MISCELLANEOUS NOTES

Bangalore for the facilities provided. Thanks are due to Prof. B. V. David, President, Sun Agro Biotech Research Centre, Porur, Chennai for loaning the types and for his valuable comments. Financial assistance provided by the Ministry of Environment and Forests, Government of India for conducting this research work, is also acknowledged.

REFERENCES


26. ADDITIONS TO KNOWN LARVAL HOST PLANTS OF INDIAN BUTTERFLIES

KRUSHNAMEGH KUNTE

1Accepted March 12, 2004
2Section of Integrative Biology, University of Texas at Austin, 1 University Station C0930, Austin, TX 78712, USA.
Email: krushnamegh@mail.utexas.edu

Larval host plants of butterflies of the Western Ghats are well documented as compared to butterflies in other regions of India. This is due mainly to the efforts of T.R. Bell, J. Davidson, E.H. Aitken and other pioneer butterfly workers in India. However, their studies were concentrated more or less around Karwar (northwestern Karnataka, central Western Ghats) and the Nilgiri Mountains. Hence, host plant reports from other parts of the Western Ghats are either scanty or completely lacking. Earlier major records of use of larval host plants can be found in older original publications (Bell 1910-1927) or compilations (Pant and Chatterjee 1949; Wynter-Blyth 1957; Sevastopulo 1973). Some more recent but scattered records or incomplete species lists may be found in Gay et al. (1992), Haribal (1992) and Kunte (2000).

In this note I report previously unrecorded and site-specific host plants of 36 butterfly species from mainly three areas of the Western Ghats and adjoining localities: i) Pune city (western Maharashtra, northern Western Ghats), ii) Indian Institute of Science campus (Karnataka, Bangalore), and iii) Karian Shola and Varagaliar Shola in the Anamalai Hills (Tamil Nadu, southern Western Ghats). This includes 26 additions to the known 420 larval host plants of the Western Ghats butterflies. Larval host plants of two species, Quedara basilava (Kunte, in press) and Plastingia saia (in prep.), whose early stages have not yet been reported are also presented.

In India, site-specific records of larval host plants are rare, as patterns in local host plant use have not been studied. Differences in host plant use in different areas can be due to individual- or population-based patterns in egg-laying preferences, which can be very complex and may lead to interesting ecological and evolutionary questions (e.g. see work on Euphydryas editha butterflies, reviewed in Singer 1971). Secondly, species endemic to the Western Ghats, which have been considered monophagous, may actually be regionally oligophagous, as shown by discoveries of second host plants for Papilio dravidarum (see below) and Idea malabarica (Susanth 2005). Such observations lead to better understanding of regional patterns in host plant use. All the host plants reported here are based on successful rearing of caterpillars, not on mere observation of egg laying on those plants. Scientific names and authors of the larval host plant species were taken from floras (Cooke 1967; Saldanha and Nicolson 1976; Shetty and Pandey 1983; Chandrabose and Nair 1987; Vajravelu 1990; Deshpande et al. 1993; Sharma et al. 1993; Sasidharan 1997; Sivarajan and Mathew 1997).

Family Papilionidae


4. Papilio dravidarum Wood-Mason: Clausena heptaphylla (Roxb.) Wt.&Arn., Rutaceae. Large shrub in tall evergreen forest, Karian Shola. October 2001. This butterfly was believed to be monophagous on Glycosmis arborea.
I had previously reared a caterpillar in Karian Shola in December 1999. In 2001, I observed a female lay two eggs on Clausena and also found two caterpillars on the same plant. Later all these caterpillars fed on Glycosmis, but showed a marked preference for Clausena.


**Family Pieridae**


5. *Cepora nerissa* (Fabricius): *Capparis zeylanica* L., Capparaceae. Pune. 1992-94. *C. zeylanica* is already reported for this butterfly, as are several other *Capparis* spp. However, in Pune this species feeds exclusively on *C. zeylanica* although *C. grandis* L.f. and other *Capparis* spp. are commonly available.

6. *Appias indra* (Moore): *Drypetes oblongifolia* (Bedd.) Airy Shaw, Euphorbiaceae. Small tree in tall evergreen forest, Varagaliar Shola, Anamalais. January 2000. Earlier I had reported *Putranjiva roxburghii* Wall. for this butterfly from Pune (Kunte 1998), which is a synonym of *Drypetes roxburghii* (Wall.) Hurusava. This butterfly occurs in Bhimashankar and since its caterpillars feed on *Drypetes* spp., it probably feeds on *D. venusta* (Wt.) Pax. & Hoffm., which is the only species present at Bhimashankar.

7. *Appias albina* (Boisduval): *Drypetes oblongifolia* (Bedd.) Airy Shaw, Euphorbiaceae. Small tree in tall evergreen forest, Varagaliar Shola. January 2000. I found both *Appias indra* and *A. albina* caterpillars simultaneously on the same individual plant. Also, *Drypetes roxburghii* (Wall.) Hurusava, a small, evergreen tree growing along moist stream banks in mixed deciduous forest, Yeoor, Thane, close to Mumbai. February 2000. As in *A. indra*, *A. albina* should be feeding on *D. venusta* (Wt.) Pax. & Hoffm. at Bhimashankar, as also reported by Bell from Karwar.

8. *Ixias marianne* (Cramer): *Capparis grandis* L.f., Capparaceae. Small tree in scrub forest, Law College Hill, Pune. 1992-94. The caterpillars refused to feed on *C. zeylanica* or other *Capparis* spp. present in this area.


**Family Nymphalidae**


7. *Phalanta phalantha* (Drury): *Xylosma longifolium* Clos, Flacourtiaceae. Small tree along water courses and in secondary thickets, Dehradun, north India. November 1998. Distribution of the plant extends to the Eastern Ghats and the...
Nilgiris, and given the polyphagous nature of this butterfly, it probably feeds on *Xylosma* throughout its range. In Bangalore, the species feeds on both *Flacourbia indica* (Burm. f.) Merr. and *Salix* sp. (Family Salicaceae).


**Family Lycanidae**


2. **Leptotes plinius** (Fabricius): *Dyeroptyrum indicum* (Gibs. ex. Wight) Kuntze, Plumbaginaceae. Small shrub in dry deciduous forest, Pandupol, Sariska National Park. October 1997. The plant also occurs close to northern Western Ghats, where the larvae could be using it.


4. **Zizula hylax** (Fabricius): *Hygrophila auriculata* (Schum.) Heine, Acanthaceae. Tall herb in marshes. Pune and I.I.Sc. campus. Used throughout the year except during the monsoon (June-September) when the plants may be partly submerged. Also *Phaulopsis dorisflora* (Retz.) Sant., Acanthaceae: Small herb in mixed deciduous forest, Tiger Crossing Road, Top Slip, Anamalais. February 1999.


**Family Hesperiidae**


5. **Gangara thyrsis** Fabricius: This is a highly polyphagous species. However, earlier reports mention the hosts merely as 'palms' (Arecaceae). Here I report some site-specific hosts: *Calamus pseudo-tenuis* Beccari ex Beccari & Hook, *Calamus rothangii* Beccari ex Beccari & Hook, *Calamus thwaitesii* Beccari ex Beccari & Hook, and *Calamus thwaitesii* Beccari ex Beccari & Hook, all from Karian Shola. *Phoenix loureirii* Kunth, dwarf palm in savannahs, Pandarvarai. *Cocos nucifera* L., planted in Erumapparai settlement, Top Slip, Anamalais. Therefore, this palm is probably not used as a larval host in Bangalore, although it is reportedly utilized elsewhere.

**ACKNOWLEDGEMENTS**

I am indebted to the following field botanists for their sustained help over the years in identifying plants: Harish Bhat, Dattaraj, Utkarsh Ghate, Gopal Rawat, V.V. Sivan and H.S. Suresh. Thanks are due to Barrett Klein for comments on an earlier draft.

**REFERENCES**


Studies on molluscs in India and throughout the world are hindered by lack of up-to-date systematics and faunal lists. For the Indian subcontinent, however, contributions from the Zoological Survey of India are of utmost value from the extent of coverage made and species enlisted (Annandale 1922, 1924; Annandale and Kemp 1916; Annandale and Prashad 1919; Ray 1949; Rajagopal and Mookherjee 1978, 1982; Mookherjee 1985; Subba Rao et al. 1991, 1992, 1995; Mohapatra 2001; Ramakrishna and Dey 2003). Nevertheless, in several cases the descriptions are based on empty shells obtained from old collections. There is a need, therefore, to focus on observations based on live material collected in recent years.

As a part of benthos productivity investigation for the northeast Indian shelf (1998-2002), a number of samples were collected that formed the chief source of material for this study. In addition, many short cruises were conducted off Visakhapatnam to study the littoral benthos. The main objective of this paper is to list 40 species of molluscs represented by 24 gastropods and 16 bivalves as new records for the northeastern Indian coast, including the shelf sediments up to 200 m.

The study area (Fig. 1) includes five locations off the northeast coast of India at 1° intervals from Divi Point (16° 00' 50" N, 81° 09' 30" E) in the south to Paradeep (31° 01' 10" N, 87° 49' 45" E) in the north.

Table 1: Hydrographical conditions off northeast coast of India (January 1999 and July 2000)

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Salinity (%)</th>
<th>Dissolved Oxygen (ml/l)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30-50</td>
<td>28.75-34.23</td>
<td>1.270-4.404</td>
</tr>
<tr>
<td>(n=32)</td>
<td>(31.79 ± 0.23)</td>
<td>(2.847 ± 0.15)</td>
</tr>
<tr>
<td>51-75</td>
<td>29.17-33.61</td>
<td>2.340-3.983</td>
</tr>
<tr>
<td>(n=4)</td>
<td>(32.06 ± 1.02)</td>
<td>(2.935 ± 0.36)</td>
</tr>
<tr>
<td>76-100</td>
<td>30.31-35.19</td>
<td>0.803-4.371</td>
</tr>
<tr>
<td>(n=12)</td>
<td>(33.27 ± 0.37)</td>
<td>(2.303 ± 0.30)</td>
</tr>
<tr>
<td>101-150</td>
<td>32.97-34.84</td>
<td>-0.01-3.848</td>
</tr>
<tr>
<td>(n=8)</td>
<td>(34.36 ± 0.23)</td>
<td>(1.214 ± 0.49)</td>
</tr>
<tr>
<td>&gt;150</td>
<td>32.27-34.86</td>
<td>-0.03-1.557</td>
</tr>
<tr>
<td>(n=14)</td>
<td>(34.44 ± 0.29)</td>
<td>(0.561 ± 0.15)</td>
</tr>
</tbody>
</table>

Mean ± standard error are in parenthesis; n - sample size.