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Moths (Lepidoptera) diversity of district Koderma, Jharkhand

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Abstract
The manuscript is about the moths collected from Koderma district of Jharkhand state. Koderma is unexplored as far as its floral and faunal composition is concerned. The information is based on four surveys conducted in July 2012, August 2013, September 2014 and October 2015. A total of 140 species under 106 genera of moths are reported from Koderma. Out of which, 32 species are reported for the first time from Jharkhand. Family Erebidae dominated among all the 17 families in diversity as well as in abundance.

Keywords: lepidoptera, moths, diversity, new records, koderma

Introduction
The study area Koderma was selected due to its unique geographical location. It is the northern edge of Chhota Nagpur plateau and from where the plateau smoothly disappears into the Gangetic plains of Bihar. The area is also known as a lower Hazaribagh plateau. Koderma lies between 24015.46 & 2404918 N latitude and 8502601 & 8505416 east longitude with an average altitude of 397m above the sea level. It covers an area of about 1500.00 sq kms [1]. The region is also having Koderma Wildlife Sanctuary which is spread over an area of 150.62 sq. km. lying between 85°05'15" and 85°05'30" E longitudes and 24°12' and 24°37' N latitudes. Koderma is unexplored as far as its floral and faunal composition is concerned. Except some general information about floral components like: Mahua, Banyan, Sakhua, Palas, Pipal, Neem, Khajoor, Bamboo and similarly about some common faunal components: Cow, Bull, Buffalo, Goat, Leopard, Bear, Pig, Deer, Hares etc. [2], we do not have any consolidated information about other faunal groups. Therefore, Keeping in mind the virginity of the area and focusing on the primary objective of Zoological Survey of India to explore, survey, inventorying and monitoring of faunal diversity in various states, the study was planned to initiate the documentation of faunal diversity from Koderma district as a part of the project, "Fauna of Jharkhand". Information about the diversity of one of the economically important faunal groups, the moths is compiled in this research paper. Moths belong to order Lepidoptera and are mainly nocturnal creatures. Their caterpillars are pests of many agricultural crops, forest trees, ornamental plants, etc. Although, many of the adult moths are important indicators of ecological health of many ecosystems. To study the diversity of moths from Koderma, four surveys were conducted (July 2012, August 2013, September 2014 and October 2015). A total of 140 species representing 106 genera of moths were collected and identified. It includes 32 species reported for the first time from the state of Jharkhand. Photographs of all the adults representing 140 species are also provided.

Materials and Methods
The collection of moths was made with the help of vertical sheet light traps during night time. Two sites were selected: Urwan (24.344558 N, 85.464073 E) and Meghatari (24.489303 N, 85.477930 E). The collected specimens were killed with the help of ethyl acetate vapors and processed as per standard techniques in Lepidopterology. Dry preservation is done in fumigated entomological boxes and stored in the insect cabinets in the Zoological Survey of India, GPRC, Patna. The identification is done with the help of relevant literature [3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14]. The classification followed here is given by Nieukerken *et al.* [15].

Results and Discussion

According to Richard Monastersky (in Nature Vol. 516; Pp 159) 'researchers have so far sampled only a sliver of Earth's biodiversity, and most of the unknown groups inhabit small regions of the world, often in habitats that are rapidly being destroyed'. Furthermore, it is a fact that the ecosystems are changing due to interference of anthropogenic activities and we are losing our biodiversity at a high rate without even knowing their existence. Therefore, our highest priority should be to explore undiscovered species and to document the faunal and floral components from these small but bio-diverse rich pockets at regional as well as National levels. There is an urgent need to establish a strictly comparative data base for various groups of organisms on both global and regional scales, to provide a proper scientific basis for the implementation of conservation measures. Inventories of any area are the pillars which help in the decision-making processes and understanding the changes that took place in the past and can impact the environment. The results of these inventories will support the framework to be designed by environmental agencies. In this line, we are providing the baseline data of moths from Koderma district.

During our collection surveys, 311 specimens of moths were collected and identified into 140 different species representing 106 genera (Table 1) under 45 subfamilies and 17 families (Table 2). Out of the 140 species, 109 species are identified up to species level and 31 species are identified up to genus level. The major outcome of this research is the reporting of 32 species for the first time from Jharkhand. The species reported for the first time are: *Hypospila bolinoides*, Guenee, 1852; *Anticarsia irrorata*, (Fabricius, 1781); *Aemene tenebrosa*, Moore, 1878; *Spilarctia coorgensis*, Kirti& Gill, 2010; *Simplicia niphona*, (Butler, 1878); *Anomis mesogona*, Walker, 1858; *Anomis sabulifera*, Guenee, 1852; *Hypocala rostrata*, (Fabricius, 1794); *Parasa pastoralis*, Butler, 1885; *Phocoderma velutina*, Kollar, 1844; *Thosea bipartita*, Hering, 1933; *Aphendala mechiensis*, Yashimoto, 1994; *Altha subnotata*, Walker, 1865; *Maurilia iconica*, (Walker, 1857); *Tympanistes rubidorsalis*, Moore, 1888; *Aiteta truncata*, (Walker, 1858); *Ornithospila avicularia*, Guenee, 1857; *Glyphodes canthusalis*, Walker, 1861; *Glyphodes caesalis*, (Walker, 1859); *Glyphodes bicolor*, (Swainson, 1821); *Diaphania indica*, (Saunders, 1851); *Lamprophaia ablactalis*, (Walker, 1859); *Pachynoa, sabelialis*, Walker, 1866; *Herculia suffusalis*, Walker, 1866; *Hypsopygia pernigralis*, (Ragonot, 1891); *Cryptoblabes gnidiella*, (Haworth, 1811); *Aphomia zelleri*, (Joannis, 1932); *Lebeda nobilis*, Walker, 1855; *Chrysodeixis eriosoma*, (Doubleday, 1843); *Condicacircuita*, (Guenee, 1852); *Callyna semivitta*, Moore, 1882 & *Trisula variegata*, Moore, 1858. Not only this, the under-mentioned genera have also been reported for the first time: *Hypospila*, Guenée, 1852; *Anticarsia*, Hubner, 1818; *Simplicia*, Guenée, 1854; *Phocoderma*, Butler, 1886; *Thosea*, Walker, 1855; *Aphendala*, Walker, 1865; *Altha*, Walker, 1862; *Maurilia*, Möschler, 1884; *Tympanistes*, Moore, 1867; *Ornithospila*, Warren, 1894; *Glyphodes*, Guenée, 1854; *Diaphania*, Hubner, 1818; *Lamprophaia*, Caradja, 1925; *Pachynoa*, Lederer, 1863; *Hypsopygia*, Hubner, 1825; *Cryptoblabes*, Zeller, 1848; *Ctenoplusia*, Dufay, 1970; *Caradrina*, Ochsenheimer, 1816; *Trisula*, Moore, 1858; *Laelia*, Stephens, 1828; *Miresa*, Walker, 1855; *Petelia*, Herrich-Schäffer, [1855]; *Saliocleta*, Walker, 1862; *Ambadra*, Moore, 1883; *Teleclita*, Turner, 1930; *Omiodes*, Guenée, 1854; *Chilo*, Zincken, 1817; *Bostra*, Walker, 1863; *Atteva*, Walker, 1854; *Tonica*, Walker, 1864; *Condica*, Walker, 1856 & *Athetis*, Hübner, [1821]. Family Erebidae is represented by 152 examples, 54 species under 39 genera and 11 subfamilies and dominated among all the 17 families in diversity as well as in abundance. However, families Drepanidae, Saturniidae, Depressariidae, Attevidae & Uraniidae are represented by single specimen [Fig1]. Similar studies were conducted Palkot Wildlife Sanctuary[12], Dalwa Wildlife Sanctuary[13] and Topchanchi Wildlife Sanctuary[14] of Jharkhand. This is the first attempt from Koderma (Jharkhand) to compile moths diversity.

The results of the present study will surely act as a baseline for documentation of Insect fauna of Koderma district as well as for Koderma Wildlife sanctuary.

Table 1: Summary of number of species collected alongwith their number of examples.

Sr. No.	Family	Subfamily	Scientific Name & Author	Number of examples Locality wise		Total no. of examples collected
				MG	UR	
1.	Cossidae	Zeuzerinae	*Xyleutes persona*, (Le Guillou, 1841)	2	0	2
2.	Cossidae	Zeuzerinae	*Zeuzera coffeae*, Nietner, 1861	2	2	4
3.	Crambidae	Pyraustinae	*Glyphodes canthusalis*, Walker, 1859	1	1	2
4.	Crambidae	Pyraustinae	*Glyphodes caesalis*, (Walker, 1859)	6	4	10
5.	Crambidae	Pyraustinae	*Glyphodes bicolor*, (Swainson, 1821)	1	0	1
6.	Crambidae	Pyraustinae	*Omiodes sp.*	1	0	1
7.	Crambidae	Pyraustinae	*Diaphania indica*, (Saunders, 1851)	1	3	4
8.	Crambidae	Pyraustinae	*Lamprophaia ablactalis*, (Walker, 1859)	4	5	9
9.	Crambidae	Pyraustinae	*Pachynoa sabelialis*, Walker, 1866	0	2	2
10.	Crambidae	Crambinae	*Chilo sp.*	1	1	2
11.	Depressariidae		*Tonica sp.*	1	0	1
12.	Drepanidae	Drepaninae	*Tridrepana albonotata*, (Moore, 1879)	0	3	3
13.	Erebidae	Erebinae	*Trigonodes hyppasia*, (Cramer, 1779)	8	1	9
14.	Erebidae	Erebinae	*Chalciope mygdon*, ([Cramer, 1777])	0	5	5
15.	Erebidae	Erebinae	*Grammodes geometrica*, (Fabricius, 1775)	1	5	6
16.	Erebidae	Erebinae	*Spirama retorta*, (Clerck, 1764)	2	1	3
17.	Erebidae	Erebinae	*Ercheia diversipennis*, Walker, [1858]	0	1	1
18.	Erebidae	Erebinae	*Mocis frugalis*, (Fabricius, 1775)	5	1	6
19.	Erebidae	Erebinae	*Mocis undata*, (Fabricius, 1775)	2	0	2
20.	Erebidae	Erebinae	*Hypospila bolinoides*, Guenee, 1852	2	1	3
21.	Erebidae	Erebinae	*Ericeia inangulata*, (Guenee, 1852)	2	1	3
22.	Erebidae	Erebinae	*Thyas coronata*, (Fabricius, 1775)	0	1	1

23.	Erebidae	Erebinae	*Pericyma cruegeri*, (Butler, 1886)	0	1	1
24.	Erebidae	Erebinae	*Bamra mundata*, Walker, 1858	2	6	8
25.	Erebidae	Spilosomini	*Microaloa emittens*, (Walker, 1855)	0	3	3
26.	Erebidae	Boletobiinae	*Hamodes propitia*, (Boisduval, 1832)	0	2	2
27.	Erebidae	Aganainae	*Asota caricae*, (Fabricius, 1775)	1	0	1
28.	Erebidae	Aganainae	*Asota ficus*, Fabricius, 1775	0	3	3
29.	Erebidae	Aganainae	*Digama hearseyana*, Moore, 1859	0	1	1
30.	Erebidae	Eulepidotinae	*Anticarsia irrorata*, (Fabricius, 1781)	0	1	1
31.	Erebidae	Arctiinae	*Olepa koslandana*, Orhant, 1986	0	2	2
32.	Erebidae	Arctiinae	*Olepa ricini*, (Fabricius,1775)	2	11	13
33.	Erebidae	Arctiinae	*Olepa sp.*	1	0	1
34.	Erebidae	Arctiinae	*Amerila astreus*, (Drury, 1773)	0	1	1
35.	Erebidae	Arctiinae	*Rajendra biguttata*, (Walker, 1855)	0	1	1
36.	Erebidae	Arctiinae	*Creatonotos interrupta*, (Linnaeus, 1767)	0	3	3
37.	Erebidae	Arctiinae	*Cyana puella*, (Drury, 1773)	0	3	3
38.	Erebidae	Arctiinae	*Nepita conferta*, (Walker, 1854)	0	2	2
39.	Erebidae	Arctiinae	*Aemene tenebrosa*, Moore, 1878	3	3	6
40.	Erebidae	Arctiinae	*Aemene sp.1*	0	1	1
41.	Erebidae	Arctiinae	*Aemene sp.2*	0	1	1
42.	Erebidae	Arctiinae	*Brunia antica*, (Walker, 1854)	0	1	1
43.	Erebidae	Arctiinae	*Utetheisa lotrix*, (Cramer, [1777])	0	1	1
44.	Erebidae	Arctiinae	*Utetheisa pulchelloides*, Hampson, 1907	0	2	2
45.	Erebidae	Arctiinae	*Aloa lactinea*, (Cramer, [1777])	0	1	1
46.	Erebidae	Arctiinae	*Spilarctia coorgensis*, Kirti & Gill, 2010	0	3	3
47.	Erebidae	Arctiinae	*Spilarctia sp.*	0	1	1
48.	Erebidae	Arctiinae	*Syntomoides imaon*, (Cramer, [1779])	0	1	1
49.	Erebidae	Arctiinae	*Amata passalis*, (Fabricius, 1781)	0	1	1
50.	Erebidae	Arctiinae	*Miltochrista sp.*	0	1	1
51.	Erebidae	Herminiinae	*Simplicia niphona*, (Butler, 1878)	1	0	1
52.	Erebidae	Scoliopteryginae	*Anomis lyona*, (Swinhoe, 1919)	0	1	1
53.	Erebidae	Scoliopteryginae	*Anomis flava*, (Fabricius, 1775)	2	0	2
54.	Erebidae	Scoliopteryginae	*Anomis mesogona*, Walker, [1858]	1	0	1
55.	Erebidae	Scoliopteryginae	*Anomis sabulifera*, Guenee, 1852	2	0	2
56.	Erebidae	Scoliopteryginae	*Rusicada pindraberensis*, Singh & Ranjan, 2016	1	0	1
57.	Erebidae	Lymantrinii	*Euproctis lunata*, Walker, 1855	0	1	1
58.	Erebidae	Lymantrinii	*Euproctis subnotata*, Walker, 1865	2	0	2
59.	Erebidae	Lymantrinii	*Lymantria mathura*, Moore, [1866]	0	1	1
60.	Erebidae	Lymantrinii	*Lymantria marginata*, Walker, 1855	1	1	2
61.	Erebidae	Lymantrinii	*Lymantria semicincta*, (Walker, 1855)	1	0	1
62.	Erebidae	Lymantrinii	*Lymantria sp.*	1	4	5
63.	Erebidae	Lymantrinii	*Nygmia icilia*, (Stoll, [1790])	0	1	1
64.	Erebidae	Lymantrinii	*Laelia sp.*	0	1	1
65.	Erebidae	Pangraptinae	*Episparis liturata*, (Fabricius, 1787)	1	0	1
66.	Erebidae	Hypocalinae	*Hypocala rostrata*, (Fabricius, 1794)	0	1	1
67.	Eupterotidae	Eupterotinae	*Eupterote geminata*, (Walker, 1855)	0	1	1
68.	Geometridae	Ennominae	*Chiasmia xanthonora*, (Walker, 1861)	0	1	1
69.	Geometridae	Ennominae	*Chiasmia eleonora*, (Cramer, [1780])	0	1	1
70.	Geometridae	Ennominae	*Chiasmia sp.*	7	0	7
71.	Geometridae	Ennominae	*Biston suppressaria*, (Guenee, 1858)	0	4	4
72.	Geometridae	Ennominae	*Hyperythra lutea*, Stoll, 1781	1	0	1
73.	Geometridae	Ennominae	*Cleora sp.*1	0	1	1
74.	Geometridae	Ennominae	*Cleora sp.*2	1	0	1
75.	Geometridae	Ennominae	*Hyposidra talaca*, (Walker, 1860)	1	7	8
76.	Geometridae	Ennominae	*Petelia sp.*	1	0	1
77.	Geometridae	Geometrinae	*Ornithospila avicularia*, Guenee, 1857	2	3	5
78.	Lasiocampidae	Gastropachinae	*Gastropacha pardale*, (Walker, 1855)	0	2	2
79.	Lasiocampidae	Lasiocampinae	*Lebeda nobilis*, Walker, 1855	0	1	1
80.	Limacodidae	Limacodinae	*Parasa pastoralis*, Butler, 1885	0	1	1
81.	Limacodidae	Limacodinae	*Cheromettia laleana*, Moore, 1859	0	1	1
82.	Limacodidae	Limacodinae	*Phocoderma velutina*, Kollar, 1844	1	0	1
83.	Limacodidae	Limacodinae	*Miresa sp.*	1	0	1
84.	Limacodidae	Limacodinae	*Thosea bipartita*, Hering, 1933	1	0	1
85.	Limacodidae	-	*Aphendala mechiensis*, Yashimoto, 1994	1	0	1
86.	Limacodidae	-	*Altha subnotata*,Walker, 1865	1	3	4
87.	Notodontidae	Biretinae	*Ceira longipennis*,Moore, 1881	0	1	1
88.	Notodontidae	Biretinae	*Saliocleta sp.*	1	0	1
89.	Notodontidae	Biretinae	*Ambadra sp.*	0	4	4
90.	Notodontidae	Stauropinae	*Teleclita sp.* 1	1	0	1

91.	Notodontidae	Stauropinae	*Teleclita sp.* 2	0	1	1
92.	Notodontidae	Stauropinae	*Teleclita sp.* 3	2	0	2
93.	Notodontidae	Phalerinae	*Phalera cossoides*, Walker, 1863	1	1	2
94.	Notodontidae	Cerurinae	*Neocerura liturata*, Kiriakoff, 1968	0	1	1
95.	Noctuidae	Agaristinae	*Aegocera venulia*, (Cramer, [1777])	2	0	2
96.	Noctuidae	Acontiinae	*Aedia leucomelas*, (Linnaeus, 1758)	1	0	1
97.	Noctuidae	Acontiinae	*Acontia marmoralis*, Fabricius, 1794	4	0	4
98.	Noctuidae	Plusiinae	*Xanthodes transversa*, Guenee, 1852	1	0	1
99.	Noctuidae	Plusiinae	*Xanthodes sp.*	0	1	1
100	Noctuidae	Plusiinae	*Chrysodeixis acuta*, (Walker, 1858)	0	2	2
101	Noctuidae	Plusiinae	*Chrysodeixis eriosoma*, (Doubleday, 1843)	0	1	1
102	Noctuidae	Plusiinae	*Ctenoplusia, sp.*	1	0	1
103	Noctuidae	Heliothinae	*Condica circuita*, (Guenee, 1852)	0	2	2
104	Noctuidae	Noctuinae	*Caradrina sp.* 1	0	1	1
105	Noctuidae	Noctuinae	*Caradrina sp.*2	0	1	1
106	Noctuidae	Noctuinae	*Mythimna sp.*1	0	1	1
107	Noctuidae	Noctuinae	*Mythimna sp.*2	1	0	1
108	Noctuidae	Noctuinae	*Mythimna yu*, Guenee, 1852	0	1	1
109	Noctuidae	Noctuinae	*Leucania sp.*	0	1	1
110	Noctuidae	Noctuinae	*Leucania venalba*, Moore, 1867	0	1	1
111	Noctuidae	Noctuinae	*Spodoptera litura*, (Fabricius, 1775)	1	0	1
112	Noctuidae	Noctuinae	*Spodoptera mauritia*, (Boisduval, 1833)	0	1	1
113	Noctuidae	Noctuinae	*Athetis sp.*	0	1	1
114	Noctuidae	Amphipyrinae	*Callyna semivitta*, Moore, 1882	0	1	1
115	Noctuidae	Amphipyrinae	*Callyna monoleuca*, Walker, 1858	1	0	1
116	Noctuidae	Pantheinae	*Trisula variegata*, Moore, 1858	1	3	4
117	Noctuidae	Bryophilinae	*Callopistria sp.*	0	4	4
118	Noctuidae	Bryophilinae	*Callopistria maillardi*, Guenee, 1862	1	3	4
119	Nolidae	Westermanniinae	*Westermannia superba*, Hubner, 1823	0	1	1
120	Nolidae	Beaninae	*Beana terminigera*, (Walker, 1858)	1	0	1
121	Nolidae	Chloephorinae	*Carea angulata*, Fabricius, 1793	1	0	1
122	Nolidae	Chloephorinae	*Maurilia iconica*, (Walker, 1858)	2	0	2
123	Nolidae	Chloephorinae	*Tympanistes rubidorsalis*, Moore, 1888	0	1	1
124	Nolidae	Chloephorinae	*Aiteta rufoflava*, (Walker, [1857])	0	3	3
125	Nolidae	Chloephorinae	*Aiteta truncata*,(Walker, 1858)	0	4	4
126	Pyralidae	Pyralinae	*Herculia suffusalis*, Walker, 1866	0	3	3
127	Pyralidae	Pyralinae	*Hypsopygia pernigralis*, (Ragonot, 1891)	0	4	4
128	Pyralidae	-	*Bostra sp.*	0	3	3
129	Pyralidae	Phycitinae	*Cryptoblabes gnidiella*, (Millière, 1867)	0	1	1
130	Pyralidae	Galleriinae	*Aphomia zelleri*, (De Joannis, 1932)	0	4	4
131	Saturniidae	Saturniinae	*Antheraea paphia*, Linnaeus, 1758	0	1	1
132	Sphingidae	Macroglossinae	*Acosmeryx anceus*, (Stoll, [1781])	0	1	1
133	Sphingidae	Macroglossinae	*Theretra alecto*, (Linnaeus, 1758)	0	1	1
134	Sphingidae	Macroglossinae	*Theretra nessus*, (Drury, 1773)	3	4	7
135	Sphingidae	Macroglossinae	*Theretra oldenlandiae*, (Fabricius, 1775)	0	1	1
136	Sphingidae	Macroglossinae	*Pergea acteus*, (Cramer, 1779)	0	2	2
137	Sphingidae	Sphinginae	*Psilogramma menephron*, (Cramer, 1780)	0	1	1
138	Sphingidae	Sphinginae	*Acherontia styx*, Westwood, 1847	1	0	1
139	Uraniidae	Microniinae	*Micronia aculeata*, Guenee, 1857	0	1	1
140	Attevidae	Attevinae	*Atteva sp.*	0	1	1
Total				109	202	311

MG: Meghatari, UR: Urwan

Table 2: Summary of number of specimens collected under different number of species and genera representing different subfamilies and families.

Sr. No.	Family	Subfamily	Genera	No. of Species	No. of specimens
1	Cossidae	01	02	02	05
2	Crambidae	02	06	08	10
3	Depressariidae	01	01	01	01
4	Drepanidae	01	01	01	01
5	Erebidae	11	38	54	152
6	Eupterotidae	01	01	01	05
7	Geometridae	02	07	10	11
8	Lasiocampidae	02	02	02	03
9	Limacodidae	01	07	07	09
10	Notodontidae	04	06	08	14
11	Noctuidae	08	16	24	51
12	Nolidae	03	06	07	12
13	Pyralidae	03	05	05	10

14	Saturniidae	01	01	01	01
15	Sphingidae	02	05	07	24
16	Uraniidae	01	01	01	01
17	Attevidae	01	01	01	01
	TOTAL	45	106	140	311

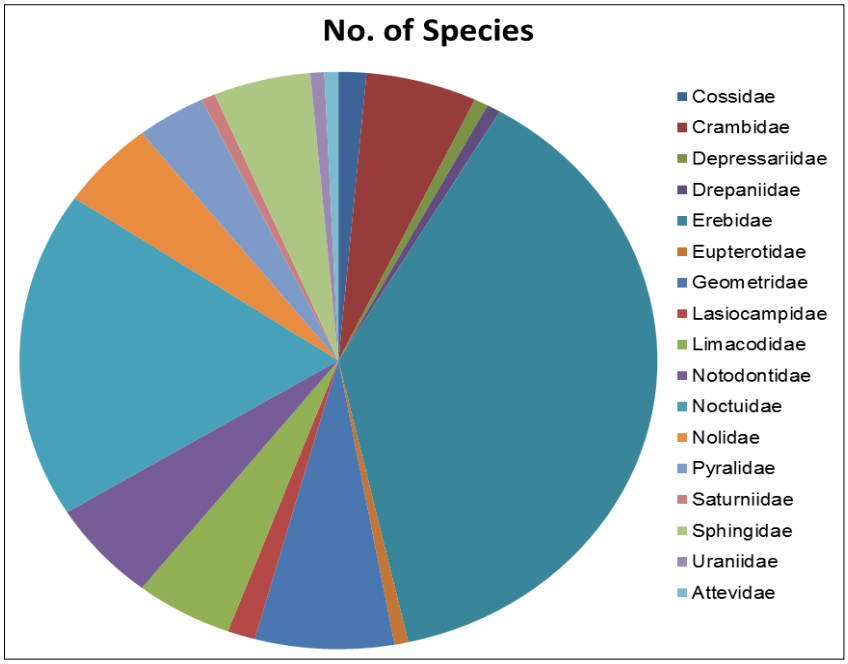
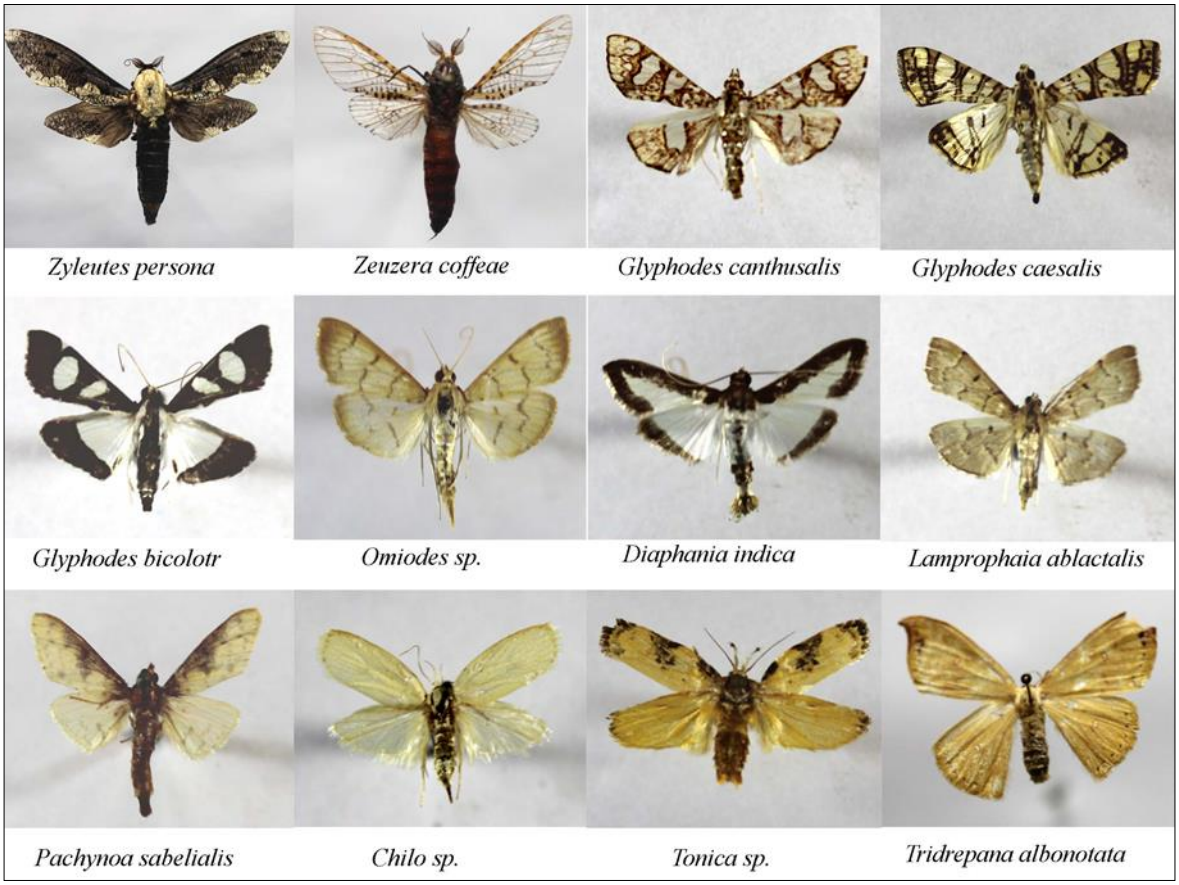
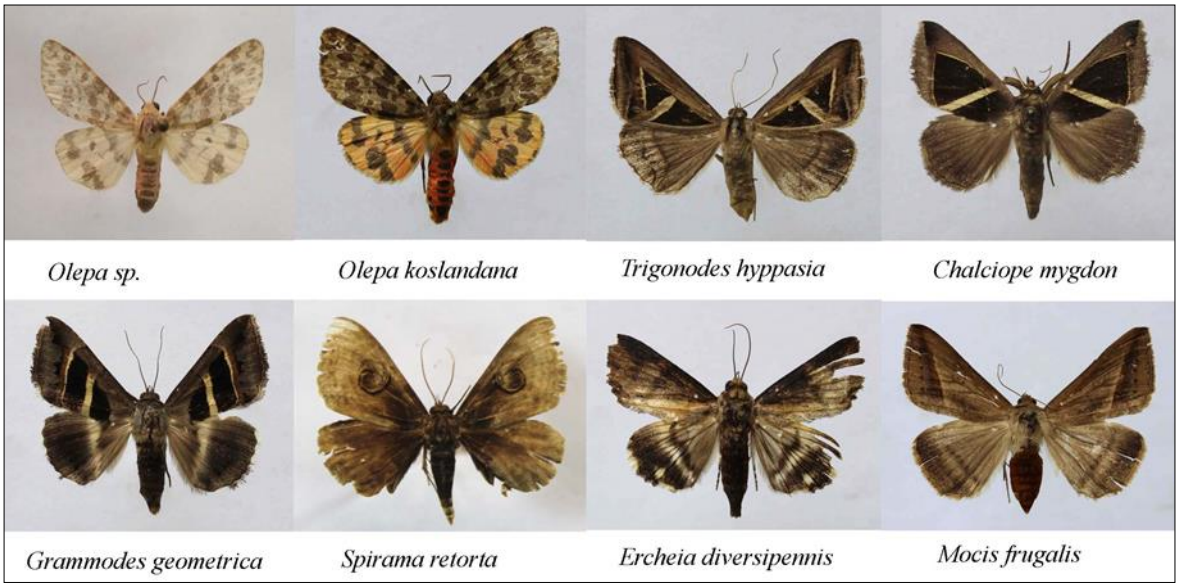


Fig 1: Chart of comparative analysis of no. of species found family wise.

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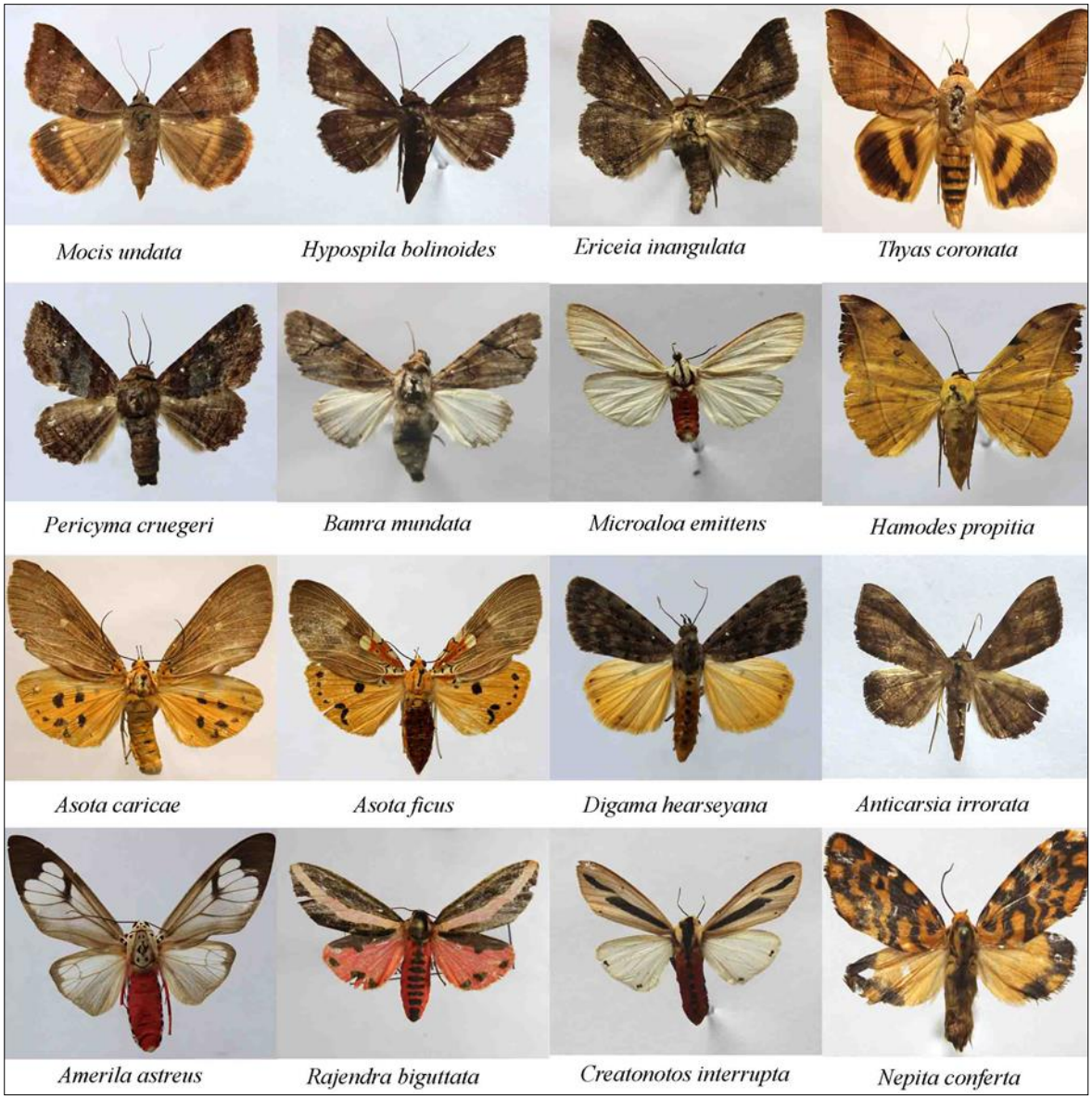
Olepa koslandana
Trigonodes hyppasia
Chalciope mygdon
Grammodes geometrica
Spirama retorta
Ercheia diversipennis
Mocis frugalis

Fig 2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Hypospila bolinoides
Ericeia inangulata
Thyas coronata
Pericyma cruegeri
Bamra mundata
Microaloa emittens
Hamodes propitia
Asota caricae
Asota ficus
Digama hearseyana
Anticarsia irrorata
Amerila astreus
Rajendra biguttata
Creatonotos interrupta
Nepita conferta

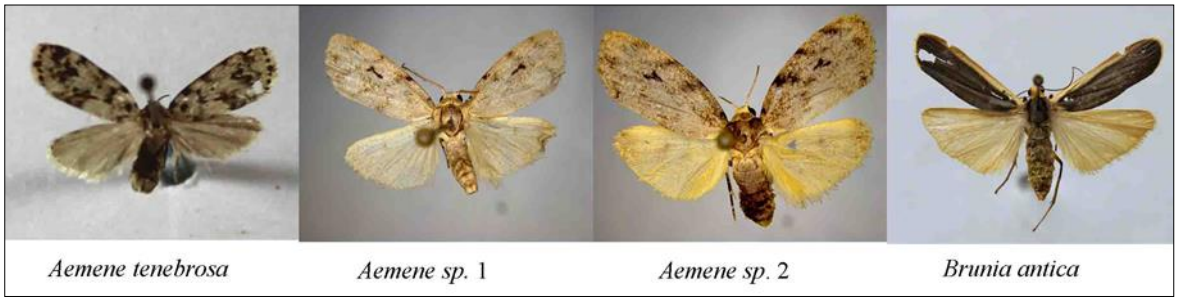

Aemene tenebrosa
Aemene sp. 1
Aemene sp. 2
Brunia antica

Fig 2

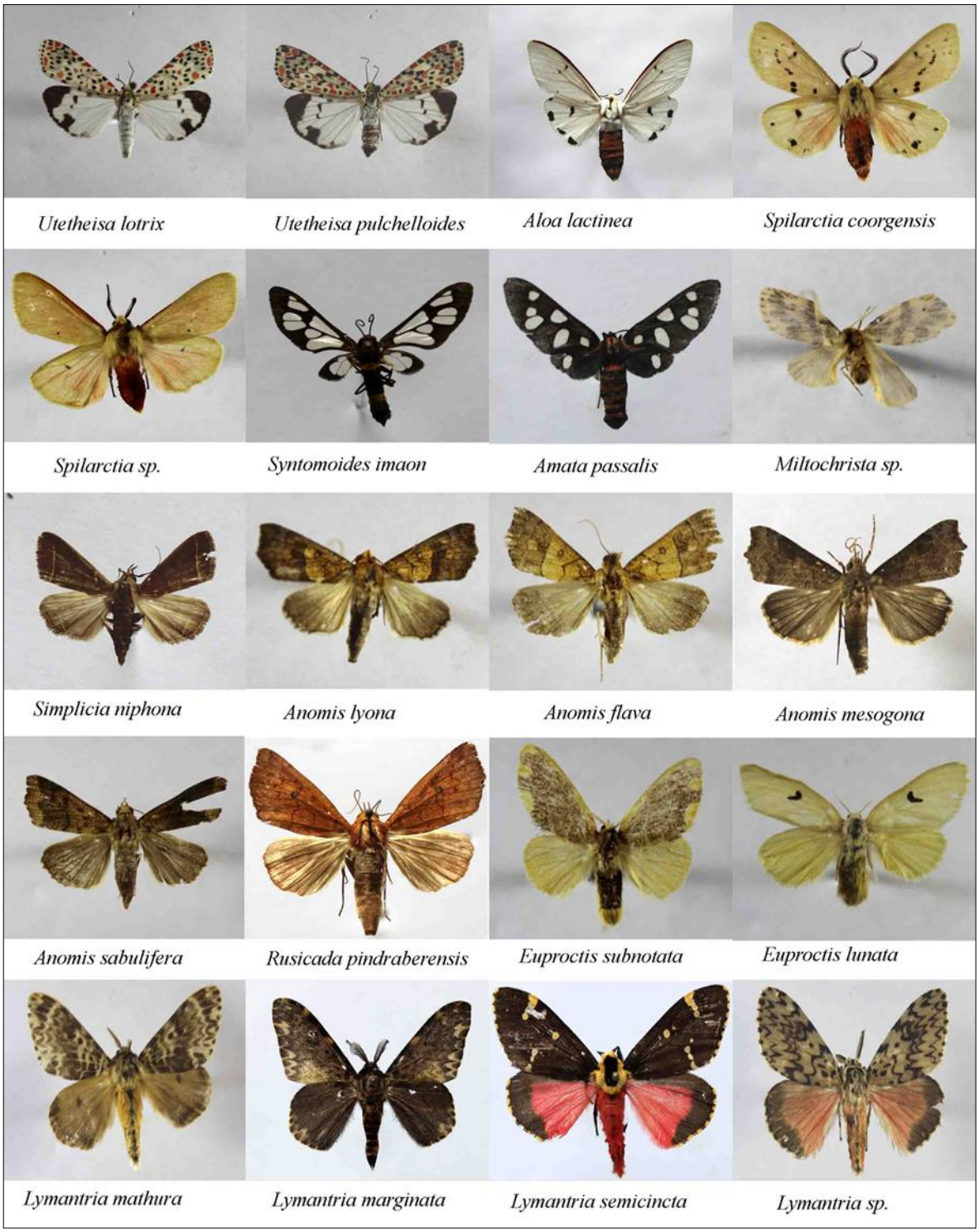
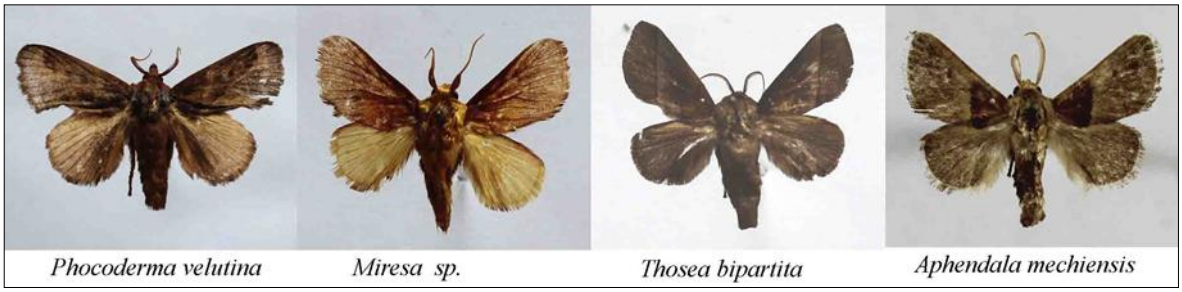

Utetheisa lotrix
Utetheisa pulchelloides
Aloa lactinea
Spilarctia coorgensis
Spilarctia sp.
Syntomoides imaon
Amata passalis
Miltochrista sp.
Simplicia niphona
Anomis lyona
Anomis flava
Anomis mesogona
Anomis sabulifera
Rusicada pindraberensis
Euproctis subnotata
Euproctis lunata
Lymantria mathura
Lymantria marginata
Lymantria semicincta
Lymantria sp.

Fig 3


Nygmia icilia
Laelia sp.
Episparis liturata
Hypocala rostrata
Eupterote geminata
Eupterote geminata
Chiasmia eleonora
Chiasmia sp.
Biston suppressaria
Hyperythra lutea
Cleora sp.!
Cleora sp.2
Hyposidra talaca
Petelia sp.
Ornithospila avicularia
Gastropacha pardale
Gastropacha pardale
Lebeda nobilis
Parasa pastoralis
Cheromettia laleana

Fig 4


Phocoderma velutina
Miresa sp.
Thosea bipartita
Aphendala mechiensis

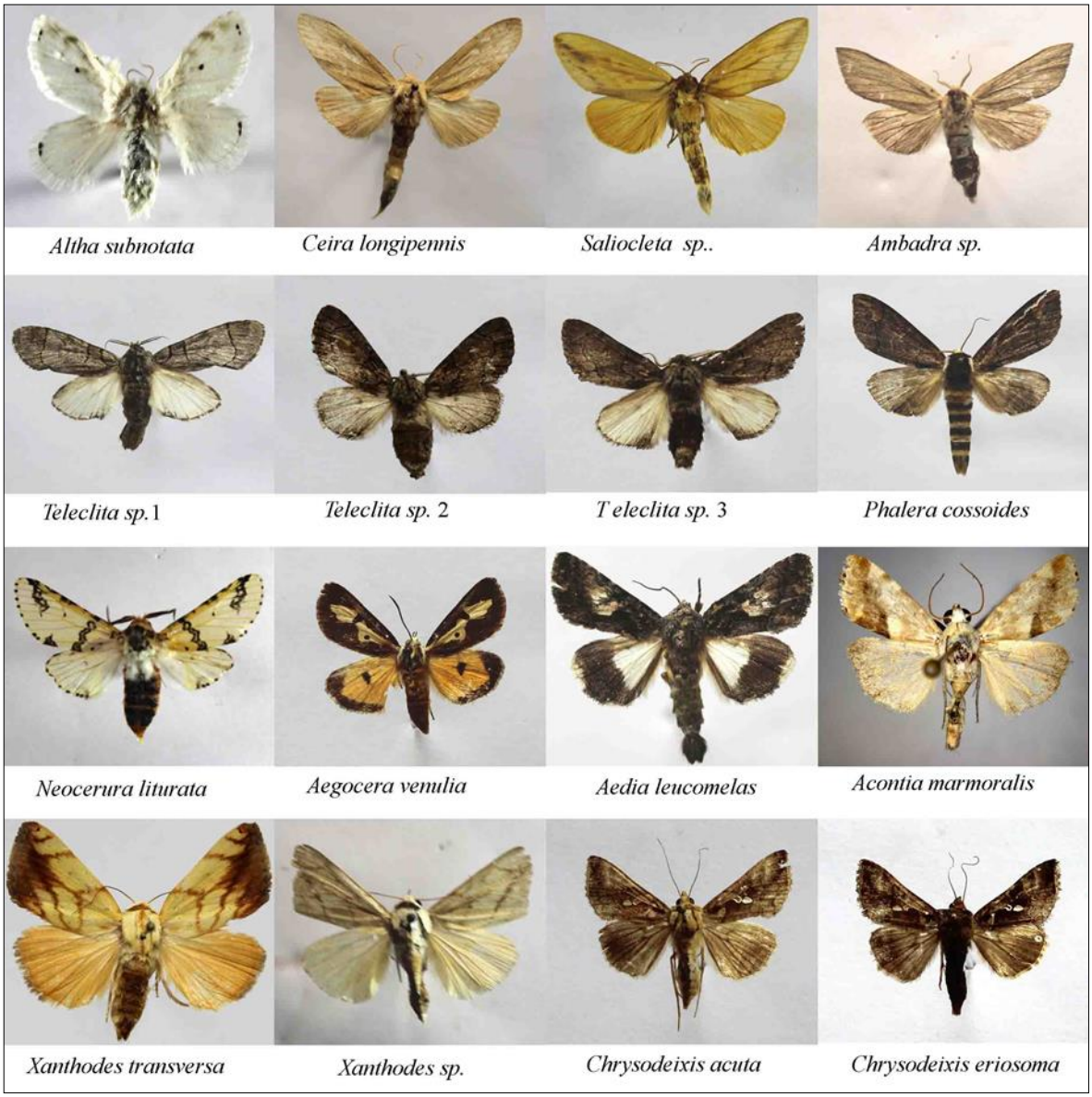
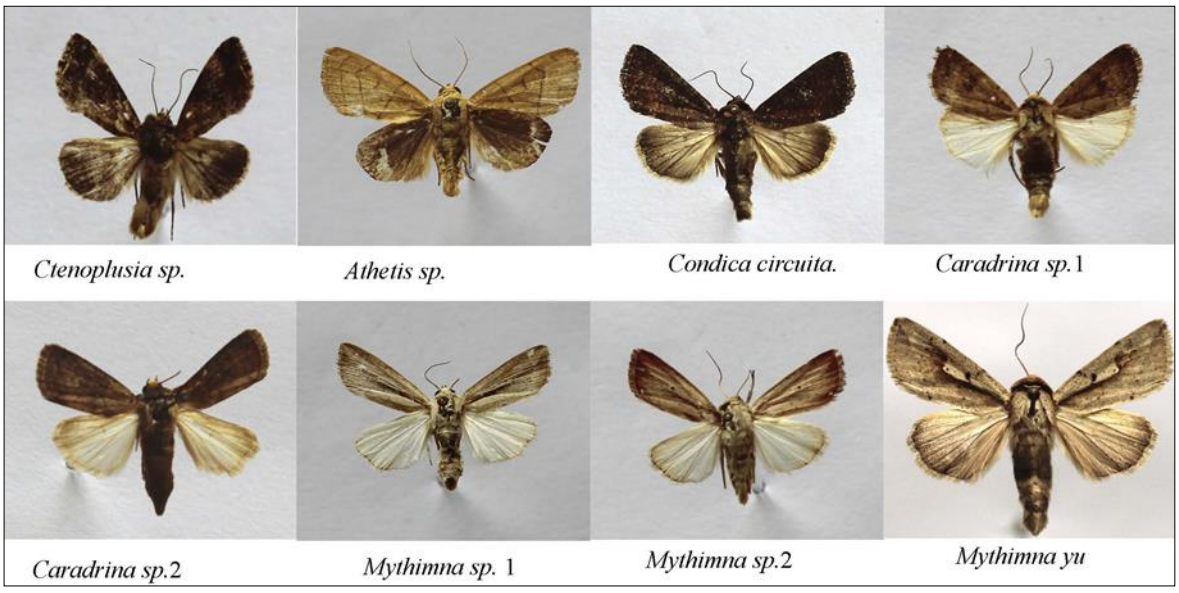

Altha subnotata
Ceira longipennis
Saliocleta sp..
Ambadra sp.
Teleclita sp.1
Teleclita sp. 2
T eleclita sp. 3
Phalera cossoides
Neocerura liturata
Aegocera venulia
Aedia leucomelas
Acontia marmoralis
Xanthodes transversa
Xanthodes sp.
Chrysodeixis acuta
Chrysodeixis eriosoma

Fig 5


Ctenoplusia sp.
Athetis sp.
Condica circuita.
Caradrina sp.1
Caradrina sp.2
Mythimna sp. 1
Mythimna sp.2
Mythimna yu

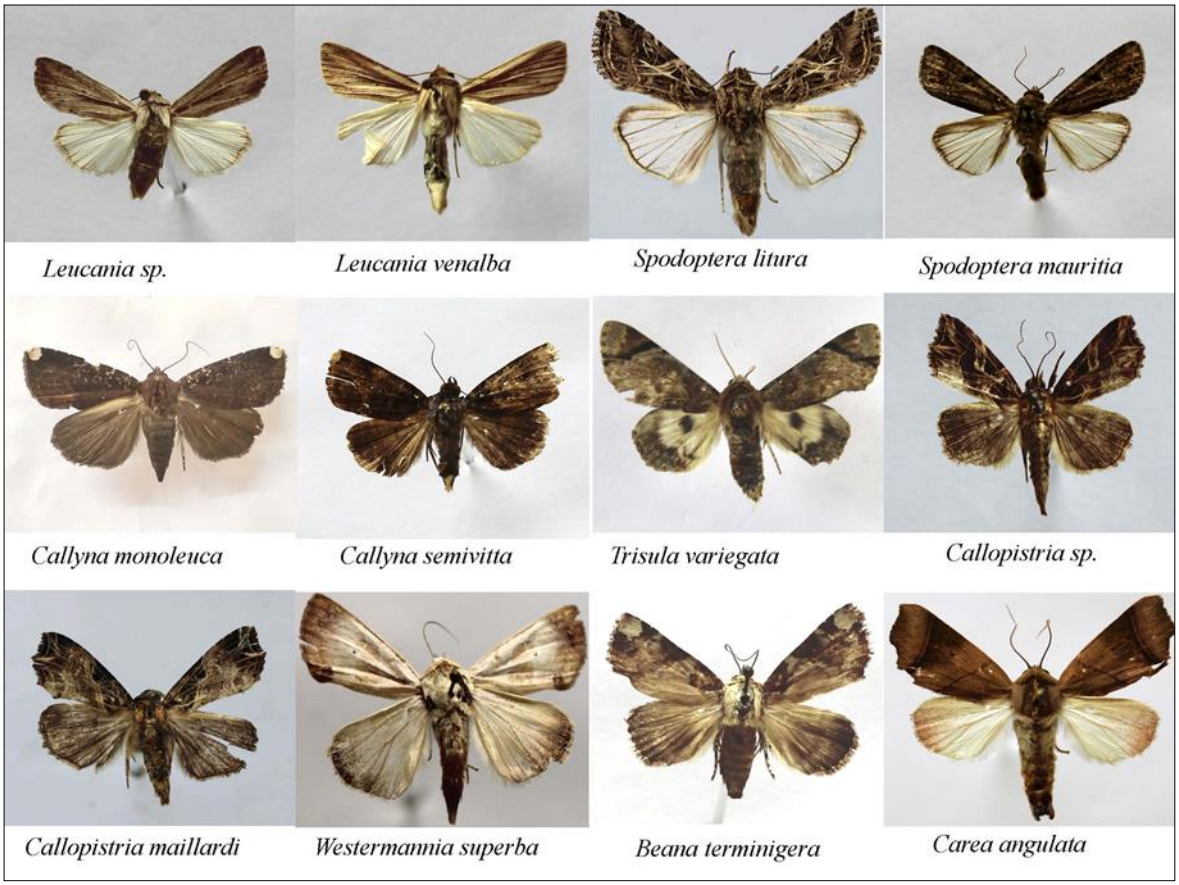
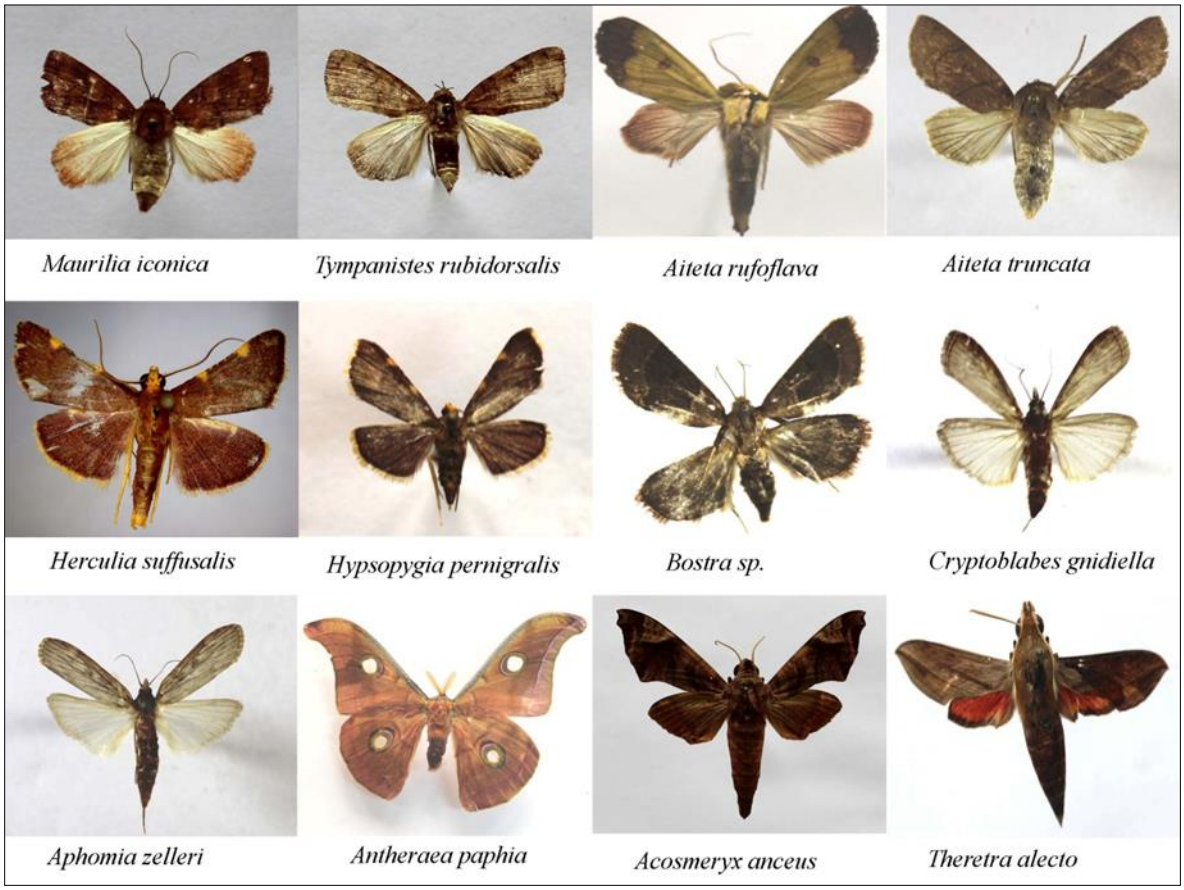

Leucania sp.
Leucania venalba
Spodoptera litura
Spodoptera mauritia
Callyna monoleuca
Callyna semivitta
Trisula variegata
Callopistria sp.
Callopistria maillardi
Westermannia superba
Beana terminigera
Carea angulata

Fig 6


Maurilia iconica
Tympanistes rubidorsalis
Aiteta rufoflava
Aiteta truncata
Herculia suffusalis
Hypsopygia pernigralis
Bostra sp.
Cryptoblabes gnidiella
Aphomia zelleri
Antheraea paphia
Acosmeryx anceus
Theretra alecto

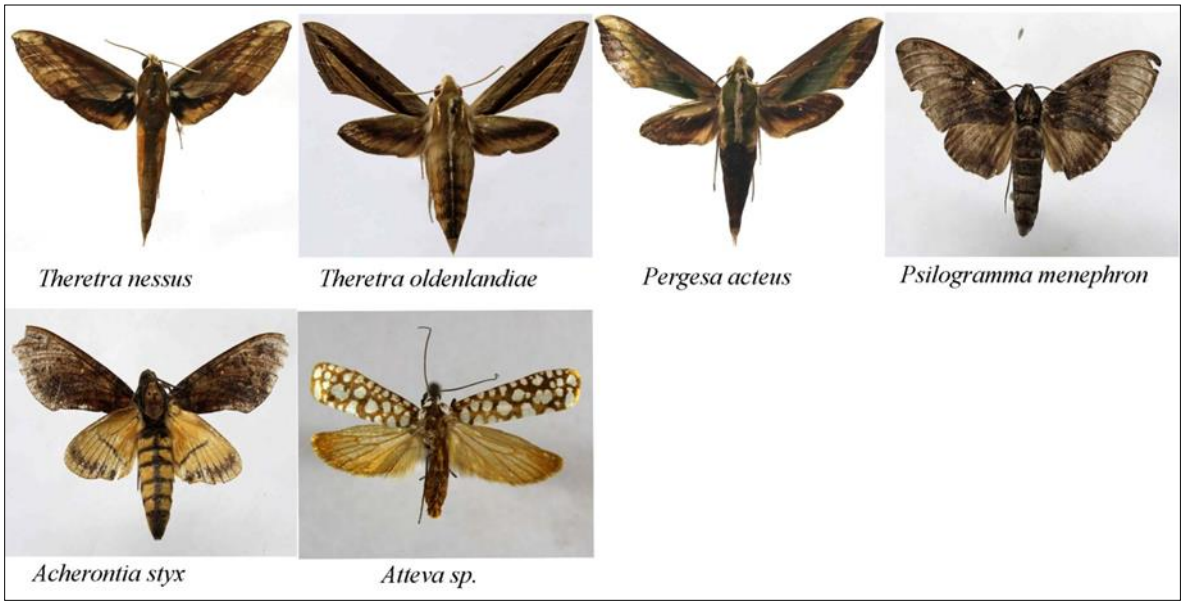


Fig 7

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