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Moths (Lepidoptera: Heterocera) of Bhavnagar city, Gujarat, India: A preliminary checklist

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Abstract
A lack of baseline data on Moths of Saurashtra region of Gujarat was found as a result of literature review. Very few records of Moths are published from the area. To fill in this gap, a study was carried in Bhavnagar City, Gujarat, India to record the Moth fauna of the area. Selected sites (subject to accessibility and convenience) were surveyed regularly from July-2019 to July-2021. A preliminary checklist of 232 species of Moths was compiled as a result of this study. Erebidae was found to be the most species rich family with 62 species; followed by crambidae with 44 species. 11 Families showed least diversity with single species representative. First record of family sessidae (*Mellitia sp.*) was obtained during this study. A clear seasonal fluctuation was seen in number of species seen during a month. Maximum species were recorded in the month of August (75), which mark the peak of monsoon. Whereas least number of species were recorded in the month of may (7), which marks the peak of summer. The survey improves our understanding of the bio-diversity of Moths in semi-arid region of Gujarat, and can will helpful in conducting further ecological research and conservation practices.

Keywords: Bhavnagar, checklist, inventory, lepidoptera, moths

Introduction
Majority of Order Lepidoptera is represented by moths, with more than 165,000 described species (Regier *et al*., 2009) [17] and a likely similar number of undescribed species (Wahlberg N, Wheat CW, Peña C, 2013) [23]. Moths and their caterpillars are important food for many other species, including amphibians, small mammals, bats, and many bird species (Perveen, Farzana & Khan, Anzela. 2018). Moths are useful indicator species as they are abundant, well distributed in different habitat, closely interact with the vegetation structure (Axmacher *et al.* 2011) [1] and are sensitive to environmental alterations (Maleque *et al*. 2009) [10]. Many plant species depend exclusively on one or more number of moth species for pollination and a decline in those moth population and their diversity might lead to a negative impact in the plant communities they pollinate (Young *et al*., 2017) [22]. India exhibits a very rich moth assemblage with nearly 10,000 species (Smetacek, 2013) [15].
In order to prepare a conservation strategy, an inventory of biodiversity is of primary importance as part of biodiversity conservation for sustainable development (Uniyal, V.P., Dey, P. and Sanyal, A.K. 2016) [16]. The most straightforward approach for evaluating sites for conservation is to survey the species present in the area (Hochberg *et al.*, 1996). But, there have been very few studies carried out to record the diversity of Insects occurring in the state of Gujarat. The earliest work on Moth in Gujarat (C.G Nurse, 1899) [12] was carried out in present day Kutchh district. 105 Species of Moths were recorded in this study. Later, (Mosse, 1929) [11] recorded around 96 species of Lepidoptera from Bhavnagar, in which 18 species were moths from a single family Sphingidae. (Nadkerny & Shull, 1964) [18] recorded around 180 species of moths from the dang region in south Gujarat. (Gupta & Thakur, 1990) [3] recorded a few species of moths from several districts in Gujarat. Recently, (Paulson *et al*., 2020) [13] recorded 20 species of moths in their study on agriculturally important insects from the Vadodara district. Literature review shows a significant void in studies of Moths from Saurashtra region. An attempt has been made in this study to initiate the preparation of Moths inventory from Bhavnagar city in Saurashtra region of Gujarat.

Method
Study areas
1. Swaminarayan Gurukul campus, shampara, Bhavnagar; lies between 21.422163 N & 72.054992 E. The campus is surrounded by farmlands with many fruiting trees on three sides and a road at the front. The campus is nearly 3.5 km far from the bhikda dam built on Maleshree River. One of the canal from this dam passes from right in front of the campus after the road.

2. The campus of Department of Life Sciences, M.K.Bhavnagar University; lies between 21.452144 N & 77.044763 E. A part of the campus is covered with a canopy of trees like *Peltophorum pterocarpum, Ficus benghalensis*, *Azadirachta indica*. Another part is open land with rocky terrain. It also has a seasonal pond that remains filled for around six months a year during and after the monsoon. The department is nearly 400 meters far from Victoria park reserve forest
3. Anandnagar residential area, Bhavnagar; lies between 21.463798 N & 72.101869 E. Surveys were carried out in a residential plot which is surrounded by abandoned residential plots. A huge variety of vegetation grows in these empty plots, which attracts many insects.
4. Victoria park reserve forest; lies between 21.7556 N, 72.1257 E. 422 species of Plants are recorded from the park (Bholenath P., 1982) [2]. Two Light trapping sessions were arranged with the permission of Bhavnagar Forest Department during National Moth Week 2021.

Surveys

Extensive Surveys were conducted from July 2019 to July 2021 at selected locations within Bhavnagar city, to record the diversity of moths. No specific effort was made to set up light traps for attracting moths; instead, the moths attracted to the lights already present at the sites were recorded. Observations were made for not less than 20 days a month. Sampling wasn't done uniformly due to the COVID-19 restrictions. We made sure that sampling was done for at least 20 days a month combining the efforts at each site. Moths attracted to Lights after the sunset (at site 1 and 3) as well as the ones which remained over night inside the building (at site-2) were clicked with a Smartphone camera or a digital SLR.

Identification

For identification of the photographed moths, we compared them with descriptions available in scientific publication *viz* Hampson (1892, 1894, 1895 and 1896), Vaylure (2018) [21], Kirti & Singh (2015) [9] and others. In addition, citizen science platform called iNaturalist (https://www.inaturalist.org) and Moths of India (http://www.mothsofindia.org) were also used for the purpose of identification. However, previous records of moths from Bhavnagar district found from literature review are also included in the list with proper citation.

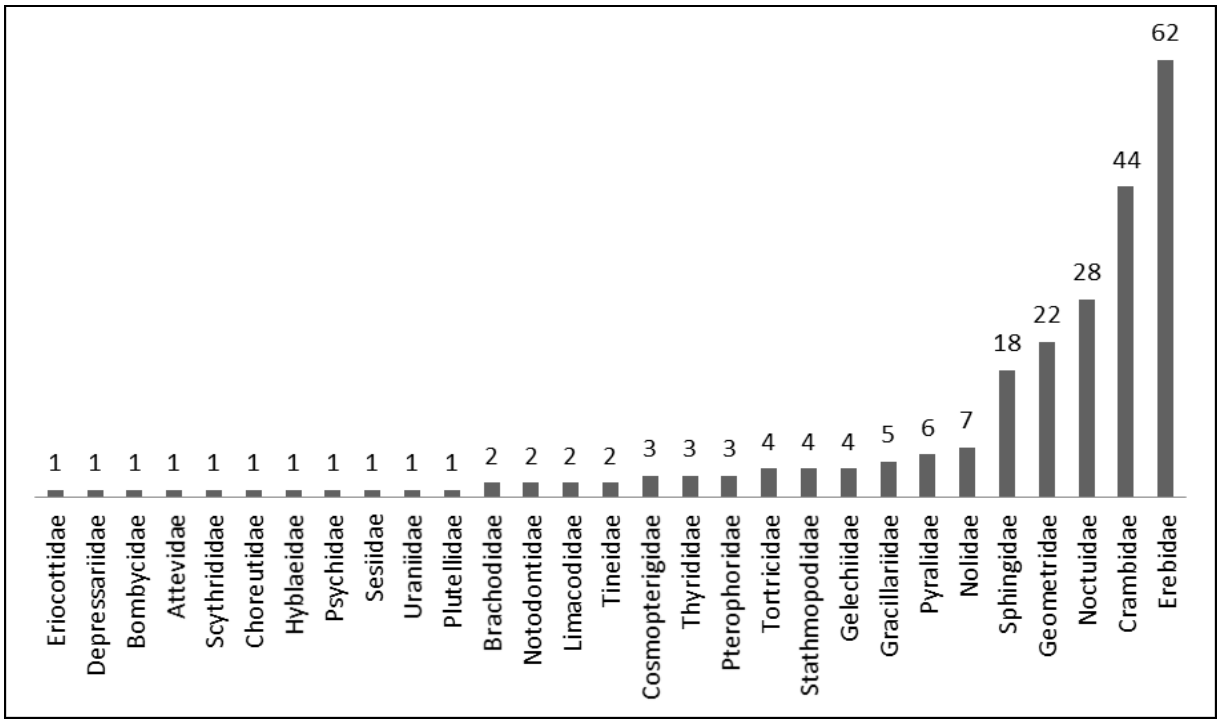

Fig 1: Number of Species per Family

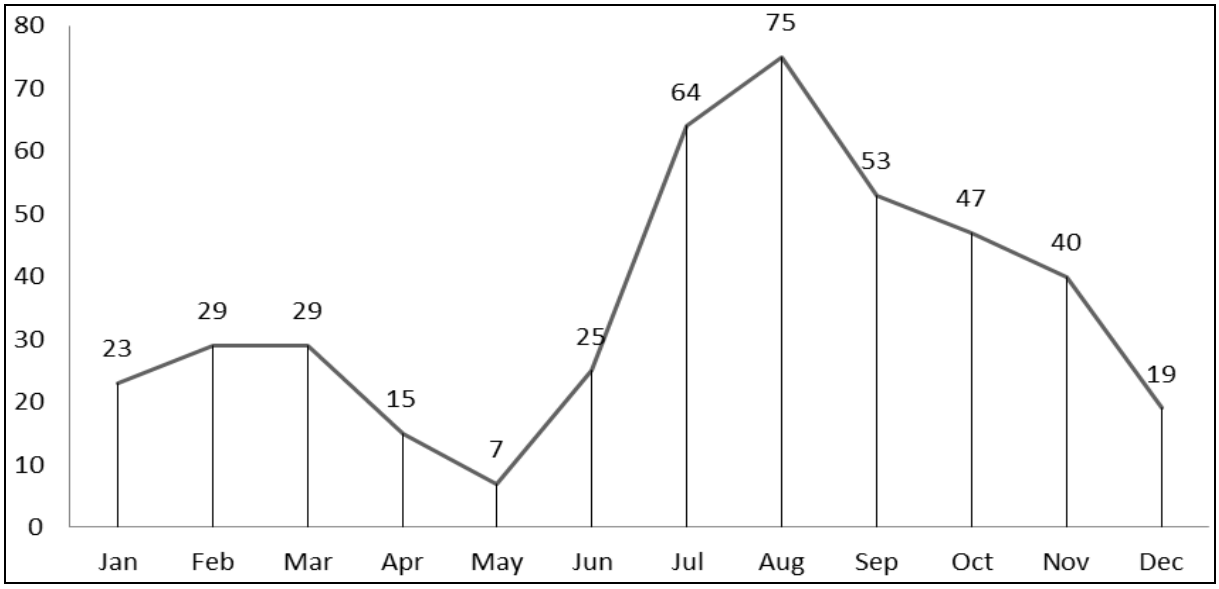

Fig 2: Number of Species observed per Month

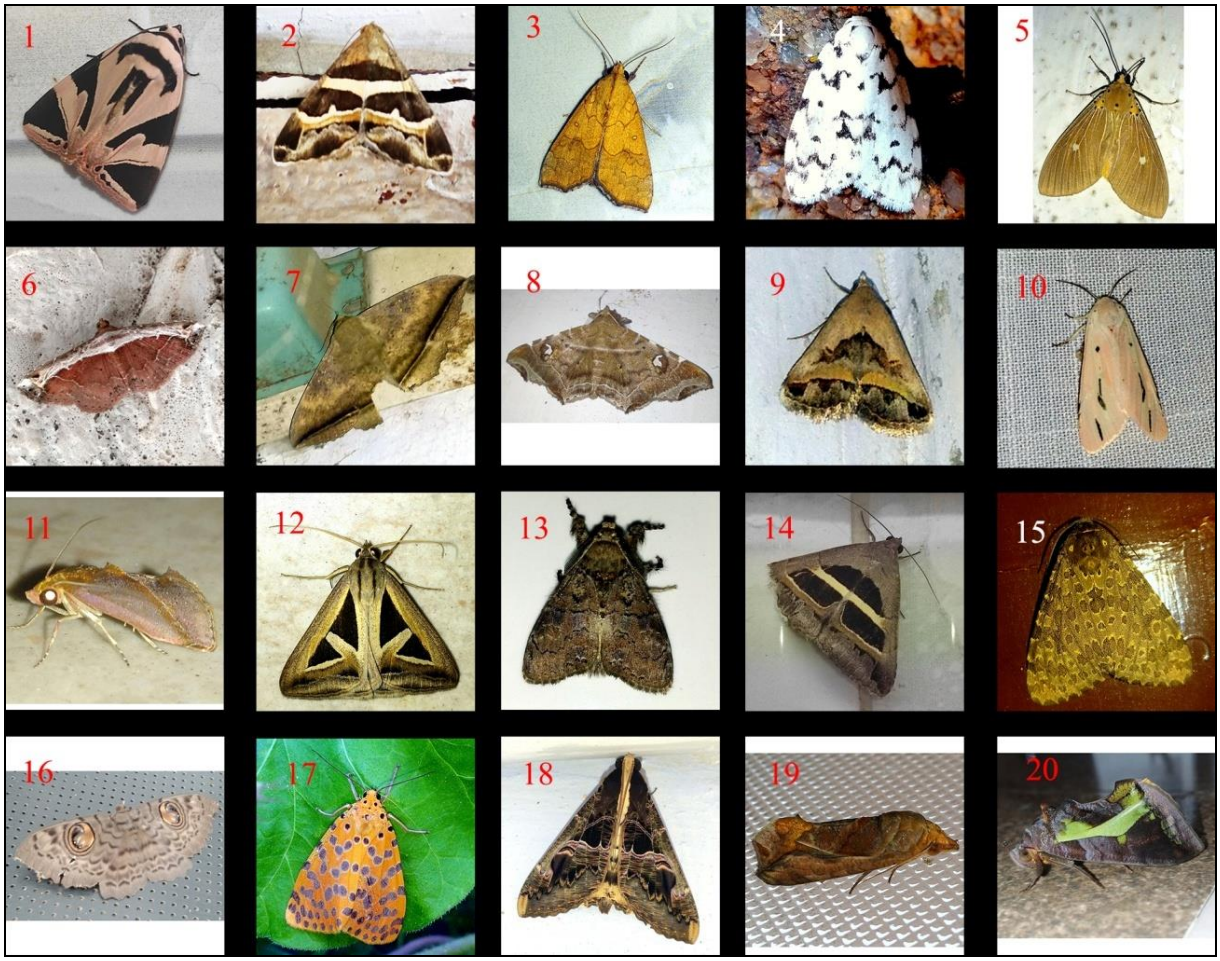

Plate 1: 1-*Attatha sp.*; 2-*Grammodes stolida*; 3-*Anomis flava*; 4-*Aemene taprobanis*; 5-*Asota caricae*; 6-*Zurobata vacillans*; 7-*Hulodes caranea*; 8-*Episparis sp.*; 9-*Acantholipes sp.*; 10-Unidentified (Subtribe-Spilosomina); 11-*Arsacia rectalis*; 12-*Trigonodes hyppasia*; 13-*Olene sp.*; 14-*Grammodes geometrica*; 15-*Olepa sp.*; 16-*Erebus macrops*; 17-*Argina sp.*; 18-*Sphingomorpha chlorea*; 19-*Oraesia emarginata*; 20-*Eudocima homaena*

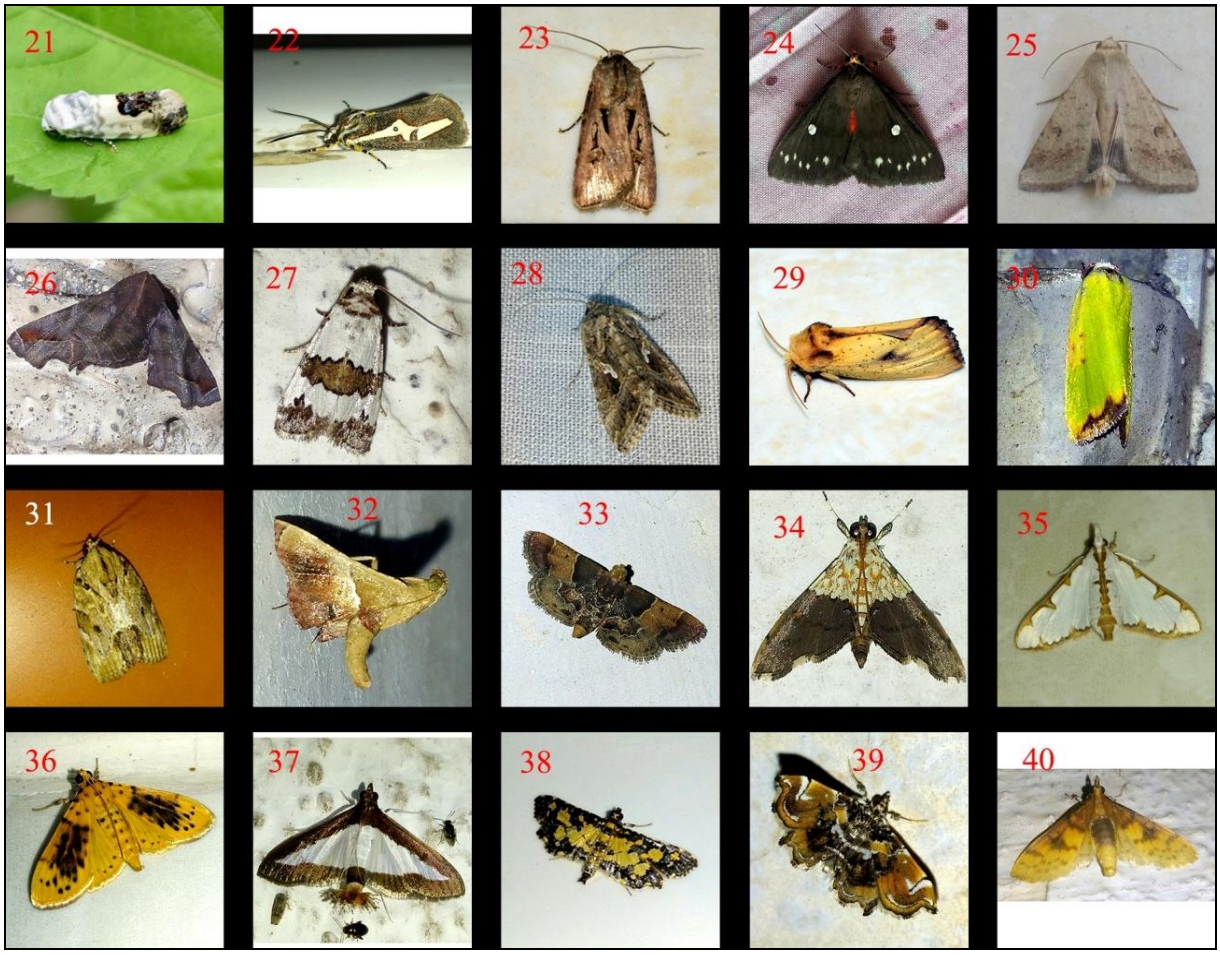

Plate 2: 21-*Acontia sp.*; 22-*Aegocera venulia*; 23-*Agrotis spinifera*; 24-*Calesia stillifera*; 25-*Helicoverpa armigera*; 26-*Penicillaria jocosatrix*; 27-*Maliattha sp.*; 28-*Chrysodeixis sp.*; 29-*Antheua servula*; 30-*Earias cupreoviridis*; 31-*Etanna breviuscula*; 32- *Endotricha repandalis*; 33-*Pyrails pictalis*; 34-*Agrotera basinotata*; 35-*Cirrhochrista brizoalis*; 36-*Conogethes semifascialis*; 37-*Diaphania indica*; 38-*Eurrhyparodes bracteolalis*; 39-*Musotima suffusalis*; 40-*Pachynoa sabelialis*

Plate 3: 41-*Agrius convolvuli*; 42-*Daphnis nerii*; 43-*Hippotion rosetta*; 44-*Hippotion celerio*; 45-*Hyles livornica*; 46-*Psilogramma increta*; 47-*Lobischiza koenigiana*; 48-*Plutella xylostella*; 49-*Atteva fabriciella*; 50-*Monopis sp.*; 51-Unidentified (Family-Grac illaridae); 52- Unidentified (Family-Gracillaridae); 53-*Melittia sp.*; 54-*Hyblaea purea*; 55-*Labdia sp.*

Table 1: Checklist of Moths

Superfamily	Family	Species
NOCTUOIDEA	Noctuidae	*Acontia*
NOCTUOIDEA	Noctuidae	*Acontia sp. 2*
NOCTUOIDEA	Noctuidae	*Aedia leucomelas* (Linnaeus, 1758)
NOCTUOIDEA	Noctuidae	*Aegocera venulia* (Cramer, 1777)
NOCTUOIDEA	Noctuidae	*Agrotis spinifera (Hubner, 188)*
NOCTUOIDEA	Noctuidae	*Agrotis ipsilon* (Hufnagel, 1766)
NOCTUOIDEA	Noctuidae	*Amyna axis* (Guenee, 1852)
NOCTUOIDEA	Noctuidae	*Arcte coerulea* (Guenee, 1852)
NOCTUOIDEA	Noctuidae	*Calesia stillifera* (Felder, 1874)
NOCTUOIDEA	Noctuidae	*Chrysodeixis sp.*
NOCTUOIDEA	Noctuidae	*Condica illecta* (Walker, 1865)
NOCTUOIDEA	Noctuidae	*Helicoverpa armigera* (Hubner, 1808)
NOCTUOIDEA	Noctuidae	*Heliothis peltigera* (Denis & Schiffermüller, 1775)
NOCTUOIDEA	Noctuidae	*Leucania sp.*
NOCTUOIDEA	Noctuidae	*Maliattha signifera* (Walker, 1857)
NOCTUOIDEA	Noctuidae	*Maliattha sp.*
NOCTUOIDEA	Noctuidae	*Ozarba sp.*
NOCTUOIDEA	Noctuidae	*Penicillaria jocosatrix* (Guenee, 1852)
NOCTUOIDEA	Noctuidae	*Spodoptera cilium* (Guenee, 1852)
NOCTUOIDEA	Noctuidae	*Spodoptera exigua* (Hubner, 1808)
NOCTUOIDEA	Noctuidae	*Spodoptera litura* (Fabricius, 1775)
NOCTUOIDEA	Noctuidae	*Thiacidas postica?* (Walker, 1855)
NOCTUOIDEA	Noctuidae	*Trichoplusia ni* (Hubner, 1803)
NOCTUOIDEA	Noctuidae	*Xanthodes sp.*
NOCTUOIDEA	Noctuidae	unidentified (subfam: acontiinae)
NOCTUOIDEA	Noctuidae	unidentified (subfam: acontiinae)2
NOCTUOIDEA	Noctuidae	unidentified (subfam: eustrotiinae)
NOCTUOIDEA	Noctuidae	unidentified (subfam: bagisarinae)
NOCTUOIDEA	Erebidae	*Acantholipes sp.*
NOCTUOIDEA	Erebidae	*Achaea janata* (Linnaeus, 1758)
NOCTUOIDEA	Erebidae	*Aemene taprobanis* (Walker, 1854)
NOCTUOIDEA	Erebidae	*Aloa lactinea* (Cramer, 1777)
NOCTUOIDEA	Erebidae	*Amata passalis* (Fabricius, 1781)
NOCTUOIDEA	Erebidae	*Amata sp.*
NOCTUOIDEA	Erebidae	*Anomis flava* (Fabricius, 1775)
NOCTUOIDEA	Erebidae	*Argina astrea* (Drury, 1773)
NOCTUOIDEA	Erebidae	*Arsacia rectalis* (Walker, 1863)
NOCTUOIDEA	Erebidae	*Artaxa sp.*
NOCTUOIDEA	Erebidae	*Asota caricae* (Fabricius, 1775)
NOCTUOIDEA	Erebidae	*Ataboruza divisa* (Walker, 1862)
NOCTUOIDEA	Erebidae	*Attatha sp.*
NOCTUOIDEA	Erebidae	*Creatonotos gangis* (Linnaeus, 1763)
NOCTUOIDEA	Erebidae	*Daona sp.*
NOCTUOIDEA	Erebidae	*Dysgonia algira* (Linnaeus, 1767)
NOCTUOIDEA	Erebidae	*Entomogramma fautrix* (Guenee, 1852)
NOCTUOIDEA	Erebidae	*Episparis sp.*
NOCTUOIDEA	Erebidae	*Ercheia cyllaria* (Cramer, 1782)
NOCTUOIDEA	Erebidae	*Erebus hieroglyphica* (Drury, 1773)
NOCTUOIDEA	Erebidae	*Erebus macrops* (Linnaeus, 1768)
NOCTUOIDEA	Erebidae	*Erygia sp.*
NOCTUOIDEA	Erebidae	*Eublemma accedens* (Wallengren, 1863)
NOCTUOIDEA	Erebidae	*Eubelmma amabilis* (Saalmuller, 1891)
NOCTUOIDEA	Erebidae	*Eublemma baccalix* (Swinhoe, 1886)
NOCTUOIDEA	Erebidae	*Eublemma cochyliodes* (Guenee, 1852)
NOCTUOIDEA	Erebidae	*Eudocima homaena* (Hubner, 1816)
NOCTUOIDEA	Erebidae	*Eudocima materna* (Linnaeus, 1767)
NOCTUOIDEA	Erebidae	*Eudocima phalonia* (Linnaeus, 1763)
NOCTUOIDEA	Erebidae	*Gonitis mesogona* (Walker, 1858)
NOCTUOIDEA	Erebidae	*Grammodes geometrica* (Fabricius, 1775)

NOCTUOIDEA	Erebidae	*Grammodes stolida* (Fabricius, 1775)
NOCTUOIDEA	Erebidae	*Heteropalpia sp.*
NOCTUOIDEA	Erebidae	*Hulodes caranea (Cramer, 178)*
NOCTUOIDEA	Erebidae	*Hypena laceratalis* (Walker, 1859)
NOCTUOIDEA	Erebidae	*Hypena obacerralis*
NOCTUOIDEA	Erebidae	*Micraloa lineola*
NOCTUOIDEA	Erebidae	*Mocis frugalis* (Fabricius, 1775)
NOCTUOIDEA	Erebidae	*Mocis unduta* (Fabricius, 1775)
NOCTUOIDEA	Erebidae	*Naarda sp.*
NOCTUOIDEA	Erebidae	*Olene sp.*
NOCTUOIDEA	Erebidae	*Olepa sp.*
NOCTUOIDEA	Erebidae	*Ophiusa tirhaca* (Cramer, 1777)
NOCTUOIDEA	Erebidae	*Oraesia emarginata* (Fabricius, 1794)
NOCTUOIDEA	Erebidae	*Orvasca subnotata* (Walker, 1865)
NOCTUOIDEA	Erebidae	*Pericyma sp.*
NOCTUOIDEA	Erebidae	*Polydesma sp.*?
NOCTUOIDEA	Erebidae	*Serrodes campana* (Guenee, 1852)
NOCTUOIDEA	Erebidae	*Sphingomorpha chlorea* (Cramer, 1777)
NOCTUOIDEA	Erebidae	*Spirama sp.*
NOCTUOIDEA	Erebidae	unidentified (tribe syntomiini)
NOCTUOIDEA	Erebidae	*Radara sp.*
NOCTUOIDEA	Erebidae	*Tathorhynchus exsiccata*
NOCTUOIDEA	Erebidae	*Trigonodes hyppasia* (Cramer, 1779)
NOCTUOIDEA	Erebidae	unidentified (tribe arctiini)
NOCTUOIDEA	Erebidae	unidentified (tribe nygmiini)
NOCTUOIDEA	Erebidae	unidentified (tribe nygmiini)
NOCTUOIDEA	Erebidae	unidentified (tribe nygmiini)
NOCTUOIDEA	Erebidae	unidentified (sub-tribe spilosomina)
NOCTUOIDEA	Erebidae	*Utethesia pulchelloides (Hampson, 197)*
NOCTUOIDEA	Erebidae	*Zekelita sp.*
NOCTUOIDEA	Erebidae	*Zurobata vacillans* (Walker, 1864)
NOCTUOIDEA	Notodontidae	*Antheua servula* (Drury, 1773)
NOCTUOIDEA	Notodontidae	*Phalera combusta* (Walker, 1855)
NOCTUOIDEA	Nolidae	*Earias cupreoviridis* (Walker, 1862)
NOCTUOIDEA	Nolidae	*Earias sp.*
NOCTUOIDEA	Nolidae	*Etanna breviuscula* (Walker, 1863)
NOCTUOIDEA	Nolidae	*Nola analis* (Wileman & West, 1928)
NOCTUOIDEA	Nolidae	*nola sp.1*
NOCTUOIDEA	Nolidae	*nola sp.2*
NOCTUOIDEA	Nolidae	*Selepa sp.*
PYRALOIDEA	Pyralidae	*Endotricha repandalis* (Fabricius, 1794)
PYRALOIDEA	Pyralidae	*Etiella sp.*
PYRALOIDEA	Pyralidae	*Lamoria sp.*
PYRALOIDEA	Pyralidae	*Pyralis pictalis* (Curtis, 1834)
PYRALOIDEA	Pyralidae	unidentified
PYRALOIDEA	Pyralidae	unidentified (tribe phyctiini)
PYRALOIDEA	Crambidae	*Achyra sp.*?
PYRALOIDEA	Crambidae	*Agrotera basinotata* (Hampson, 1891)
PYRALOIDEA	Crambidae	*Antigastra catalaunalis* (Duponchel, 1833)
PYRALOIDEA	Crambidae	*Botyodes asialis* (Guenee, 1854)
PYRALOIDEA	Crambidae	*Chabula acamasalis* (Walker, 1859)
PYRALOIDEA	Crambidae	*Chilo sp.*
PYRALOIDEA	Crambidae	*Cirrhochrista brizoalis* (Walker, 1859)
PYRALOIDEA	Crambidae	*Cnaphalocrocis medinalis* (Guenee, 1854)
PYRALOIDEA	Crambidae	*Cnaphalocrocis poeyalis* (Boisduval, 1833)
PYRALOIDEA	Crambidae	*Conogethes punctiferalis* (Guenee, 1854)
PYRALOIDEA	Crambidae	*Conogethes semifascialis* (Walker, 1866)
PYRALOIDEA	Crambidae	*Crocidolomia binotalis* (Zeller, 1852)
PYRALOIDEA	Crambidae	*Culladia sp.*
PYRALOIDEA	Crambidae	*Diaphania indica* (Saunders, 1851)
PYRALOIDEA	Crambidae	*Eoophyla sp.*

PYRALOIDEA	Crambidae	*Euchromius sp.*
PYRALOIDEA	Crambidae	*Euclasta sp.*
PYRALOIDEA	Crambidae	*Eurrhyparodes bracteolalis* (Zeller, 1852)
PYRALOIDEA	Crambidae	*Glyphodes bivitrialis* (Guenee, 1854)
PYRALOIDEA	Crambidae	*Glyphodes sp.*
PYRALOIDEA	Crambidae	*Hellula sp.*
PYRALOIDEA	Crambidae	*Hellula undalis* (Fabricius, 1794)
PYRALOIDEA	Crambidae	*Hendecasis duplifascialis* (Hampson, 1891)
PYRALOIDEA	Crambidae	*Herpetogramma sp.*
PYRALOIDEA	Crambidae	*Hodebertia testalis* (Fabricius, 1794)
PYRALOIDEA	Crambidae	*Hydriris ornatalis* (Duponchel, 1832)
PYRALOIDEA	Crambidae	*Maruca vitrata* (Fabricius, 1787)
PYRALOIDEA	Crambidae	*Metoeca foedalis* (Guenee, 1854)
PYRALOIDEA	Crambidae	*Musotima suffusalis* (Walker, 1893)
PYRALOIDEA	Crambidae	*Nausinoe geometralis* (Guenee, 1854)
PYRALOIDEA	Crambidae	*Noorda blitealis* (Walker, 1859)
PYRALOIDEA	Crambidae	*Omiodes indicata* (Fabricius, 1775)
PYRALOIDEA	Crambidae	*Orphanostigma abruptalis* (Walker, 1859)
PYRALOIDEA	Crambidae	*Pachynoa sabelialis* (Guenee, 1854)
PYRALOIDEA	Crambidae	*Pachynoa sp.*
PYRALOIDEA	Crambidae	*Paraponyx affinialis* (Walker, 1859)
PYRALOIDEA	Crambidae	*Autocharis sp.*
PYRALOIDEA	Crambidae	*Ptychopseutis sp.*
PYRALOIDEA	Crambidae	*Pygospilla tyres* (Cramer, 1870)
PYRALOIDEA	Crambidae	*Pyrausta phoenicialis* (Hubner, 1818)
PYRALOIDEA	Crambidae	*Sameodes cancellalis* (Zeller, 1852)
PYRALOIDEA	Crambidae	*Scirpophaga sp.*
PYRALOIDEA	Crambidae	*Spoladea recurvalis* (Fabricius, 1775)
PYRALOIDEA	Crambidae	unidentified
GEOMETROIDEA	Geometridae	*Ascotis sp.*
GEOMETROIDEA	Geometridae	*Astygisa sp.*
GEOMETROIDEA	Geometridae	*Chiasmia emersaria* (Walker, 1861)
GEOMETROIDEA	Geometridae	*Chiasmia fidoniata* (Guenee, 1858)
GEOMETROIDEA	Geometridae	*Chrysocraspeda faganaria* (Guenee, 1858)
GEOMETROIDEA	Geometridae	*Cleora sp.*
GEOMETROIDEA	Geometridae	*Comibaena cassidara* (Guenee, 1858)
GEOMETROIDEA	Geometridae	*Hemithea sp.*
GEOMETROIDEA	Geometridae	*Hyperythra lutea* (Stoll, 1781)
GEOMETROIDEA	Geometridae	*Hypomecis sp.*
GEOMETROIDEA	Geometridae	*Idaea sp.*
GEOMETROIDEA	Geometridae	*Isturgia sp.*
GEOMETROIDEA	Geometridae	*Microloxia indecretata* (Walker, 1863)
GEOMETROIDEA	Geometridae	*Pelagodes sp.*
GEOMETROIDEA	Geometridae	*Petelia sp.*
GEOMETROIDEA	Geometridae	*Pingasa lariaria* (Walker, 1860)
GEOMETROIDEA	Geometridae	*Scopula addictaria* (Walker, 1861)
GEOMETROIDEA	Geometridae	*Scopula sp.*
GEOMETROIDEA	Geometridae	*Traminda mundissima* (Walker, 1861)
GEOMETROIDEA	Geometridae	unidentified (subfam: sterrhinae)
GEOMETROIDEA	Geometridae	unidentified (tribe eupitheciini)
GEOMETROIDEA	Geometridae	*Micronia aculeata* (Guenee, 1857)
GEOMETROIDEA	Uraniidae	*Phazaca sp.*
GELECHIOIDEA	Gelechiidae	*Anarsia sp.*
GELECHIOIDEA	Gelechiidae	*Dichomeris sp.*
GELECHIOIDEA	Gelechiidae	*Hypatima sp.*
GELECHIOIDEA	Gelechiidae	*Stegasta bosquella* (Chambers, 1875)
GELECHIOIDEA	Cosmopterigidae	*Anatrachyntis sp.*
GELECHIOIDEA	Cosmopterigidae	*Labdia sp.*
GELECHIOIDEA	Cosmopterigidae	*Cosmopterix sp.*
GELECHIOIDEA	Depressariidae	*Psorosticha zizyphi* (Stainton, 1859)
GELECHIOIDEA	Stathmopodidae	*Stathmopoda auriferella* (Walker, 1864)

GELECHIOIDEA	Stathmopodidae	*Stathmopoda sp.*1
GELECHIOIDEA	Stathmopodidae	*Stathmopoda sp.*2
GELECHIOIDEA	Stathmopodidae	*Stathmopoda sp.*3
GELECHIOIDEA	Scythrididae	*Eretmocera impactella* (Walker, 1864)
PTEROPHOROIDEA	Pterophoridae	*Exelastis sp.*
PTEROPHOROIDEA	Pterophoridae	*Lantanophaga pusillidactyulus* (Walker, 1864)
PTEROPHOROIDEA	Pterophoridae	*Cosmoclostis leucomochla* (Fletcher, 194)
THYRIDOIDEA	Thyrididae	*Banisia myrsualis* (Walker, 1859)
THYRIDOIDEA	Thyrididae	unidentified
THYRIDOIDEA	Thyrididae	unidentified
BOMBYCOIDEA	Bombycidae	*Trilocha varians* (Walker, 1855)
BOMBYCOIDEA	Sphingidae	*Acherontia lachesis* (Fabricius, 1798)**
BOMBYCOIDEA	Sphingidae	*Acherontia styx* (Westwood, 1847)
BOMBYCOIDEA	Sphingidae	*Agrius convolvuli* (Linnaeus, 1758)
BOMBYCOIDEA	Sphingidae	*Ambulyx sp.***
BOMBYCOIDEA	Sphingidae	*Cephonodes hylas* (Linnaeus, 1771)**
BOMBYCOIDEA	Sphingidae	*Daphnis nerii* (Linnaeus, 1758)
BOMBYCOIDEA	Sphingidae	*Hippotion celerio* (Linnaeus, 1758)
BOMBYCOIDEA	Sphingidae	*Hippotion rosetta* (Swinhoe, 1892)
BOMBYCOIDEA	Sphingidae	*Hyles livornica* (Esper, 1780)
BOMBYCOIDEA	Sphingidae	*Leucophlebia emittens* (Walker, 1866)**
BOMBYCOIDEA	Sphingidae	*Macroglossum belis* (Linnaeus, 1758)**
BOMBYCOIDEA	Sphingidae	*Macroglossum gyrans* (Walker, 1856)**
BOMBYCOIDEA	Sphingidae	*Nephele hespera* (Fabricius, 1775)
BOMBYCOIDEA	Sphingidae	*Polyptychus dentatus* (Cramer, 1777)**
BOMBYCOIDEA	Sphingidae	*Psilogramma increta* (Walker, 1864)
BOMBYCOIDEA	Sphingidae	*Theretra alecto* (Linnaeus, 1758)**
BOMBYCOIDEA	Sphingidae	*Theretra gnoma* (Fabcricius, 1775)**
BOMBYCOIDEA	Sphingidae	*Theretra oldenlandiae* (Fabricius, 1775)**
TORTRICOIDEA	Tortricidae	*Dudua aprobola* (Myerick, 1886)
TORTRICOIDEA	Tortricidae	*Loboschiza koenigiana* (Fabricius, 1775)
TORTRICOIDEA	Tortricidae	unidentified
TORTRICOIDEA	Tortricidae	unidentified
YPONOMUTOIDEA	Plutellidae	*Plutella xylostella* (Linnaeus, 1758)
YPONOMUTOIDEA	Attevidae	*Atteva fabriciella* (Swederus, 1787)
TINEOIDEA	Tineidae	*Monopis sp.*
TINEOIDEA	Tineidae	*Opogona sp.*
TINEOIDEA	Eriocottidae	unidentified
TINEOIDEA	Psychidae	unidentified
GRACILLARIOIDEA	Gracillariidae	*Epicephala sp.*
GRACILLARIOIDEA	Gracillariidae	unidentified
GRACILLARIOIDEA	Gracillariidae	unidentified
GRACILLARIOIDEA	Gracillariidae	unidentified
GRACILLARIOIDEA	Gracillariidae	unidentified
ZYGAENOIDEA	Limacodidae	unidentified
ZYGAENOIDEA	Limacodidae	unidentified
COSSOIDEA	Sesiidae	*Melittia sp.*
COSSOIDEA	Brachodidae	*Phycodes minor* (Moore, 1881)?
COSSOIDEA	Brachodidae	*Phycodes radiata* (Ochsenheimer, 1808)?
CHOREUTOIDEA	choreutidae	unidentified
HYBLAEOIDEA	Hyblaeidae	*Hyblaea purea* (Cramer, 1777)

?= Preliminary identification

**=Records adapted from (Mosse, 1929) [11]

Result and discussion

A total of 232 species of Moths (Table-1) from 29 different Families in 15 Super-families were recorded during the study period. Out of these, 136 moths were identified up to species level, 68 were identified up to genus level and 28 species remained unidentified.

This study aimed to prepare a baseline data of moths of Bhavnagar city. Most number of species (61) found during surveys belongs to the family Erebidae (Figure-1). Ten Families had lowest species representation with 1 species each. Similar trend can be seen in work done by (Shull & Nadkerny, 1963) at Dangs in South Gujarat. Erebidae was the family with most diversity in their study with 59 species. Their work was followed by

(Shubhalaxmi *et al.*, 2011) in Northern Western Ghats which resulted in inventory of 418 species of Moths. Erebidae was found to be one of the dominant families in their study as well. Family Sesiidae is recorded from Gujarat for the first time. An unidentified species from genus *Melittia* was recorded from Victoria park reserve forest during National Moth week 2021. Many of the Sphingidae recorded from Bhavnagar previously (Mosse, 1929) [11] were not seen at our survey sites. However, those records were included in this study with citation. As the only objective of this study was to prepare a checklist of Moths existing at the study area, number of moths attracted to the lights weren't recorded. However from our rough estimation, we can say that some of the species *viz*. *Spoladea recurvalis, Traminda mundissima, Aegocera venulia, Pyrausta phoenicialis, Stathmopoda sp., Loboschiza koenigiana, Amata passalis* are fairly common as they were seen at all the study sites and in considerably high numbers. This study does not aim to give comprehensive data of Moth diversity in the area; however, it aims to provide an insight into moth diversity of Bhavnagar city. Maximum number of species (75) was recorded in the month of August, followed by July and September with 64 and 53 species respectively. Therefore monsoon must be the most favorable season for moths in the region. Least number of species was recorded during the peaks of summer and winter i.e in the month of April, May and December (Figure: 2)

The latest extensive survey on moths in Gujarat was carried out in 1963 in Dangs. After which very few records of Moths have been published from the state. This suggests that the work on Moths is progressing at very slow pace. This study with a checklist of 232 species of Moths is a first extensive survey on Moths from Saurashtra region in Gujarat. There certainly are chances of adding much more species to this checklist with further efforts in future. Places like Malnath hill range, Palitana, Jesar in Bhavnagar district may have a high species richness of Moths and needs to be explored in near future. Several other places in Saurashtra like Gir National Park and Sanctuary, Girnar Wildlife Sanctuary, Blackbuck NP, Mitiyala Wildlife Sanctuary, Hingolgadh Nature education Sanctuary are unexplored in terms of Moth diversity.

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