Fauna of Protected Areas - 32:

INSECT FAUNA OF NEYYAR WILDLIFE SANCTUARY, KERALA, INDIA

George Mathew [1], R.S.M. Shamsudeen [2] and C.M. Brijesh [2]

[1,2] Division of Entomology, Kerala Forest Research Institute, Peechi, Kerala 680653, India
Email: [1] mathew@kfri.org, gmathewkfri@rediffmail.com

The Neyyar Wildlife Sanctuary is situated about 30km away from Thiruvananthapuram, located between 80° and 80°38' N latitude, is contiguous with the Kalakkadu Wildlife Sanctuary and Mundanthurai Wildlife Sanctuary of Tamil Nadu and covers an area of 128km². It includes Klamala, Nettukalther, Kottoor reserve forest and the Neyyar lake (Fig. 1). The rivers Neyyar, Kallar and Mullayar originate from the wet evergreen forests of this Sanctuary.

The topography is rugged with flat meadows and gentle to steep slopes. The altitude ranges from 90-1,868m. Agasthyamala having an elevation of 1,868m is the second highest peak in Kerala. Agasthyamala, Chettuppara and Varayattumudi are some of the picnic spots in the Sanctuary. The Agasthyamala valley is one of the most famous elephant habitats in India. This, together with the extremely rich faunal diversity of this area, contributed to Neyyar being declared a sanctuary in 1958.

The climate is moderately hot and humid, the temperature ranges between 16 and 35°C. This area receives rain from both the northeast and southwest monsoons. The mean annual rainfall recorded is as high as 2800mm. Due to the presence of elevated peaks, montane type of climate prevails in some areas.

The Sanctuary presents a remarkable diversity in vegetation and forest types, viz., west coast tropical evergreen, west coast semi evergreen, southern hill top tropical evergreen, southern wet temperate, southern moist mixed deciduous and southern montane grassland are the major forest types of this area. The tree species found in the evergreen forest include *Artocarpus hirsutus*, *Canarium strictum*, *Cullenia exarillata*, *Elaeocarpus tuberculatus*, *Hopea utilis* and *Palaquium ellipticum*. The major species found in deciduous forests are *Haldina cordifolia*, *Anogeissus latifolia*, *Dillenia pentagyna* and *Pterocarpus marsupium*. In addition to these species, sizable populations of *Dalbergia latifolia* and *Vateria indica* are present in the moist deciduous forests. In the grassland *Chrysopogen orientalis* and *Themida tremila* are the dominant species.

The flora is diverse and exhibits high level of endemism. Out of 1000 species of flowering plants, about 120 are endemic to the southern Western Ghats. The sanctuary has a profuse population of orchids and about 125 species have already been recorded. The area is also home for several rare and endemic plants belonging to rare and threatened categories. *Semicarpus auriculata*, *Eugenia floccosa* and *Eugenia discifera* are some rare species present in this area.

The Sanctuary has an exquisite collection of wildlife. The evergreen forest, contiguous with the protected areas of Tamil Nadu, carries viable populations of the Endangered Lion-tailed Macaque and Vulnerable Nilgiri Langur. Other arboreals include Bonnet Macaque and Malabar Giant Squirrel. The gorgeous peaks of the area are habitats of the Nilgiri Tahr.

The Elephants and Sambars are the most frequently sighted animals. Gaur, Barking Deer, Mouse Deer and Wild Boar are the other herbivores sighted. Tiger and Leopards though scarce, have also been reported. The avifauna is rich and diverse and includes Darters, Little Cormorant, Little Grey Heron, Racket-tailed Drongo, Emerald Dove and Grey Jungle Fowl. Among reptiles, Python, Cobra and Viper are the commonly seen snakes. The Neyyar dam supports a good number of crocodiles that have been introduced.

Insect fauna: With regard to the insects, butterflies have been documented by Sreekumar & Balakrishnanan (1998). They have listed over 75 species of commonly occurring butterflies from Neyyar catchment area. According to Kerala Forest Research Institute (1990) on the insect diversity of this area, 13 orders of insects with 58 families have been recorded from Thiruvananthapuram district where Neyyar Wildlife Scnctuary is located. The most important groups of insects recorded from this area are the hemipteran families Pyrrhocoridae, Scutellaridae, Cydnidae, Fulgoridae and Cicadidae. The last one contained a cicada, *Platypleura polita*. Other than these, dipteran flies of the genus *Psychoda* and predaceous beetles of the family Cicindelidae have been recorded from this area. The latter being predaceous, are important organisms that keep populations of several insect species within limits. In addition to these, several species of soil insects (termites and collembolans) have also been collected and described (Prabhoo, 1971).

Materials and Methods: Sampling of insects was done using a battery-operated Mathew's model light trap specially fitted with a switching device to facilitate self-operation at specified hours. The trap was operated continuously at various locations in the Sanctuary. In addition to light trap catches, collections were also made during day time (0800-1300hr) using hand nets. Collections were made for a period of two months (March-April, 2003) and the insects collected were sorted out to species level and identified by comparison with materials available in the KFRI collections.

Results and Discussion: Collections have been made from Thenmala, Kappukad and Meenmutti. During the two-week survey, 236 taxa of insects were collected of which 215 species could be identified and are listed in Table 1. This included 53 species of butterflies, 90 species of moths, 22 species of beetles, 20 species of bugs, 17 species of bees and wasps, six species of dragonflies, six species of grasshoppers and 21 unidentified species of flies.

The butterflies studied included three protected species and three Western Ghats endemics. Some of the butterflies recorded in this study *viz*., *Papilio paris tamilana*, *P. budha*, *Cyrestis thyodamas*, *Kaniska canace*, *Tirumala septentrionis dravidarum* and *Pantoporia ranga* are rare, having restricted distribution.

The moth fauna was very rich comprising mostly of arboreal feeding forms indicating a fairly undisturbed forest patch in the area. Some of the moths recorded were very colourful ones, which included the beautiful saturnid *Loepa sikkima*. The hosts of several species could not be determined.

Beetles were present in abundance, being dominated by phytophagous and scavenger forms, the former feeding mostly on herbaceous ground flora and the latter associated with animal

Manuscript 1575; © ZOO; Date of publication 21 November 2007
Received 08 June 2006; Revised received 01 February 2007;
Finally accepted 01 October 2007

Table 1. List of insects recorded from Neyyar Wildlife Sanctuary

Scientific names	Remarks
Lepidoptera	
Rhopalocera	
Papilionidae	
Chilasa clytia Lin.	Rare
Graphium sarpedon Felder	Common
Graphium agamemnon agamemnon Lin.	Common
Graphium doson doson Felder	Common
Papilio helenus Lin.	Common
Papilio polymnestor parinda Moore	Common
Papilio budha Westwood	Rare, endemic to Western Ghats. Schedule II
Papilio dravidarum Wood-Mason	Rare, endemic to Western Ghats
Papilio polytes thesus Cramer	Common
Papilio demoleus demoleus Lin.	Common
Papilio paris tamilana Moore	Rare
Pachliopta aristolochiae Lin.	Common
Pachliopta hector Lin.	Common
Troides minos Cram.	Endemic to western Ghats
Nymphalidae	
Argynnis hyperbius (Johannsen)	Common
Cyrestis thyodamas Kollar	Not rare
Ergolis merione Cramer	Common
Hypolimnas bolina Lin.	Common
Hypolimnas misippus Lin.	Common, Schedule I & II
Neptis hylas varmona Moore	Very common
Pantoporia ranga (Moore)	Rare
Phalanta phalanta Drury	Common
Junonia atlites Lin.	Common
Junonia heirta Fb.	Very common
Junonia iphita pluvialis Fruhstorfer	Rare
Junonia lemonias vaisya Fruhstorfer	Common
Kaniska canace Moore	Not rare
Danaidae	
Danaus genuita genuita Cramer	Common
Danaus chrysippus (Lin.)	Common
Euploea core core Cramer	Very common
Parantica aglea Stoll	Fairly common
Tirumala limniace leopardus Butler	Common
Tirumala sepentrionis dravidarum Fruhstorfer	Rare
Pieridae	
Delias eucharis Drury	Common
A. lyncida (Cramer)	Not rare
Catopsilia florella (Fb.)	Fairly common
Catopsilia pomona Fb.	Very common
Catopsilia pyranthe (Lin.)	Very common
Cepora nadina Moore	Rare
Eurema blanda Boisd.	Common
Eurema brigitta Stoll	Common
Eurema hecabe Lin.	Common
Satyridae	
Elymnias caudata Butler	
Melanitis leda Lin.	Very common
Mycalesis anaxias Hewitson	Not rare, Schedule II
Ypthima sp.	Fairly common
Hesperidae	
Potanthus pava pava Fruhstorfer	Rare
Pelopidas mathias Fb.	Fairly common
Telicota acigias Lin.	Fairly common
Lycaenidae	
Arhopala centaurus Moore	Common
Euchrysops cnejus (Fb.)	Common
Jamides alecto (Felder)	Rare
Thalicada nyseus (Guerin.)	Fairly common
Heterocera	
Noctuidae	
Achaea janata Fb.	Common
Achaea flava (Fb.)	Common
Carea endophaea Hamp.	Common
Carea subtilis Walker	Common
Chasmina rejecta Fb.	-
Heliothis sp.	Common
Hyblaea puera Cram.	Teak skeletonizer
Laphygma exigua Hb.	-
Mocis frugalis Fb.	Common
Mythimna curvilinea Hamp.	-
Ophideres materna Lin.	Fruit moth
Ophideres fullonica Lin.	Fruit moth
Othreis ancilla Cram.	Fruit moth
Polytela gloriosae Fb.	Common
Prodenia litura Fb.	Common
Spiredonia retorta Cram.	-
Spodoptera litura (Fb.)	Common
Spodoptera mauritia Boisduval	Common
Tiracola plagiata Walker	-
Lymantriidae	
Dasychira mendosa Hb.	Common
Orgyia sp.	-
Eupterotidae	
Eupterote flavida Moore	-
Arctiidae	
Amata extensa Walker	-
Argina syringa Cram.	-
Argina argus Koll.	-
Argina astrea Drury	Common
Argina cribraria Clerck	Common
Asura conferta Walker	Common
Creatonotus gangis Lin.	Common
Diacrisia obliqua Walker	Polyphagous
Eligma narcissus Cram.	Common on *Ailanthus triphysa*
Estigmene perotetti	Common on bamboo
Hypsa alciphron Cram.	Common on ficus
Pericallia ricini Fb.	Common on castor
Yponomeutidae	
Atteva fabriciella Swed.	Common on *Ailanthus triphysa*
Geometridae	
Abraxas sp. nr. *latizonata* Hamp.	Feeds on foliage of forest trees
Buzura? suppressaria Walker	Feeds on foliage of forest trees
Cleora sp. prob. *alienaria* Walker	Feeds on foliage of forest trees
Epiplema quadricaudata Walker	Common on *Haldina cordifolia*
Epiplema fulvilinea Hamp.	-
Eumelea rosalia Cram.	-
Eumelea sp.	-
Hypochrosis sp.? *abstractaria* Walker	-
Hypomecis sp.	-
Hyposidra talaca Walker	Feeds on foliage of forest trees
Semiothisa quadraria Moore	Feeds on foliage of forest trees
Thalassodes sp.	-
Pyralidae	
Agathodes ostentalis Hubn.	Common
Agrotera basinotata Hamp.	Common
Antigastra catalunalis Swinh.	Common on gingelli
Botyodes asialis Guen.	-
Bocchoris inspersalis Zell.	-
Bradina admixtalis Walker	Common on Graminae
Cirrhochrista fumipalpis Feld.	-
Cnaphalocrocis medinalis Guen.	Common on rice / Graminae
Dichocrocis sp.	Common in castor
Etiella zinckenella Treit.	Common
Eutectona macheralis Walker	Common on Teak
Eurrhyparodes tricoloralis Zell.	-
Filodes fulvidorsalis Hubn.	-
Galleria mellonella Lin.	Common on bees
Glyphodes celsalis Walker	Common on forest trees
Glyphodes bicolor Swains.	Common on forest trees
Glyphodes laticostalis Guen.	Common on forest trees
Glyphodes vertumnalis Guen.	Common on Jack
Glyphodes glauculalis Guen.	-
Glyphodes indica Saund.	Common on cucumber
Glyphodes itysalis Walker	-
Glyphodes marginata Hamp.	Common on forest trees
Isocentris filalis Guen.	-
Lamprosema sp.	Common on pulses
Marasmia trapezalis Guen.	Common on grasses

Scientific names	Remarks
Nacoleia diemenalis Guen.	Common on pulses
Nephoteryx atrisquamella Hamp.	-
Nephoteryx fluctuosalis Zell.	Common on Graminae
Nephoteryx foedalis Guen.	Common on Graminae
Protrigonia zizanialis Swinh.	-
Psara bipunctalis Fb.	Common on pulses
Pycnarmon caberalis Guen.	Common on coleus
Pygospila tyres Cram.	-
Sylepta sp.	-
Syngamia abruptalis Walker	Common on Ocimum
Syngamia latimarginalis Walker	-
Syngamia sp.	-
Terastia egialealis Walker	Common on Erythrina
Sphingidae	
Acherontia lachesis Fb.	Common
Acherontia sp.	Common
Herse convolvuli Lin.	Common
Theretra sp.	-
Saturnidae	
Loepa sikkima Moore	-
Coleoptera	
Odontolabis cuvera Hope	-
Odontolabis sp.	
Coccinellidae	
Coccinella septempunctata Lin.	-
Epilachna septima Dieke	-
E. vigintioctopunctata Fb.	-
Scarabaeidae	
Anomala ruficapilla Burmeister	Adults feed on foliage
Anomala sp.	Adults feed on foliage
Copris sp.	Dung rolling
Heliocopris dominus Bates	Dung rolling
Heterorrhina sp.	-
Holotrichia rufoflava Brenske	Grubs feed on roots
Holotrichia fessa Brenske	Grubs feed on roots
Holotrichia serrata Fb.	Grubs feed on roots
Maladera sp.	Adults feed on foliage
Mimela sp.	Adults feed on foliage
Popillia complanata Newm.	Adults feed on foliage
Buprestidae	
Chrysochroa sp.	Common in woody stem
Cerambycidae	
Acanthophorus serraticornis Oliv.	Polyphagous
Batocera sp.	Polyphagous
Cerosterna scabrator (Fb.)	Polyphagous
Nupserha madurensis Pic.	-
Nupserha malabarensis Pic.	-
Prionomma atratum Gmelin.	-
Plocaederus obesus	-
Chrysomelidae	
Aulacophora cincta (Fb.)	Feeds on foliage
Aulacophora unicolor Illig.	Feeds on foliage
Basilepta fulvicornis Jac.	Feeds on foliage
Hoplasoma unicolor Illig.	Feeds on foliage
Monolepta longitarsis Jac.	Feeds on foliage
Curculionidae	
Myllocerus viridanus Fb.	Polyphagous, feeds on foliage
Dynastidae	
Oryctes rhinoceros Lin.	Common on palms
Lampyridae	
Epicauta sp.	-
Hemiptera	
Eurybrachidae	
Eurybrachis sp.	-
Ricaniidae	
Ricania sp.	-
Flattidae	
Flata ? ocellata Fb.	-

Scientific names	Remarks
Dictyopharidae	
Dictyopharina ? viridissima Melicher	-
Cercopidae	
Cosmocarta relata Dist.	-
Lygaeidae	
Dindymus lanius Stal.	-
Macropes sp.	-
Fulgoridae	
Kalidasa lanata Drury	-
Cicadellidae	
Bothrogonia ferruginea Fb.	-
Krishna strigicollis Spinola	-
Tettigoniella indistincta Walker	-
Pentatomidae	
Nezara viridis Lin.	Common on ear-head of paddy
Placosternum taurus (Fb.)	-
Dysdercus cingulatus Fb.	Cotton bug
Serinatha augur Fb.	-
Hymenoptera	
Apidae	
Apis dorsata Fb.	Honey bee
Apis indica Fb.	Honey bee
Xylocopidae	
Xylocopa verticalis Lepel.	Carpenter bee
Eumenidae	
Eumenes conica Fb.	Mud wasp
Scoliidae	
Megascolia sp.	-
Pompilidae	
Salius aureosericeus Guer.	-
Sphecidae	
Ammophila laevigata Smith.	-
Chalybion bengalense Dahl.	-
Sceliphron javanum Lepel.	-
Chrysididae	
Stilbum cyanurum Forster	Cockoo wasp
Vespidae	
Vespa sp.nr.*cincta Fb.*	-
Odonata	
Orthetrum pruinesum neglectum (Ramb.)	-
Macromia sp.	-
Nemothemis fulvia Drury	-
Nemothemis intermedia (Ramb.)	-
Trithemis aurora (Burm.)	-
Trithemis festiva (Ramb.)	-
Diptera	
Muscidae - 10 spp.	
Phlebotomodae - 2 spp.	
Tabanidae - 2 spp.	
Syrphidae - 2spp.	
Culicidae - 5spp.	
Orthoptera	
Acrididae	
Conocephalus sp..	-
Mecopoda sp.	-
Acrida lugubris Bur.	-
Acrida sp.	-
Phlaeoba sp.	-
Bacunculidae sp.	-
Dictyoptera	
Mantidae	
Deroplatys desicata West	Preying mantis
Humbertiella indica Sauss.	Preying mantis

- habits not known

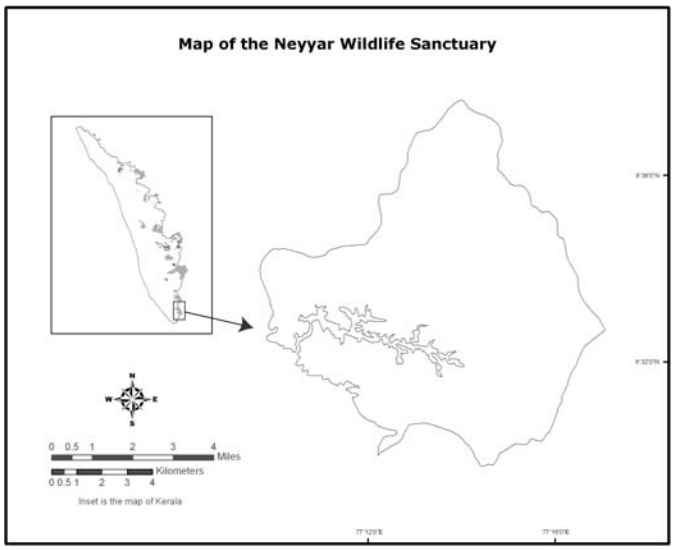

Figure 1. Map of Neyyar Wildlife Sanctuary

excreta. These insects have great ecological significance, as the phytophagous insects are primary herbivores. The scavenger beetles are important in the conversion of dead organic matter and have important roles in nutrient cycling.

Among bugs, most species collected were phytophagous. Several species of hemipteran bugs belonging to the families Pyrrhocoridae, Scutellaridae, Cydnidae, Fulgoridae and Cicadidae were recorded.

The hymenopterans contained two species of honeybees, one species each of solitary bee and bumble bee and eight species of wasps. Although 21 dipteran fly species were collected none could be identified. In addition to these, several species of soil insects (termites and collembolans) had been collected and described from this region (Prabhoo, 1971).

Conclusion: Being a short-term study, only limited areas could be covered. Preliminary observations suggest Meenmutty in Neyyar as a biologically rich area. Both areas contain several rare and protected species of butterflies and moths. More intensive survey spread over different seasons would be required to provide a complete picture of the faunal diversity of this area.

References

K.F.R.I. (1990). "People's Campaign for Ninth Plan: District level planning". Forest and Biodiversity, Kollam district, 57-59pp.

Prabhoo, N.R. (1971). Distribution of soil and litter Collembola of south India. *Oriental Insects* 5(2): 243-262.

Sreekumar, P.G. & M. Balakrishnan (1998). A Study of animal diversity in the proposed Adirapally hydroelectric project area in Kerala. *International Journal of Ecolgy and Environmental Sciences* 24: 393-410.

Acknowledgements

We are grateful to Dr. J.K. Sharma, Director for his interest and encouragement in this study. Dr. R. Gnanaharan, Research Coordinator kindly went through the manuscript and offered several valuable suggestions. The cooperation rendered by Shri. Pradeep, Wildlife Warden, Neyyar and Peppara Wildlife Division and his staff is gratefully acknowledged. Dr. T.C. Narendran, Professor of Entomology, Calicut University kindly identified several species of insects collected in this study.

ASSOCIATION OF *MOLOIDOGYNE INCOGNITA* AND OTHER PLANT PARASITIC NEMATODES WITH DIFFERENT CROPS OF MANIPUR

L. Joymati and W. Mema

Department of Zoology, G.P. Women's College, Imphal, Manipur 795001, India

Plant parasitic nematode is an important pathogen which can reduce the yield of certain economically important crops. Many workers have been investigating the effect of root knot nematode *Meloidogyne incognita* and their association with other plant parasitic nematodes infecting many crops. Queneherve *et al.* (1995) investigated host status of some weeds to *Meloydogyne* spp., *Paratylenchus* spp., *Helicotylenchus* spp., *Rotylenchulus reniformis* associated with vegetables cultivated in polytunnels in Martinique for 33 weed species. Khan & Khan (1996) investigated occurrence of root knot nematode *M. incognita* and other plant parasitic nematode on vegetable crops in Uttar Pradesh. To investigate the effect and their number of association with other plant parasitic nematodes infecting many crops the study has been taken up for providing useful information in the nematode management programme.

Material and Methods: Altogether 81 soil samples from rhizospheric regions of different medicinal, wild and vegetable crops infected with *M. incognita* were collected. The samples were brought into the laboratory for extraction of nematode by Cobb's (1918) seiving and decanting method followed by modified Baermann's funnel technique. The extracted nematodes were killed, fixed and transferred into a desiccator at room temperature for about two to three weeks for complete dehydration. The dehydrated nematodes were mounted by using De Man's (1884) formula for denoting the dimension of the nematode and classification system followed by Siddiqi (1986) for *Tylenchs*. The number of genera counted in different samples were recorded according to the following notation.

Result and Discussion: During this investigation altogether 17 genera and 25 nematode species were found to be associated with juveniles of *M. incognita* (Table 1). Out of the plant parasitic nematode *Helicotylenchus* spp. were found to be most commonly found with the root knot nematode in different crops namely *Cyperus brevifolius, Biden biternata, Dactyloctenium aegypticum, Urena lobata, Curcuma longa, Atalantia malabarica, Sacharum officinarum, Fragaria indica* and *Punica granatum. Helicotylenchus* spp. is followed by *Basiria varians, Cephalenchus leptus, Imphalenchus indicus, Tylenchorhynchus elegans, Scutellonema* spp. *Xiphinema* spp., *Longidorus psidii, Ditylenchus caudatus, Pratylenchus caudatus, Hemicriconemoides mangifera, Tylenchorhynchus punensis, Psilenchus elegans,Aglenchus parvus, Coslenchus diversus, Boleodorus*

Manuscript 1450; © ZOO; Date of publication 21 November 2007
Received 12 September 2005; Revised received 19 September 2007;
Finally accepted 01 November 2007