

THE MOTHS (LEPIDOPTERA: HETEROCERA) OF NORTHERN MAHARASHTRA: A PRELIMINARY CHECKLIST

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The northern region of Maharashtra State, India, includes Nashik, Dhule, Jalgaon and Nandurbar districts. This area is bounded in the north-west by the Dang forest, Gujarat, in the north by Madhya Pradesh, by Marathwada region to the east, by Ahmadnagar District to the south, and towards the south-west by Thane District. The area is located between 18°33'–21°61'N & 73°16'–76°28'E, and covers an area of 40,346km² (Fig. 1).

Northern Maharashtra has a tropical climate, specifically a tropical wet and dry climate in the Koppen climate classification (McKnight & Hess 1884), with a seven-month dry season and a peak of rains in July, receiving rain from both the northeast and southwest monsoons. The temperature is moderately stable, ranging between 20°C and 42°C. The cold season from December to February is followed by the summer season from March to June; June to about the end of September constitutes the south-west monsoon season; and October and November form the post-monsoon season (Greater Bombay District Gazetteer 1960). The forest types found in the area are classified as tropical moist deciduous forest, sub-tropical hill forest and tropical dry

deciduous forest (District Gazetteer Nashik District 2010).

Due to the high altitude and favorable conditions, northern Maharashtra has an abundant and diverse flora and fauna. The region has a wide variety of insects, a major component of which is the order Lepidoptera, but scientific documentation of the moth fauna is very much lacking. Insects comprise about 90% of tropical forest biomass (Fatimah & Catherine 2002), but in northern Maharashtra there is little data on the Lepidoptera due to a lack of researchers, who only prefer to work on less diverse taxa. Another problem in assessing insect diversity lies in the deficiency of knowledge of the systematics of the insect fauna of this region, which is due in part to lower conservation efforts towards invertebrates compared to those accorded to large vertebrates and plants (Mahajan 2004). Although 789 species of moths have been recorded from Maharashtra State, from Pune, Satara, Mumbai and Khandala (Cotes & Swinhoe 1887–89), there are no records of the moths found in Nashik, Dhule, Jalgaon & Nandurbar districts.

Megadiverse groups like the insects form a major component of the biodiversity of any area and thus scientific surveying and documentation of this fauna is indispensable to any scientific study and conservation programme. It is not possible to assess the value of a site for conservation without such data (Kendrick 2002). Being a megadiverse taxon with enormous species richness in the tropics, the evaluation of the total species



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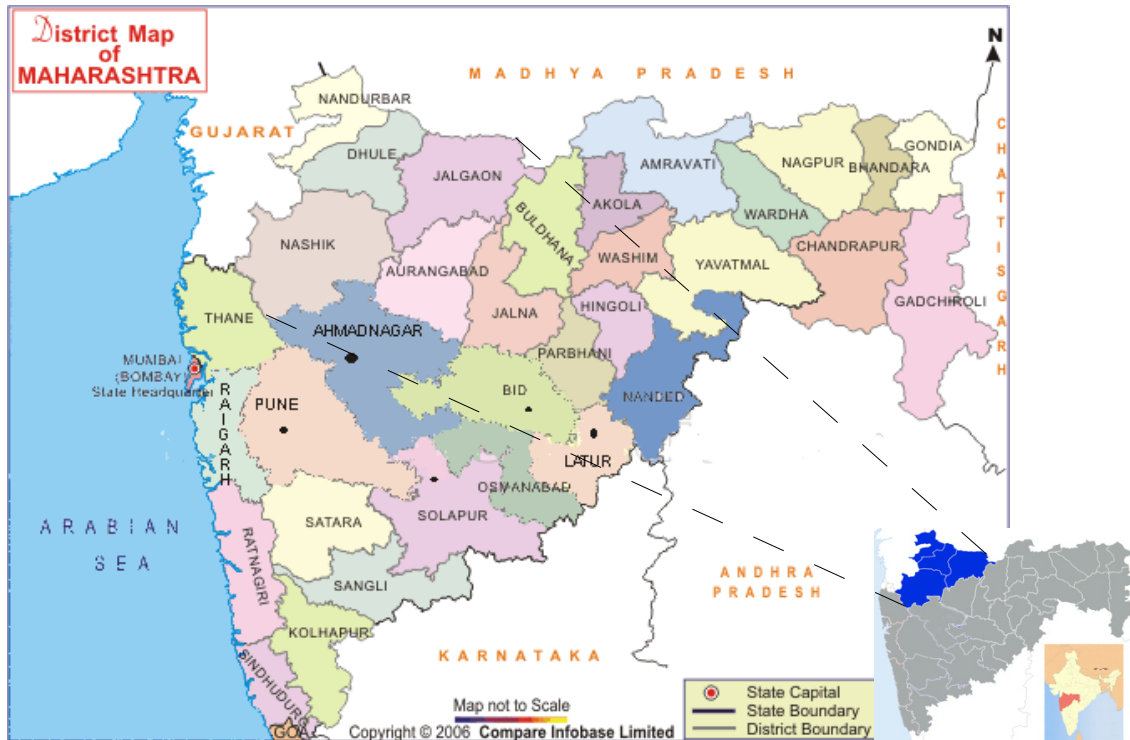


Figure 1. Study area

richness of all insects would be extremely laborious and time consuming. Therefore, indicator groups, such as moths, are frequently selected as the subject of study. Such a taxon is often selected because it is taxonomically well-known and thus species are relatively rapid to identify (Holloway 1985).

Collection and Identification

The collection of moth specimens were done from Nashik, Dhule, Jalgaon and Nandurbar district of northern Maharashtra during June 2009 to June 2010. The five sites (Table 1) from each district selected for collection. In the present study data was collected from 67 trap nights within the selected sites for about 5hr trapping each night.

The collection of nocturnal moths was undertaken with light traps at a light sheet (Fig. 2 a,b), using either a

Philips HQL 125W mercury vapour bulb, Wipro smartlite 20W compact fluorescent lamp or a GE Edison 15W 240V Quad. Several traps had been devised for capturing moths, such as the Rothamsted trap, Heath trap and Robinson trap (Fry & Waring 1996); for this study a light trap (Fig. 2a) was designed based on principles of standard traps. As widely recognized by lepidopterists, many trap designs are not particularly suitable for use in tropical conditions, primarily because they are too small to cope with the enormous catches that are so frequently encountered (Barlow 1982). To overcome these difficulties, most moths were recorded at a light sheet. A white 10'x6' cloth sheet was hung between two vertical poles and the light source placed in such way that the whole sheet was brightly illuminated. Moths were collected from both forest and residential parts of the study area.

Table 1. Collection data of study area.

	District	Name of sites	No. of trapping nights	No. of specimens collected
1	Nashik	Trimbakeshwar, Igatpuri, Peint, Saptashrungi grad, Kalwan.	23	361
2	Dhule	Sakri, Chhadvel, Sindkheda, Shirpur, Boradi.	15	160
3	Jalgaon	Chalisgaon, Pachora, Amalner, Chopda, Bhusawal.	16	115
4	Nandurbar	Navapur, Shahada, Taloda, Toranmal, Virpur.	13	92
			Total	728



Figure 2. (a) Light trap model (b) Light sheet method for moth collection at night.

The moth specimens collected were pinned and labeled in the field. Later, they were further prepared (relaxed, set), sorted to family level and then identified to species in the laboratory.

As noted by many lepidopterists, relaxing, setting and labeling of specimens are both laborious and time consuming procedures (Fatimah & Catherine 2002). Thus, in the present study, species abundance data was recorded in the field and most moths released, with only a small sample collected and prepared as voucher materials which are deposited in the Departmental Insect Reference Museum of KTHM College, Nashik, which is affiliated to Pune University. Cocoons of moths of family Bombycidae were collected from sericulture farms in which *Bombyx mori* are domesticated for the production of mulberry raw silk. Identification of the moths was carried out with the help of identification keys, standard reference books, and available literature. Species whose identities could not be ascertained from external morphology were studied by dissecting the genitalia with the stereoscopic binocular microscope using standard methods. Species not assigned to species level were given a morphospecies label, pending further investigation, and are held at Zoology Research centre, K.T.H.M. College affiliated to Pune University. They are listed in the checklist as [genus] sp. The classification used mainly follows Holloway (1983, 1985, 1986, 1987b, 1988, 1989, 1994, 1996, 1997, 1999); Kristensen 1999 but also incorporating recent changes in superfamily Noctuoidea (Lafontaine & Schmidt 2010; van Nieukirken et al. 2011; Zahir et al. 2010, 2011; Dubatolov & de Vos 2010). Species are listed alphabetically within family and subfamily (Table 2).

Results

A total of 728 moth specimens were collected, which were classified into 245 species (of the 789 species previously recorded from Maharashtra) and placed in 177 genera, and 20 families; the remaining specimens were deposited in Departmental Insect Reference Museum of KTHM College, Nashik, affiliated to Pune University pending further investigation. A preliminary checklist of the moth fauna of northern Maharashtra is presented in Table 2 (Images 1–245 all photographs taken by Sachin A. Gurule).

A larger number of Macrolepidoptera were recorded than Microlepidoptera due to greater efforts taken to record these moths using light sheet and light trap methods rather than other methods, and also due to the difficulty with identification of Microlepidoptera; many of the specimens are thus pending further investigation. The Microlepidoptera superfamilies Tineoidea, Tortricoidea, Cossoidea, Zygaenoidea, Thyridoidea and Hyblaeoidea were represented by the families Tineidae, Tortricidae, Cossidae, Limacodidae, Thyrididae and Hyblaeidae respectively. The superfamily Pyraloidea is represented by two families Pyralidae and Crambidae. In the present survey, only one species each was recorded from the families Tineidae, Tortricidae, Cossidae and Thyrididae; whereas the families Limacodidae and Hyblaeidae were represented by three and two species respectively. Crambidae are the dominant microlepidopteran family represented by 26 species and *Hypsopygia mauritialis* is the only representative of the family Pyralidae. The superfamily Lasiocampoidea, which includes only the family Lasiocampidae, is represented by four species. Moths of this family are susceptible to fungi and are

Table 2. Preliminary checklist of moth fauna from northern Maharashtra: their distribution and status.

	Scientific name	District	Status
A.	Tineoidea		
I.	Family: Tineidae		
	Subfamily: Hapsiferinae		
1	<i>Cimrha seclusella</i> Walker, 1864	NK	R
B.	Tortricoidea		
II.	Family: Tortricidae		
	Subfamily: Olethreutinae		
2	<i>Loboschiza koenigiana</i> Fabricius, 1775	NK	R
C.	Cossoidea		
III.	Family: Cossidae		
	Subfamily: Zeuzerinae		
3	<i>Xyleutes persona</i> Le Guillou, 1841	NK	R
D.	Zygaenoidea		
IV.	Family: Limacodidae		
	Subfamily: Limacodinae		
4	<i>Hyphormides argentipunctata</i> Hering, 1931	NK DL	R
5	<i>Parasa hilaris</i> Westwood, 1848	NK JG	C
6	<i>Parasa lepida</i> Cramer, 1799	NK NB	R
E.	Thyridoidea		
V.	Family: Thyrididae		
	Subfamily: Siculodinae		
7	<i>Rhodoneura</i> sp. A	NK	R
F.	Hyblaeoidea		
VI.	Family: Hyblaeidae		
8	<i>Hyblaea constellata</i> Guenée, 1852	NK	U
9	<i>Hyblaea puera</i> Cramer 1777	NK NB	U
G.	Pyraloidea		
VII.	Family: Pyralidae		
	Subfamily: Pyralinae		
10	<i>Hypsopygia mauritalis</i> Boisduval, 1833	NK NB	U
VIII.	Family: Crambidae		
	Subfamily: Pyraustinae		
11	<i>Pyrausta panopealis</i> Walker, 1859	NK	C
	Subfamily: Acentropinae		
12	<i>Parapoynx stagnalis</i> Zeller, 1852	NK	U
	Subfamily: Crambinae		
13	<i>Ancylolomia saundersiella</i> Zeller, 1863	NK	U
	Subfamily: Odontiinae		
14	<i>Autocharis fessalis</i> Swinhoe, 1887	NK	R
	Subfamily: Spilomelinae		
15	<i>Agathodes ostentalis</i> Guenée, 1854	NK JG NB	C
16	<i>Agrotera basinotata</i> Hampson, 1891	NK	R
17	<i>Antigastra catalaunalis</i> Duponchel, 1833	NK DL JG	C
18	<i>Botyodes asialis</i> Guenée, 1854	NK JG NB	C
19	<i>Botyodes flavibasalis</i> Moore, 1867	NK JG	C
20	<i>Cirrhochrista brizaalis</i> Walker 1859	NK	R
21	<i>Cnaphalocrocis medinalis</i> Guenée, 1854	DL NB	U
22	<i>Conogethes punctiferalis</i> Guenée, 1854	NK NB	R
23	<i>Cydalima laticostalis</i> Guenée, 1854	NK DL JG NB	C
24	<i>Diaphania indica</i> Saunders, 1851	NK DL JG NB	C
25	<i>Filodes fulvidorsalis</i> Hübner 1832	NK	R
26	<i>Glyphodes bivitalis</i> Guenée, 1854	NK DL JG NB	C
27	<i>Maruca vitrata</i> Fabricius, 1787	NK DL JG NB	C
28	<i>Omiodes diemenalis</i> Guenée, 1854		
29	<i>Omiodes indicata</i> Fabricius, 1775	NK	U
30	<i>Pardomima distorta</i> Moore, 1886	NK	R
31	<i>Parotis marginata</i> Hampson, 1893	NK JG NB	U
32	<i>Pygospila tyres</i> Cramer, 1780	NK DL JG	C
33	<i>Sameodes cancellalis</i> Zeller, 1852	NK DL	R
34	<i>Spoladea recurvalis</i> Fabricius, 1794	NK DL JG NB	C
35	<i>Terastia egialealis</i> Walker, 1859	NK	U
36	<i>Tyspanodes linealis</i> Moore, 1867	NK JG NB	C
H.	Lasiocampoidea		
IX.	Family: Lasiocampidae		
	Subfamily: Lasiocampinae		
37	<i>Estigena pardale</i> Walker 1855	NK DL NB	R
38	<i>Kunugia ampla</i> Walker, 1855	NK	U
39	<i>Streblote dorsalis</i> Walker, 1866	NK	U
40	<i>Trabala vishnou</i> Lefèbvre, 1827	NK	R
I.	Bombycoidea		
X.	Family: Eupterotidae		
41	<i>Eupterote fabia</i> Cramer, 1780	NK JG NB	U
42	<i>Eupterote lineosa</i> Walker, 1855	NK DL NB	C
43	<i>Eupterote mollifera discrepans</i> Moore, 1884	NK NB	U
XI.	Family: Bombycidae		
	Subfamily: Bombycinae		
44	<i>Bombyx mori</i> Linnaeus, 1758	NK DL JG NB	C
45	<i>Gunda javanica</i> Moore, 1872	NK DL	R
46	<i>Ocinara</i> sp. A	NK	R
47	<i>Trilocha varians</i> Walker, 1855	NK DL NB	C
XII.	Family: Saturniidae		
	Subfamily: Saturniinae		
48	<i>Actias selene</i> Hübner, 1807	NK	C
49	<i>Antheraea mylitta</i> Drury, 1773	NK DL	C

	Scientific name	District	Status
50	<i>Attacus taprobanis</i> Moore, 1882- 1883	NK	R
XIII.	Family: Sphingidae		
	Subfamily: Smerinthinae		
51	<i>Agnosia microta</i> Hampson, 1907	NK	R
52	<i>Marumba dyras</i> Walker, 1856	NK NB	C
53	<i>Marumba indicus</i> Walker, 1856	NK DL	C
54	<i>Marumba spectabilis</i> Butler, 1875	DL	U
55	<i>Polyptychus dentatus</i> Cramer, 1777	NK NB	R
	Subfamily: Sphinginae		
56	<i>Acherontia lachesis</i> Fabricius, 1798	NK DL JG NB	C
57	<i>Acherontia styx</i> Westwood, 1847	NK DL JG NB	C
58	<i>Agrius convolvuli</i> Linnaeus, 1758	NK DL JG	C
59	<i>Psilogamma increta</i> Walker, 1865	NK DL	C
	Subfamily: Macroglossinae		
60	<i>Cephonodes hylas</i> Linnaeus, 1771	NK JG NB	U
61	<i>Daphnis nerii</i> Linnaeus, 1758	NK DL JG	C
62	<i>Hippotion celerio</i> Linnaeus, 1758	NK JG NB	C
63	<i>Hippotion rosetta</i> Swinhoe, 1892	NK	U
64	<i>Hyles livornica</i> Esper, 1780	NK DL	C
65	<i>Leucophebia emittens</i> Walker, 1866	NK	U
66	<i>Leucophebia lineate</i> Westwood, 1847	NK	R
67	<i>Macroglossum belis</i> Linnaeus, 1758	NK	R
68	<i>Nephele hespera</i> Fabricius, 1775	NK JG NB	C
69	<i>Theretra alecto</i> Linnaeus, 1758	NK DL JG NB	C
70	<i>Theretra castanea</i> Moore, 1872	NK	R
71	<i>Theretra clotho</i> Drury, 1773	NK JG NB	C
72	<i>Theretra gnoma</i> Fabricius, 1775	DL	C
73	<i>Theretra nessus</i> Drury, 1773	NK DL JG NB	C
74	<i>Theretra oldenlandiae</i> Fabricius, 1775	NK JG	U
J.	Geometroidea		
XIV.	Family: Uraniidae		
	Subfamily: Microniinae		
75	<i>Micronia aculeata</i> Guenée, 1857	NK JG NB	C
	Subfamily: Epipleminae		
76	<i>Phazaca theclata</i> Guenée, 1857	NK	C
XV.	Family: Geometridae		
	Subfamily: Ennominae		
77	<i>Amraica recursaria</i> Walker, 1860	NK	C
78	<i>Biston suppressaria</i> Guenée, 1857	NK	U
79	<i>Chiasmia cymatodes</i> Wehrli, 1932	NK JG NB	C
80	<i>Chiasmia eleonora</i> Hübner, 1818	NK DL	C
81	<i>Chiasmia fidoniata</i> Guenée, 1858	NK JG NB	C
82	<i>Chiasmia nora</i> Walker, 1861	NK NB	C
83	<i>Heterostegane subtessellata</i> Walker, 1863	NK JG	C

	Scientific name	District	Status
84	<i>Hyperythra lutea</i> Stoll, 1781	NK DL NB	U
85	<i>Hypomecis</i> sp. A	NK	R
86	<i>Hyposidra talaca</i> Walker, 1860	NK DL NB	R
87	<i>Istrugia disputaria</i> Guenée, 1858	NK	C
88	<i>Zeheba aureata</i> Moore, 1887	NK JG NB	C
89	<i>Zamarada excisa</i> Hampson 1891	NK NB	C
	Subfamily: Geometrinae		
90	<i>Agathia laetata</i> Fabricius, 1794	NK DL JG NB	C
91	<i>Agathia</i> sp. A	NK	C
92	<i>Comostola pyrrhoga</i> Walker, 1866	NK	R
93	<i>Maxates</i> sp. A	NK DL	U
94	<i>Pelagodes quadra</i> Guenée, 1857	NK NB	R
95	<i>Pingasa ruginaria</i> Guenée, 1857	NK DL NB	C
	Subfamily : Larentiinae		
96	<i>Pasiphila rectangulata</i> Linnaeus, 1758	NK	U
	Subfamily: Sterrhinae		
97	<i>Problepsis deliaria</i> Guenée, 1858	NK	C
98	<i>Scopula pulchellata</i> Fabricius, 1794	DL	R
99	<i>Scopula subpunctaria</i> Herrich-Schäffer, 1847	NK	C
100	<i>Scopula</i> sp. A	NK	U
101	<i>Traminda mundissima</i> Walker, 1861	NK DL	R
K.	Noctuoidea		
XVI.	Family: Notodontidae		
	Subfamily: Phalerinae		
102	<i>Phalera cossoides</i> Walker, 1863	NK NB	U
103	<i>Phalera grotei</i> Moore, 1859	NK NB	C
	Subfamily: Cerurinae		
104	<i>Paracerura priapus</i> Schintmeister, 1997	NK	R
XVII.	Family: Erebiidae		
	Subfamily: Lymantriinae		
105	<i>Arna</i> sp. A	NK	U
106	<i>Artaxa digamma</i> Boisduval, 1844	NK NB	C
107	<i>Calliteara grotei</i> Moore, 1859	NK NB	R
108	<i>Olene mendosa</i> Hübner, 1823	NK	R
109	<i>Orgyia pastica</i> Walker, 1855.	NK NB	C
110	<i>Orvasca subnotata</i> Walker, 1865	DL	U
111	<i>Perina nuda</i> Fabricius, 1787	NK DL NB	C
	Subfamily: Arctiinae		
112	<i>Aloa lactinea</i> Cramer, 1777	NK DL NB	C
113	<i>Amata</i> sp. A	DL	R
114	<i>Amerila astrea</i> Drury, 1773	NK DL JG	U
115	<i>Creatonotos gangis</i> Linnaeus, 1763	NK NB	C
116	<i>Creatonotos transiens</i> Walker, 1855	NK	R
117	<i>Mangina argus</i> Kollar, 1844	NK DL NB	C
118	<i>Mangina astrea</i> Drury, 1773	NK	R
119	<i>Nepita conferta</i> Walker 1854	NK NB	R

	Scientific name	District	Status
120	<i>Olepa ricini</i> Fabricius, 1775	NK DL JG NB	C
121	<i>Rajendra vittata</i> Moore, 1879	NK DL NB	C
122	<i>Rajendra perrotteti</i> Guérin-Méneville, 1844	NK NB	U
123	<i>Spilarctia eldorado</i> Rothschild, 1910	NK	U
124	<i>Spilarctia mona</i> Swinhoe, 1885	NK DL NB	C
125	<i>Syntomoides imaon</i> Cramer, 1779	NK DL NB	C
126	<i>Utetheisa lotrix</i> Cramer, 1777	NK DL	U
	Subfamily: Pangraptinae		
127	<i>Egnasia ephyrodalis</i> Walker, 1858	NK NB	C
128	<i>Egnasia accingalis</i> Walker, 1858	NK NB	U
129	<i>Episparsis liturata</i> Fabricius, 1787	NK DL JG	C
	Subfamily: Aganainae		
130	<i>Asota caricae</i> Fabricius, 1775	NK DL NB	C
131	<i>Asota ficus</i> Fabricius, 1775	NK NB	C
132	<i>Asota producta</i> Butler, 1875	NK	R
133	<i>Digama hearseyana similis</i> Moore 1878	NK	U
134	<i>Digama marchalii figurate</i> Moore, 1878	NK	R
135	<i>Psimada quadripennis</i> Walker, 1858	NK NB	U
	Subfamily: Hypeninae		
136	<i>Hypena laceratalis</i> Walker, 1859	NK DL JG NB	C
137	<i>Hypena obductalis</i> Walker, 1859	DL	C
138	<i>Hypena</i> sp. A	NK JG	C
139	<i>Hypena</i> sp. B	NK	U
	Subfamily: Scoliopteryginae		
140	<i>Cosmophila flava</i> Fabricius, 1775	NK DL NB	C
141	<i>Cosmophila fulvida</i> Guenée, 1852	NK DL NB	C
142	<i>Cosmophila lyona</i> Swinhoe, 1919	NK DL	C
	Subfamily: Calpinae		
143	<i>Calyptra minuticornis</i> Guenée, 1852	NK DL	U
144	<i>Eudocima homaena</i> Hübner, 1823	NK NB	C
145	<i>Eudocima hypermnestra</i> Cramer, 1780	NK	R
146	<i>Eudocima materna</i> Linnaeus, 1767	NK DL JG NB	C
147	<i>Eudocima phalonia</i> Linnaeus, 1763	NK DL JG NB	C
148	<i>Eudocima salaminia</i> Cramer 1777	NK	R
149	<i>Oraesia emarginata</i> Fabricius, 1794	NK NB	C
	Subfamily: Hypocalinae		
150	<i>Hypocala deflorata</i> Fabricius 1792	NK JG NB	C
151	<i>Hypocala subsatura</i> Guenée, 1852	NK	R
	Subfamily: Tinoliinae		
152	<i>Calesia stillifera</i> Felder, 1874	NK	R
	Subfamily: Boletobiinae		
153	<i>Eublemma baccalix</i> Swinhoe, 1886	NK JG	U

	Scientific name	District	Status
154	<i>Homodes propitia</i> Guenée, 1852	NK	U
	Subfamily : Erebiniae		
155	<i>Achaea janata</i> Linnaeus, 1758	NK DL JG NB	C
156	<i>Achaea serva</i> Fabricius, 1775	NK DL JG NB	C
157	<i>Anisoneura aluco</i> Fabricius, 1775	NK	R
158	<i>Artena dotata</i> Fabricius, 1794	NK DL JG NB	C
159	<i>Attatha regalis</i> Moore, 1872	DL	R
160	<i>Bamra mundata</i> Walker, 1858	NK	R
161	<i>Bastilla arctotaenia</i> Guenée, 1852	NK	R
162	<i>Bastilla conficiens</i> Walker, 1858	JG	U
163	<i>Bastilla crameri</i> Moore, 1885	NK DL JG NB	C
164	<i>Bastilla fulvotaenia</i> Guenée, 1852	NK DL	U
165	<i>Bastilla joviana</i> Stoll, 1782	NK	R
166	<i>Bastilla torrida</i> Guenée, 1852	NK	C
167	<i>Chalciope mygdon</i> Cramer, 1777	NK	C
168	<i>Entomogramma faurix</i> Guenée, 1858	NK DL	U
169	<i>Ercheia cyllaria</i> Walker, 1858	NK	C
170	<i>Erebus caprimulgus</i> Fabricius, 1781	NK DL	R
171	<i>Erebus ephesperis</i> Hübner, 1827	NK	U
172	<i>Erebus hieroglyphica</i> Drury, 1773	NK DL JG NB	C
173	<i>Erebus macrops</i> Linnaeus, 1768	NK DL JG NB	C
174	<i>Ericia inangulata</i> Guenée, 1852	NK	R
175	<i>Grammodes geometrica</i> Fabricius, 1775	NK DL JG NB	C
176	<i>Grammodes stolidia</i> Fabricius, 1775	NK NB	C
177	<i>Hulodes caranea</i> , Cramer 1780	NK NB	U
178	<i>Hulodes drylla</i> Guenée, 1852	DL NB	C
179	<i>Hypopyra vespertilio</i> Fabricius, 1787	NK JG NB	U
180	<i>Hyospila bolinoides</i> Guenée, 1852	NK DL	R
181	<i>Lacera procellosa</i> Butler, 1879	NK JG NB	C
182	<i>Lacera noctilio</i> Fabricius, 1794	NK	U
183	<i>Mocis frugalis</i> Fabricius, 1775	NK DL NB	C
184	<i>Mocis undata</i> Fabricius, 1775	NK NB	C
185	<i>Ophiusa tirhaca</i> Cramer, 1777	NK DL NB	C
186	<i>Ophiusa triphaenoides</i> Walker, 1858	NK JG	C
187	<i>Ophiusa indistincta</i> Moore, 1882	DL	C
188	<i>Pericyma cruegeri</i> Butler, 1886	NK DL NB	U
189	<i>Pericyma umbrina</i> Guenée, 1852	NK	U
190	<i>Pindara illibata</i> Fabricius, 1775	NK NB	R
191	<i>Polydesma boarmioides</i> Guenée, 1852	DL JG	U
192	<i>Serrododes campana</i> Guenée, 1852	NK DL JG NB	C

	Scientific name	District	Status
193	<i>Speiredonia mutabilis</i> Fabricius, 1794	NK NB	R
194	<i>Sphingomorpha chlorea</i> Cramer 1777	NK	U
195	<i>Spirama retorta</i> Clerck, 1759	NK DL JG NB	C
196	<i>Spirama indenta</i> Hampson, 1891	DL	C
197	<i>Tathorhynchus exsiccata</i> Lederer, 1855	NK NB	R
198	<i>Thyas coronata</i> Hübner, 1824	NK DL	C
199	<i>Thyas honesta</i> Hübner, 1806	NK	C
200	<i>Trigonodes disjuncta</i> Moore, 1882	NK DL NB	C
	Subfamily: Eulepidotinae		
201	<i>Anticarsia irrorata</i> Fabricius, 1781	NK DL	U
	Miscellaneous taxa		
202	<i>Chilkasa falcata</i> Swinhoe, 1885	NK NB	R
203	<i>Chrysopera combinans</i> Walker, 1858	NK DL	C
204	<i>Ischyja hemiphaea</i> Cramer, 1776	NK DL JG	C
205	<i>Ischyja manlia</i> Cramer, 1776	NK	R
XVIII.	Family: Eutelidae		
	Subfamily: Stictopterinae		
206	<i>Lophoptera squammigera</i> Guenée, 1852	NK	R
	Subfamily: Euteliinae		
207	<i>Eutelia blandiatrix</i> Guenée, 1852	NK	R
208	<i>Paectes subapicalis</i> Walker, 1858	NK	U
209	<i>Penicillaria jocosatrix</i> Guenée, 1852	NK	R
XIX.	Family: Nolidae		
	Subfamily: Blenininae		
210	<i>Blenina accipiens</i> Walker, 1858	NK	U
211	<i>Blenina donans</i> Walker, 1858	NK NB	U
	Subfamily: Chloephorinae		
212	<i>Aiteta diurna</i> Swinhoe, 1889	NK DL NB	C
213	<i>Aiteta rufiflava</i> Walker, 1857	NK NB	C
214	<i>Carea angulata</i> Fabricius, 1793	NK	U
	Subfamily: Westermanniinae		
215	<i>Miaromima pangolina</i> Holloway, 1982	NK	R
216	<i>Westermannia superba</i> Hübner, 1823	NK DL	U
XX.	Family: Noctuidae		
	Subfamily: Plusiinae		
217	<i>Chrysodeixis acuta</i> Walker, 1858	NK	C
218	<i>Thysanoplusia orichalcea</i> Fabricius, 1775	NK	R

	Scientific name	District	Status
	Subfamily: Bagisarinae		
219	<i>Amyna axis</i> (Guenée, 1852)	NK	U
220	<i>Chasmina candida</i> Walker, 1865	NK	R
221	<i>Xanthodes intersepta</i> Guenée, 1852	NK DL JG NB	C
222	<i>Xanthodes malvae</i> Esper, 1796	NK DL NB	C
223	<i>Xanthodes transversa</i> Guenée, 1852	NK DL NB	C
	Subfamily: Eustrotiinae		
224	<i>Eustrotia marginata</i> Walker, 1866	NK NB	C
225	<i>Ozarba punctigera</i> Walker, 1865	DL	C
226	<i>Maliattha quadripartita</i> Walker, 1865	NK JG	C
227	<i>Maliattha</i> sp. A	NK DL	C
	Subfamily: Acontinae		
228	<i>Acontia crocata</i> Guenée, 1852	NK NB	C
229	<i>Acontia nitidula</i> Fabricius, 1787	NK	R
	Subfamily: Aediinae		
230	<i>Aedia acronyctoides</i> Guenée, 1852	NK DL JG	C
231	<i>Aedia leucomelas</i> Linnaeus, 1758	NK	R
	Subfamily: Agaristinae		
232	<i>Episteme adalatrix</i> Kollar, 1844	NK DL	R
	Subfamily: Condicinae		
233	<i>Condica dolorosa</i> Walker, 1865	NK	R
	Subfamily: Heliothinae		
234	<i>Helicoverpa armigera</i> Hübner, 1805	NK DL JG NB	C
235	<i>Heliothis irrorata</i> Moore, 1881	NK DL NB	C
236	<i>Heliothis peltigera</i> Denis & Schiffermüller, 1775	NK JG NB	C
	Subfamily: Eriopinae		
237	<i>Callopietria</i> sp. A	NK	R
	Subfamily: Noctuinae		
238	<i>Agrotis segetum</i> Schiffermüller, 1775	NK DL JG NB	C
239	<i>Athetis</i> sp. A	JG	U
240	<i>Callyna costiplaga</i> Moore, 1872	NK JG	U
241	<i>Mythimna designata</i> Walker, 1856	NK DL NB	C
242	<i>Mythimna separata</i> Walker, 1865	NK DL	R
243	<i>Polytela gloriosae</i> Fabricius, 1775	NK DL JG NB	C
244	<i>Sasunaga tenebrosa</i> Moore, 1867	NK	U
245	<i>Spodoptera litura</i> Walker, 1857	NK	C

NK - Nashik; DL - Dhule; JG - Jalgaon; NB - Nandurbar. **Status:** C - Common (more than 20 specimens recorded); U - Uncommon (more than 5 but fewer than 20 specimens recorded); R - Rare and singletons (single and fewer than 5 specimens recorded).

also attacked by tachinid flies (Chandra 2007). The superfamily Bombycoidea is represented by four families Eupterotidae (three species), Bombycidae (four species), Saturniidae (three species) and Sphingidae (24 species). Family Eupterotidae is represented by the beautifully coloured *Eupterote fabia*, *Eupterote lineosa* and *Eupterote mollifera discrepans*. Moths of family Saturniidae often fly late at night, with an irregular flight and are readily attracted towards light. Three species, *Actias selene*, *Antheraea mylitta* and *Attacus taprobanis* were recorded from Nashik and Jalgaon districts. The superfamily Geometroidea is represented by two families, Uraniidae (two species) and Geometridae (25 species). The family Uraniidae is represented by *Micronia aculeata* and *Phazaca theclata*. Some species from Geometridae are diurnal and so would have been missed.

The superfamily Noctuoidea is represented by five families; Notodontidae (three species), Erebidae (101 species), Euteliidae (four species), Nolidae (seven species) and Noctuidae (29 species). Recent changes in the classification of this superfamily have resulted in the inclusion of the previous families Arctiidae and Lymantriidae as subfamilies of Erebidae, i.e., as Arctiinae and Lymantriinae (Lafontaine & Schmidt 2010; van Nieukirken et al. 2011; Zahiri et al. 2010, 2011). The moths of subfamily Arctiinae are well represented by brightly coloured tiger and footman moths and moths of the subfamily Lymantriinae are known as tussock moths. Erebidae is thus now the largest of all moth families. Subfamily Erebininae is the largest and includes the tribe Catocalinae (Lafontaine & Schmidt 2010) representing owlet and underwing moths. Family Notodontidae is represented by only three species, *Phalera cossoides*, *Phalera grotei* and *Paracerura priapus* and thus is rare in occurrence.

Discussion

Cotes & Swinhoe (1887–89) and Hampson (1892–1896) listed 4553 and 5277 moth species respectively from India; of which they have reported 789 and 611 moth species principally from western Maharashtra. Mathew et al. (2004) catalogued 202 species of Lepidoptera from Shendurny Wildlife Sanctuary, Kerala, of which 73 were butterflies and 129 were moths from nine families, with Noctuidae (including Erebidae) and Pyralidae the dominant families. Chandra (2007) studied the moth diversity of Madhya Pradesh and Chhattisgarh and recorded 142 species from 90 genera in 16 families, with families Noctuidae (including Erebidae) and Crambidae dominant in that area. Ghosh (2003) studied

the geometrid moths of Sikkim and reported 525 species, and cited a total of 460 and 260 species of Geometridae from Meghalaya and West Bengal respectively. Gurule et al. (2010) catalogued 70 species of moths from the family Noctuidae (including Erebidae) in Nashik District of Maharashtra. Sidhu et al. (2010) documented 109 microlepidopteran species in the online version of the Zoological Survey of India. Finally, Rose & Pooni (2004, 2005) recorded 18 species belonging to the superfamily Pterophoroidea and 16 species belonging to the superfamily Tortricoidea from the north-western part of India. The above figures indicate that the moth fauna of northern Maharashtra is highly diverse compared to Madhya Pradesh and Uttar Pradesh, despite the fact that the area shows low geometrid species as compared to Meghalaya and West Bengal.

In the present survey, family Erebidae includes most of the species (101), followed by the families Noctuidae (29), Crambidae (26), Geometridae (25) and Sphingidae (24); the noctuid to geometrid ratio found in the survey is 5:1. The surveyed area has a higher proportion of plants from the families Cupressaceae, Menispermaceae, Fabaceae, Malvaceae, Solanaceae, Convolvulaceae, Euphorbiaceae, Mimosaceae, Ebenaceae, Sapotaceae, Sapindaceae, Brassicaceae, Asteraceae, Poaceae, Linaceae and Amaranthaceae, which may serve as indicator taxa for noctuid moths, with lower proportions of plants from families Myrtaceae, Rutaceae, Rhizophoraceae, Periplocaceae, Combretaceae, Thymeliaceae, Fagaceae and Santalaceae indicating a rich geometrid fauna (Kitching et al. 2000). The ratio obtained in the present study suggests the moth assemblages recorded are typical of human-disturbed forest of wild and orchid plants with relatively low geometrid component and moderate agriculture and open habitats.

The moth fauna of northern Maharashtra is highly diverse but after evaluation of the collection data of the 245 species recorded and identified, it was also observed that due to topographical changes and loss of natural habitats (Mahajan 2004), the populations of many species have declined. As noted above, light trap designs are not particularly suitable for use in tropical conditions, because they are generally too small to cope with the enormous catches that were frequently encountered (Barlow 1982). So samples obtained from the light sheet proved to be extremely valuable for the production of a preliminary checklist of the moth fauna of northern Maharashtra. However, the sampling period is really insufficient to estimate species richness, being relatively short. A more exhaustive survey of all regions is required with other sampling methods, including

crepuscular netting, baiting, larval searching, diurnal nectaring and malaise trapping, and this is sure to yield new records for this area.

Conclusion

The results of this survey indicate that the moth fauna of northern Maharashtra is characterized by larger proportions of Erebidae, Noctuidae, Crambidae, Geometridae and Sphingidae, which are also among the most diverse families of moths in this region, other families being relatively rare (or at least under-collected, especially Microlepidoptera). Overall, the moth fauna of northern Maharashtra is highly diverse but many species are only uncommonly encountered. Conservation of the area's flora and plantation by the Forest Division thus helps preserve a reservoir for moth and other insects but more efforts are required towards their scientific documentation and conservation.

A future course of action

Inventorying is the first step in conservation. The list of moths presented here is preliminary, considering the rich faunal diversity of the area; a more comprehensive study is required to document the entire biodiversity present in this area. A detailed survey will be carried out to record the moth fauna of this area with proper scientific documentation. This exhaustive survey of all regions will be conducted using the additional sampling methods noted above. All records will be submitted to the Forest Department and the Zoological Survey of India for documentation.

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Image 1. *Cimitra seclusella*Image 2. *Loboschiza koenigiana*Image 3. *Xyleutes persona.jpg*Image 4. *Hyphormides argenti-punctata*Image 5. *Parasa hilaris*Image 6. *Parasa lepida*Image 7. *Rhodoneura sp. A*Image 8. *Hyblaea constellata*Image 9. *Hyblaea puera*Image 10. *Hypsopygia mauritialis*Image 11. *Pyrausta panopealis*Image 12. *Parapoynx stagnalis*Image 13. *Ancylolomia saundersiella*Image 14. *Autocharis fessalis*Image 15. *Agathodes ostentalis*Image 16. *Agroteta basinotata*Image 17. *Antigastra catalaunalis*Image 18. *Botyodes asialis*Image 19. *Botyodes flavibasalis*Image 20. *Cirrhochrista brizoalis*Image 21. *Cnaphalocrocis medicinalis*Image 22. *Conogethes punctiferalis*Image 23. *Cydalima laticostalis*Image 24. *Diaphania indica*



Image 25. *Filodes fulvidorsalis*



Image 26. *Glyphodes bivitalis*



Image 27. *Maruca vitrata*



Image 28. *Omiodes diemenalis*



Image 29. *Omiodes indicata*



Image 30. *Pardomima distorta*



Image 31. *Parotis marginata*



Image 32. *Pygospila tyres*



Image 33. *Sameodes cancellalis*



Image 34. *Spoladea recurvalis*



Image 35. *Terastia egialealis*



Image 36. *Tyspanodes linealis*



Image 37a. *Gastropacha pardale*
Female



Image 37b. *Gastropacha pardale*
Male



Image 38. *Kunugia ampla*



Image 39. *Streblote dorsalis*



Image 40a. *Trabala vishnou* f



Image 40b. *Trabala vishnou* m



Image 41. *Eupterote fabia* Male



Image 42. *Eupterote lineosa*



Image 43. *Eupterote mollifera*
discrepans



Image 44. *Bombyx mori*



Image 45. *Gunda javanica*



Image 46. *Ocinara* sp. A

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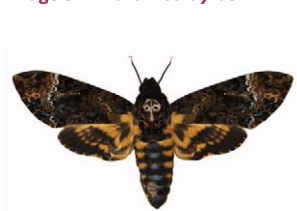
Image 47. *Trilocha varians*Image 48. *Actias selene*Image 49. *Antheraea mylitta*Image 50. *Attacus taprobanis*Image 51. *Agnosia microta*Image 52. *Marumba dyras*Image 53. *Marumba indicus*Image 54. *Marumba spectabilis*Image 55. *Polyptychus dentatus*Image 56. *Acheronitia lachesis*Image 57. *Acheronitia Styx*Image 58. *Agrius convolvuli*Image 59. *Psilogamma increta*Image 60. *Cephonodes hylas*Image 61. *Daphnis nerii*Image 62. *Hippotion celerio*Image 63. *Hippotion rosetta*Image 64. *Hyles livornica*Image 65. *Leucophlebia emittens*Image 66. *Leucophlebia lineate*Image 67. *Macroglossum belis*Image 68. *Nephele hespera*Image 69. *Theretra alecto*Image 70. *Theretra castanea*

Image 71. *Theretra clotho*Image 72. *Theretra gnoma*Image 73. *Theretra nessus*Image 74. *Theretra oldenlandiae*Image 75. *Micronia aculeata*Image 76. *Phazaca theclata*Image 77. *Amraica recursaria*Image 78. *Biston suppressaria*
FemaleImage 78. *Biston suppressaria*
MaleImage 79. *Chiasmia cymatodes*Image 80. *Chiasmia eleonora*
FemaleImage 80. *Chiasmia eleonora*
MaleImage 81. *Chiasmia fidoniata*Image 82. *Chiasmia nora*Image 83. *Heterostegane subtessellata*Image 84. *Hyperythra lutea*Image 85. *Hypomecis* sp. AImage 86. *Hyposidra talaca*
FemaleImage 86. *Hyposidra talaca* MaleImage 87. *Istrugia disputaria*Image 88. *Zeheba aureata*
FemaleImage 88. *Zeheba aureata* MaleImage 89. *Zamarada excisa*Image 90. *Agathia laetata*

Image 91. *Agathia* sp. AImage 92. *Comostola pyrrhogona*Image 93. *Maxates* sp. AImage 94. *Pelagodes quadraria*Image 95. *Pingasa* sp. AImage 96. *Pasiphila rectangulata*Image 97. *Problepsis deliaria*Image 98. *Scopula pulchella*Image 99. *Scopula subpunctaria*Image 100. *Scopula* sp. AImage 101. *Traminda mundissima*Image 102. *Phalera Cossoides*Image 103. *Phalera grotei* MaleImage 104. *Paracerura priapus*Image 105. *Arna* sp. AImage 106. *Artaxa digramma*Image 107. *Calliteara grotei*Image 108. *Olene mendosa*
FemaleImage 108. *Olene mendosa* MaleImage 109. *Orgyia postica*Image 110. *Orvasca subnotata*Image 111. *Perina nuda*Image 112. *Aloa lactinea*Image 113. *Amata* sp. A



Image 114. *Amerila astrea*



Image 115. *Creatonotos gangis*



Image 116. *Creatonotos transiens*



Image 117. *Mangina argus*



Image 118. *Mangina astrea*



Image 119. *Nepita conferta*



Image 120. *Olepa ricini*



Image 121. *Rajendra vittata*



Image 122. *Rajendra perrotteti*



Image 123. *Spilarctia eldorado*



Image 124. *Spilarctia mona*



Image 125. *Syntomoides imaan*



Image 126. *Utetheisa lotrix*



Image 127. *Egnasia ephyrodalis*



Image 128. *Egnasia accingalis*



Image 129. *Episparsis liturata*



Image 130. *Asota caricae* Female



Image 130. *Asota caricae* Male



Image 131. *Asota ficus*



Image 132. *Asota producta*



Image 133. *Digama hearseyana similis*



Image 134. *Digama marchalii figurate*



Image 135. *Psimada quadripennis*



Image 136. *Hypene laceratalis*

Image 137. *Hypena obductalis*Image 138. *Hypena* sp. AImage 139. *Hypena* sp. BImage 140. *Cosmophila flava*Image 141. *Cosmophila fulvida*Image 142. *Cosmophila lyona*Image 143. *Calyptra minuticornis*Image 144. *Eudocima homaena*
FemaleImage 144. *Eudocima homaena*
MaleImage 145. *Eudocima hypernestra*Image 146. *Eudocima materna*
FemaleImage 146. *Eudocima materna*
MaleImage 147. *Eudocima phalonia*
FemaleImage 147. *Eudocima phalonia*
MaleImage 148. *Eudocima salaminia*Image 149. *Oraesia emarginata*Image 150. *Hypocala deflorata*Image 151. *Hypocala subsatura*
f. rostrataImage 152. *Calesia stillifera*Image 153. *Eublemma baccalix*Image 154. *Homodes propitia*Image 155. *Achaea janata*Image 156. *Achaea serva*Image 157. *Anisoneura aluco*



Image 158. *Artena dotata*



Image 159. *Attatha regalis*



Image 160. *Bamra mundata* Male



Image 161. *Bastilla arctotaenia*



Image 162. *Bastilla conficiens*



Image 163. *Bastilla crameri*



Image 164. *Bastilla fulvotaenia*



Image 165. *Bastilla joviana*



Image 166. *Bastilla torrida*



Image 167. *Chalciopse mygdon*



Image 168. *Entomogramma faultrix*



Image 169. *Ercheia cyllaria*



Image 170. *Erebus caprimulgus*
Female



Image 170. *Erebus caprimulgus*
Male



Image 171. *Erebus ephesperis*



Image 172. *Erebus hieroglyphica*
Female



Image 172. *Erebus hieroglyphica*
Male



Image 173. *Erebus macrops*
Female



Image 173. *Erebus macrops* Male



Image 174. *Ericeia inangulata*
Male



Image 175. *Grammodes geometrica*



Image 176. *Grammodes stolidia*



Image 177. *Hulodes caranea*
Female



Image 177. *Hulodes caranea*
Male

Image 178. *Hulodes drylla*Image 179. *Hypopyra vespertilio*
femaleImage 179. *Hypopyra vespertilio*
maleImage 180. *Hyospila bolinoides*
femaleImage 180. *Hyospila bolinoides*
maleImage 181. *Lacera procellosa*Image 182. *Lacera noctilio*Image 183. *Mocis frugalis*Image 184. *Mocis undata* FemaleImage 184. *Mocis undata* MaleImage 185. *Ophiusa tirhaca*Image 186. *Ophiusa triphaenoides*Image 187. *Ophiusa indistincta*Image 188. *Pericyma cruegeri*Image 189. *Pericyma umbrina*Image 190. *Pindara illibata*Image 191. *Polydesma boarmioides*Image 192. *Serrodes campana*Image 193. *Speiredonia mutabilis*Image 194. *Spingomorpha chlorea* FemaleImage 195. *Spirama retorta* MaleImage 196. *Spirama indenta*Image 197. *Tathorhynchus exsiccata*Image 198. *Thyas coronata*

Image 199. *Thyas honesta*Image 200. *Trigonodes disjuncta*Image 201. *Anticarsia irrorata*Image 202. *Chilkasa falcata*
FemaleImage 202. *Chilkasa falcata* MaleImage 203. *Chrysopera combinans*Image 204. *Ischyja hemiphaea*Image 205. *Ichyija manlia*Image 206. *Lophoptera squamigera*Image 207. *Eutelia blandiatrix*Image 208. *Paectes subapicalis*Image 209. *Eutelia jocosatrix*Image 210. *Blenina donans*
FemaleImage 211. *Blenina accipiens*Image 212. *Aiteta diurna*Image 213. *Aiteta rufoflava*Image 214. *Carea angulata*Image 215. *Miaromima pangolina*Image 216. *Westermannia superba*Image 217. *Chrysodeixis acuta*Image 218. *Thyranoplusia orichalcea*Image 219. *Amyna axis*Image 220. *Chasmina candida*Image 221. *Xanthodes intersepta*



Image 222. *Xanthodes malvae*



Image 223. *Xanthodes transversa*



Image 224. *Eustrotia marginata*



Image 225. *Ozarba punctigera*



Image 226. *Maliaatha quadripartita*



Image 227. *Maliaatha* sp. A



Image 228. *Acontia crocata*
Female



Image 229. *Acontia nitidula*



Image 230. *Aedia acronyctoides*



Image 231. *Aedia leucomelas*



Image 232. *Episteme adulatrix*



Image 233. *Condicta dolorosa*



Image 234. *Helicoverpa armigera*



Image 235. *Heliothis irrorata*



Image 236. *Heliothis peltigera*



Image 237. *Callopietria* sp.



Image 238. *Agrotis segetum*



Image 239. *Athetis* sp.



Image 240. *Callyna costiplaga*



Image 241. *Mythimna designata*



Image 242. *Mythimna separata*



Image 243. *Polytela gloriosae*



Image 244. *Sasunaga tenebrosa*
Male



Image 245. *Spodoptera litura*
Male

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