 50-100 mm rainfall.

Investigations showed that there was a continuous population trend for butterflies belonging to the families Danaidae, Lycaenidae, Papilionidae and Pieridae which also developed resident populations in the study area. Attempts to manipulate local populations of certain aggregation Danaine butterflies to roost on some alkaloid containing host plants (such as *Crotalaria retusa* and *Heliotropium keralense*) were successful. The multi species aggregation comprising of 30-40 butterflies per plant was a major attraction to visitors.

In order to examine the suitability of various butterflies for captive breeding in *ex situ* conservation and for butterfly exhibitory programmes, biology of 20 species of butterflies was studied and methods for captive breeding standardised. Based on the data generated in this study, 13 species of butterflies, viz., *Chilisa clytia*, *Pachliopta aristolochiae*, *Papilio demoleus*, *P. hector*, *P. polytes*, *Troides minos* (Papilionidae); *Catopsilia pyranthe*, *Eurema blanda* (Pieridae); *Talicauda nyseus* (Lycaenidae); *Danaus chrysippus*, *Parantica aglea*, *Tirumala limniace* and *T. septentrionis* (Danaidae) were proposed as good candidates for butterfly gardening/captive breeding programmes in Kerala.

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Since the advent of human civilization, butterflies have been regarded as symbol of beauty and grace. Their marvellous colours, shapes and graceful flight give pleasure to every one. They are beneficial as pollinators, indicators of environmental quality and have aesthetic and commercial values.

Every butterfly species occupies its own precise geographical or ecological area. Their distribution may be endemic covering a few square miles of a mountain or cosmopolitan extending over an entire landmass. Spectacular changes in climate and vegetation in the recent past, have affected the geographical distribution of butterflies. Landscape has now profoundly fragmented due to human activities. These new developments are destroying natural habitats at an alarming rate and the destruction of these habitats cause extinction of many species including butterflies. In addition to environmental and climatic factors their distribution depends on capacity for colonization and flying.

The Papilionidae (Swallowtail) is generally regarded as being the most spectacular family of order Lepidoptera. They are much prized by collectors, being strikingly marked in a variety of colours, usually on a black ground. This is among the few families, so far, included in IUCN Red Data Book (Collins & Morris, 1985). Despite of greater aesthetic, ecological, educational, historical, recreational, commercial and scientific value of butterflies, there is little information about the butterfly fauna of Pakistan. Attempt has been made to compile the identified species of family Papilionidae from the country.

Most Swallowtails (Papilionids) are forest dwellers and are threatened by destruction of forests. Most species occur in the tropics but some are also found in temperate climate. In addition, the host-plants of Swallowtails are better known than those of other butterflies. Larvae of genera *Pachliopta* and *Atrophaneura* commonly feed on plants of family Aristolochiaceae; *Papilio* on Anonaceae, Lauraceae, Rutaceae, and Umbelliferae; *Graphium* on Anonaceae, and Lauraceae; *Hypermnestra* on Zygophyllaceae and *Parnassius* on Zygophyllaceae, Saxifragaceae, Aristolochiaceae, Fumariaceae and Crassulaceae. Many species of genus *Papilio* such as *Papilio demoleus* are of economic importance as pest; their larvae feed on Rutaceae and destroy young citrus plants and also damage the new leaves of old trees.

The family is reported to contain more than 600 species of diurnal, heliophilous (sun loving) butterflies of medium to large size (Staneck, 1977). However, Collins & Morris (1985) have reported 573 species, Holloway *et al.*, (1987) 550 species, Miller (1987) 561 species, Shield (1989), Heppner (1991) and Scriber (1995) nearly 570 species from the world. According to Gay *et al.*, (1992) and Novak & Severa (1995) about 700 species have been identified worldwide. Gay *et al.*, (1992) also reported that India is represented by 107 species. Recently Landman (1999) reported 900 species of butterflies belonging to the family Papilionidae. Bingham (1905), Evans (1932), Talbot (1939) and Wynter-Blyth (1957) comprehensively studied the butterfly fauna of Indian region. Varshney (1993) reported synonyms, common names, type species, host plants and geographical distribution of papilionid butterflies of South East Asian countries including Pakistan.

There has been considerable difference of opinion concerning the higher classification of subfamily Parnassiinae (Ackery, 1975). The two tribes Parnassiini and Zerynthiini were reported by Bryk (1934, 1935) and Ford (1944) as subfamilies, while Clench (1955), Hemming (1960) and Mani (1986) treated both Parnassiini and Zerynthiini as family. Ehrlich (1958), Munroe (1960) and Ackery (1975) considered the two groups as tribes which together form the subfamily Parnassiinae.

Indian sub-continent is a land diverse in physical landscape. Climatic conditions range from moist environs to tropical rain forests and to the sun-backed deserts of Sindh and Balochistan to the cold dry beaches of the northern areas (Ferguson, 1997). Pakistan represents parts of at least two zoogeographical zones, i.e., Palaearctic and Oriental and has a rich and varied butterfly fauna affinitive to these regions. More than fifty percent of Pakistan is mountainous, particularly its North and northwestern region, some

of which are most fascinating. However, it is northern Pakistan which has most unique geographical features in the world. The mighty ranges of Karakoram, the Himalayas and the Hindu Kush have the most rare species of flora and fauna; most of which are endemic. The present distribution of these butterflies is mostly confined to the northern Pakistan.

The Swallowtails of Pakistan belong to two subfamilies i.e., Parnassiinae and Papilioninae. The former contains one tribe with two genera and the latter with three tribes and five genera.

Previously, two species of Papilionidae have been reported from Karachi and its neighbourhood (Swinhoe, 1887), six from Chitral (Leslie & Evans, 1903), three from Lahore (Rhe-Philipe, 1917), four from Lahore (Puri, 1931, Ahsan & Iqbal, 1975), three from Sindh (Menesse, 1950), five from Balochistan (Evans, 1933), four from Sindh, Balochistan and NWFP (Malik, 1970, 1973), four from Islamabad and Murree (Hasan, 1994) while Mirza (1998) showed colour plates of four papilionids species from Pakistan. In the present study all the reported species have been compiled together and additional species incorporated.

#### **Papilionidae of Pakistan** **Subfamily: Parnassiinae (Apollo Butterflies)**

##### **Tribe: Parnassiini**

**Genus: *Hypermnestra*** Menetries  
*Hypermnestra helios* (Nicked, 1846)

**Genus: *Parnassius*** Latreille  
*Parnassius acco* Gray, 1853  
*Parnassius actius* Eversmann, 18430  
*Parnassius boedromius* (Pungeler, 1901)  
*Parnassius charltonius* Gray, 1853  
*Parnassius delphius* Eversmann, 1843  
*Parnassius epaphus* Oberthur, 1879  
*Parnassius hardwickii* Gray, 1831  
*Parnassius inopinatus* Kotsch, 1940  
*Parnassius jaequemontii* Boisduval, 1836  
*Parnassius loxias* Pungeler, 1901  
*Parnassius simo* Gray, 1853  
*Parnassius staudingeri* Bang-Haas, 1882  
*Parnassius stoliczkanus* C. & R. Felder, 1865  
*Parnassius tianschanicus* Oberthur, 1879

##### **Subfamily: Papilioninae (Swallowtails, Peacocks & Mimes)**

##### **Tribe: Leptocircini**

**Genus: *Iphiclides*** Hubner  
*Iphiclides podalirius* Linnaeus, 1758  
**Genus: *Graphium*** Scopoli  
*Graphium cloanthus* (Westwood, 1841)  
*Graphium doson* (C. & R. Felder, 1864)

##### **Tribe: Papilionini**

**Genus: *Papilio*** Linnaeus  
*Papilio agestor* (Gray, 1832)  
*Papilio alexanor* Esper, 1799  
*Papilio arcturus* Westwood, 1842  
*Papilio clytia* (Linnaeus, 1758)  
*Papilio demoleus* Linnaeus, 1758  
*Papilio machaon* Linnaeus, 1758  
*Papilio polyctor* Boisduval, 1836  
*Papilio polytes* Linnaeus, 1758

##### **Tribe: Troidini**

**Genus: *Atrophaneura*** Reakirt  
*Atrophaneura polyeuctes* (Doubleday, 1842)  
**Genus: *Pachliopta*** Reakirt  
*Pachliopta aristolochiae* (Fabricius, 1775)

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## Butterfly Park

A butterfly park being established at Bannerghatta Biological Park, Bannerghatta, Bangalore, over an area of 7.5 acres comprises a butterfly garden, butterfly conservatory, museum and curio shop. Visitors to the park will have the opportunity to watch butterflies along a 'butterfly trail' in the five-acre garden. The end of the trail will take them into an innovatively designed three-domed structure. The first of these with a polycarbonate roof, is the 'butterfly conservatory' where the visitors can watch butterflies at close range. The huge dome shaped structure with approximately 10490 sq feet of landscaped area will meet all possible habitat requirements including host plants and house butterflies throughout the year. The conservatory leads into a museum that will have mechanical models and dioramas depicting various facets of the life of butterflies. The museum will also have a curio shop, attached to it, housed in the smallest of the three-domed structure. The idea of a butterfly park as an integrated centre for research and education, with creation of awareness about the less appreciated biological resources of the country as its main goal, was mooted by the Department of Biotechnology, Government of India. The Zoo Authority of Karnataka with technical inputs from UAS-B and ATREE is turning the blueprint for the country's first butterfly park into a reality.

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Newsletter of the Invertebrate Special Interest Group (ISIG) of Conservation Breeding Specialist Group, South Asia. ISIG is coordinated by Dr. B.A. Daniel, Scientist, Zoo Outreach Organisation.

**Editor:** B.A. Daniel

**Advisors:** Sally Walker & Molur, S.  
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