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Diversity of hawkmoths (Sphingidae) in India: A Review

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Abstract

Family Sphingidae belonging to Order Lepidoptera whose members are commonly known as Hawk moths or Sphinx moths. There are three subfamilies of this family named as Macroglossinae, Smerinthinae and Sphinginae. Sphinx or hawkmoths are distributed all over the world mostly preferring the tropical areas. There is very less literature available on hawkmoths, so an attempt is made to understand the diversity patterns of hawkmoths throughout the India. The current study is conducted to document the earlier and existing faunal diversity patterns of hawkmoths throughout India. As hawkmoths are economically important insects as these act as beneficial pollinators as well as environmental indicators. So, presence of hawkmoths in environment is essential for maintaining ecological balance. The present review paper comprises brief information on the diversity patterns of hawkmoths throughout India.

Keywords: Hawkmoths, Sphingidae, Lepidoptera, diversity, India

Introduction

India has a tropical climate which provides optimum environmental conditions for the growth and development of variety of Insects. About 80% of Indian Insects diversity is endemic [23]. Lepidoptera is most diverse and second largest order of class Insecta which includes butterflies, moths and skippers. Moths have greater diversity as compared to other two groups among class Insecta as these can easily adapt to any climatic conditions [21]. Moths and butterflies differs from each other in their antennae, in moths they are thread like while butterflies contain club-tipped antennae [9]. Sphingidae is one of the family in Order Lepidoptera. Sphingid moths are commonly called as Sphinx or hawkmoths are distributed all over the world mostly preferring the tropical areas. Adults are usually active during night and are beneficial pollinators of night blooming flowers. Hawkmoths are medium to large sized moths, having spindle shaped and robust body with long pointed needle like wings, forewings are somewhat long and narrow as compare to hindwings. They have wingspans from 40mm to 140mm [3]. Hawkmoths larvae are commonly called as hornworms as they possess a mid-dorsal horn on their 8th abdominal segment. Hampson, 1892 first time recorded sphingids of India and he reported about 121 species. Bell & Scot (1937) Later recorded 204 species of Indian Hawkmoths [19]. Further many scientists recorded the diversity and distribution of sphingid moths of India. About 1500 species of hawkmoths are reported world widely [13]. Indian sphingid moth fauna is rich and diverse represented by about 200 species [4]. In past few years, new species of hawkmoths are reported due to which overall hawkmoths fauna reported from India has increased [19]. A new species of hawkmoth is reported from Kerala recently [31]. As there are very smaller number of Hawkmoths present worldwide as compare to other giant moth families, thus very less attention is given to record the Sphingidae diversity [23]. As hawkmoths are economically important insects as these act as beneficial pollinators as well as indicators of environment. Their presence is important in order to maintain ecological balance, so hawkmoths need to be conserved. This paper provides a review of available literature on hawkmoths diversity throughout India.

Hawkmoths fauna of Himachal Pradesh, India

[25] Recorded the distribution of five species of hawkmoths from the high-altitude areas of J&K and HP. Recorded hawkmoths species were, *Hyles gallii* (Rottensburg, 1775), *Smerinthus*

kindermannii (Lederer, 1853), *Hyles hippophaes* (Esper, 1789), *Hyles nervosa* (Rothschild & Jordan, 1903), *Hyles livornica* (Esper, 1780). Three species i.e., *Smerinthus kindermannii*, *Hyles gallii* and *Hyles hippophaes* were reported for the first time in Himachal Pradesh.

^[26] explored the moth fauna of Tirthan valley HP and they reported 165 species of moths. Out of these, 6 species were reported under family sphingidae named as *Acherontia lachesis* (Fabricius, 1798), *Nephele hespera* (Fabricius, 1775), *Agrius convolvuli* (Linnaeus, 1758), *Pergesa acteus* (Cramer, 1779), *Ambulyx substrictilis* (Westwood, 1847), *Theretra* sp.

Hawkmoths fauna of Punjab, India

^[16] Explored the moth fauna belonging to Sphingidae family from different areas of J&K, HP and Uttarakhand (North-West Himalaya). They collected a total of 408 hawkmoths specimens from the study site and reported a total of 30 species of Family Sphingidae named as *Acherontia styx* Westwood, 1847, *Agrius convolvuli* Linnaeus, 1758, *Acherontia lachesis* Fabricius, 1798, *Ambulyx siamensis* Inoue, 1991, *Ambulyx matti* Jordan, 1923, *Clanis titan* Rothschild and Jordan, 1903, *Dolbina inexacta* Walker, 1856, *Lapara coniferarum* Abott and Smith, 1797, *Leucophlebia lineate* Westwood, 1847, *Pachysphinx occidentalis* H. Edwards, *Psilogramma majunataha* (Eitschberger and Melichar), *Psilogramma menophron* Cramer, *Marumba cristata* Butler, 1875, *Cephonodes hylas* Linnaeus, 1771, *Marumba dyras* Walker, 1856, *Daphnis nerii* Linnaeus, *Gnathothilubus erotus erotus* Cramer, 1777, *Theretra odenlandiae odenlandiae* Fabricius, 1775, *Hippotion celerio* Linnaeus, 1758, *Hyles livornica* Esper, 1779, *Hippotion echeclus* Boisduval, 1875, *Macroglossum assimilis assimilis* Swainson, *Macroglossum belis* Linnaeus, 1776, *Nephele hespera* Fabricius, 1775, *Nephele didyma* Fabricius, 1775, *Pergesa acteus* Cramer, 1779, *Theretra alecto* Linnaeus, 1758, *Theretra clotho clotho* Drury, 1773, *Rhopalopsyche nycteris* Kollar, 1844, *Theretra nessus* Drury, 1773,.

Hawkmoths fauna of Uttarakhand, India

^[33] Studied the moth fauna of different areas of Uttarakhand, India. They collected a total of 248 species of moths. Out of these, 10 species were from family Sphingidae named as *Eupanacra mydon* (Walker, 1856), *Hippotion celerio* (Linnaeus, 1758), *Macroglossum belis* (Linnaeus, 1758), *Nephele hespera* (Fabricius, 1775), *Rhagastis castor* (Walker, 1856), *Theretra alecto* (Linnaeus, 1758), *Theretra griseomarginata** (Hampson, 1898) *Ambulyx liturata* (Butler, 1875), *Cypa pallens* (Jordan, 1926), *Agrius convolvuli* (Linnaeus, 1758).

Hawkmoths of Uttar Pradesh, India

^[6] Presented a manuscript which provided diversity patterns of hawkmoth fauna from the Uttar Pradesh. This survey recorded 287 species of moths belonging to 21 different families of moths. The study represented 26 number of species identified under family Sphingidae named as, *Acherontia styx* (Westwood, 1847), *Agrius convolvuli* (Linnaeus, 1758), *Amplypterus panopus* (Cramer, 1779), *Clanis bilineata* (Walker, 1866), *Acherontia lachesis* (Fabricius, 1798), *Clanis phalaris* (Cramer, 1777), *Hippotion celerio* (Linnaeus, 1758), *Theretra clotho* (Drury, 1773), *Clanis titan* (Rothschild & Jordan, 1903), *Polyptychus dentatus* (Cramer, 1777), *Cechenena minor* (Butler, 1875),

Daphnis hypothous (Cramer, 1780), *Cephonodes hylas* (Linnaeus, 1771), *Daphnis nerii* (Linnaeus, 1758), *Theretra alecto* (Linnaeus, 1758), *Hemaris saundersii* (Walker, 1856), *Hippotion boerhaviae* (Fabricius, 1775), , *Hippotion rosetta* (Swinhoe, 1892), *Hyles livornica* (Esper, 1780), *Hyles nicaea lathyrus* (Walker, 1856), *Macroglossum assimilis* (Swainson, 1821), *Nephele hespera* (Fabricius, 1775), *Macroglossum belis* (Linnaeus, 1758), *Theretra nessus* (Drury, 1773), *Pergesa acteus* (Cramer, 1779), *Theretra oldenlandiae oldenlandiae* (Fabricius, 1775). ^[15] Conducted a survey to record moth diversity of Banaras Hindu University, UP. The study recorded total of 1248 moths individuals belonging to 11 families. Two species were identified under family sphingidae named as *Hippotion cf. rosetta* (Swinhoe, 1892), *Theretra clotho* (Drury, 1773).

Hawkmoths of Rajasthan, India

^[11] Explored the moth diversity of Sariska Tiger Reserve of Rajasthan. The present study reported total of 16 moth species under 5 different families. Out of total 6 species were identified under family Sphingidae named as *Archerontia styx* (Westwood, 1847), *Hippotion rosetta* (Swinhoe, 1892), *Agrius convolvuli* (Linnaeus, 1758), *Daphnis nerii* (Linnaeus, 1758), *Nephele hespera* (Fabricius, 1775), *Theretra oldenlandiae* (Fabricius, 1775).

^[20] Explored the moth fauna of Jaipur, Rajasthan. This study reported 65 moth species under 13 different families, 9 species were identified under family Sphingidae named as *Daphnis nerii* (Linnaeus, 1758), *Theretra alecto* (Linnaeus, 1758), *Acherontia styx* (Westwood, 1848), *Hippotion celerio* (Linnaeus, 1758), *Hippotion rosetta* (Swinhoe, 1892), *Macroglossum stellatarum* (Linnaeus, 1758), *Nephele hespera* (Fabricius, 1775), *Xylophanes tersa* (Linnaeus, 1771), *Agrius convolvuli*, (Linnaeus, 1758).

Hawkmoths of Gujrat, India

^[8] Represented a preliminary checklist of 232 moths of Bhavnagar City, of Gujarat. Out of total, 18 species were identified under family sphingidae named as *Acherontia lachesis* (Fabricius, 1798), *Leucophlebia emittens* (Walker, 1866), *Acherontia styx* (Westwood, 1847), *Theretra oldenlandiae* (Fabricius, 1775), *Agrius convolvuli* (Linnaeus, 1758), *Ambulyx sp.*, *Cephonodes hylas* (Linnaeus, 1771), *Hyles livornica* (Esper, 1780), *Daphnis nerii* (Linnaeus, 1758), *Hippotion rosetta* (Swinhoe, 1892), *Hippotion celerio* (Linnaeus, 1758), *Macroglossum belis* (Linnaeus, 1758), *Macroglossum gyrans* (Walker, 1856), *Nephele hespera* (Fabricius, 1775), *Polyptychus dentatus* (Cramer, 1777), *Psilogramma increta* (Walker, 1864), *Theretra alecto* (Linnaeus, 1758), *Theretra gnoma* (Fabricius, 1775).

Hawkmoths fauna of Madhya Pradesh, India

^[4] Reported 12 species of hawkmoths from the Veerangana Durgavati Wildlife Sanctuary, MP. Reported species included *Acherontia Lachesis* (Fabricius), *Marumba dyras dyras* (Walker), *Acherontia styx styx* (Westwood), *Polyptychus dentatus* (Cramer), *Agrius convolvuli* (Linnaeus), *Daphnis nerii* (Linnaeus), *Psilogramma menophron menophron* (Cramer), *Hippotion boerhaviae* (Fabricius), *Nephele hespera* (Fabricius), *Theretra Alecto alecto* (Linnaeus), *Theretra oldenlandiae oldenlandiae* (Fabricius), *Agnosia microta* (Hampson). Out of these, one species i.e. *Agnosia microta* was found as a new species in the fauna of Madhya Pradesh.

Hawkmoth fauna of Maharashtra, India

^[24] Collected total 418 species of moths from the study site, out of which 45 number of species belonging to family Sphingidae which included *Marumba poliotis* Hampson, 1907, *Marumba dyras* (Walker, 1856), *Marumba indicus* (Walker, 1856), *Marumba spectabilis* (Butler, 1875), *Marumba nympa* Rothschild & Jordan, 1903, *Sataspes tagalica* f. *hauxwelli*, *Leucophlebia lineata* Westwood, 1847, *Polyptychus dentatus* (Cramer, 1777), *Amplipterus panopus* (Cramer, 1779) *Ambulyx substrigilis* (Jordan, 1923), *Psilogramma menephron* (Cramer, 1780), *Nephele hespera* (Fabricius, 1775), *Psilogramma increta* (Walker, [1865]), *Agnosia orneus* (Westwood, 1847), *Agnosia microta* (Hampson, 1907), *Dolbina inexacta* (Walker, 1856), *Agrius convolvuli* (Linnaeus, 1758), *Acherontia lachesis* Fabricius, 1798, *Daphnis nerii* (Linnaeus, 1758), *Acherontia styx* (Westwood, 1848), *Meganoton rubescens* (Butler, 1876), *Neogurelca hyas* (Walker, 1856), *Acosmeryx pseudonaga* Boisduval, 1875, *Macroglossum gyrans* Walker, 1856, *Macroglossum particolor* Rothschild & Jordan, 1903, *Macroglossum belis* (Linnaeus, 1758), *Macroglossum corythus* Walker, 1856, *Macroglossum sitiene* Walker, 1856, *Hippotion rosetta* (Swinhoe, 1892), *Hippotion celerio* (Linnaeus, 1758), *Hippotion rafflesii* (Moore, 1858), *Pergesa acteus* (Cramer, 1779), *Hyles livornica* (Fabricius, 1775), *Theretra nessus* (Drury, 1773), *Acosmeryx shervillii* Boisduval, 1875, *Theretra boisduvalii* (Bugnion, 1839), *Theretra gnoma* (Fabricius, 1775), *Clanis phalaris* (Cramer, 1777), *Theretra clotho* (Drury, 1773), *Theretra alecto* (Linnaeus, 1758), *Theretra lycetus* (Cramer 1775), *Theretra oldenlandiae* (Fabricius, 1775), *Theretra castanea* (Moore, 1872), *Theretra silhetensis* (Walker, 1856).

^[7] reported 41 moth species identified under 12 families from the Amravati city, out of which 3 species were from family Sphingidae named as *Theretra alecto alecto* (Linnaeus), *Nephele hespera* (Fabricius), *Daphnia nerii* (Linnaeus) ^[18]. Reported the moth's diversity of Mahadare, Satara District, Maharashtra which included *Daphnis nerii* Linnaeus, 1758, *Agrius convolvuli* Linnaeus, 1758, *Psilogramma incerta* walker, 1865.

^[23] Recorded about 463 hawkmoths from northern Western Ghats of Maharashtra, belonging to 18 species which included *Theretra clotho* (Drury, 1773), *Hippotion celerio* (Linnaeus, 1758), *Hippotion roseta* (Swinhoe, 1892), *Hyles livornica* (Esper, 1780), *Nephele hespera* (Fabricius, 1775), *Theretra alecto* (Linnaeus, 1758), *Theretra castanea* (Moore, 1872), *Psilogramma vates* (Butler, 1875), *Theretra gnoma* (Fabricius, 1775), *Daphnis nerii* (Linnaeus, 1758), *Theretra nessus* (Drury, 1773), *Theretra oldenlandiae* (Fabricius, 1775), *Theretra sumatrensis* (Joicey & Kaye, 1917), *Marumba dyras* (Walker, 1856), *Agrius convolvuli* (Linnaeus, 1758), *Polyptychus dentatus* (Cramer, 1777), *Acherontia lachesis* (Fabricius, 1775), *Acherontia styx* (Westwood, 1847).

Hawkmoths fauna of Kerala, India

^[14] Collected a total of 72 moths from Parli Panchayath, Palakkad District, Kerala. Out of which 18 moths belonging to 6 species identified under family sphingidae such as (*Acherontia lachesis* (Fab.), *Agrius convolvuli* (Linn.), *Hippotion boerhaviae* (Fab.), *Macroglossum aquila* (Boisd), *Theretra nessus* (Drury), *Theretra oldenlandiae* (Fab). It was found that diversity of the sphingidae was lower in the study area, it was due to unavailability of the host plants. ^[31] identified new hawkmoth species from Shendurney Wildlife

Sanctuary, southern Western Ghats named as *Theretra shendurneensis* sp. nov.

^[32] Reported 282 species of moths of different families from the Shendurney Wildlife Sanctuary and Ponmudi in Kerala. Out of total reported species of moths, 31 species belongs to family Sphingidae named as *Acosmeryx akanshi* (Melichar, Řezáč, Manjunatha & Horecký, 2014), *Acosmeryx anceus* (Stoll, 1781), *Daphnis hypothous* (Cramer, 1780), *Hippotion celerio* (Linnaeus, 1758), *Hippotion rosetta* (Swinhoe, 1892), *Hippotion velox* (Fabricius, 1793), *Macroglossum* sp., *Macroglossum* cf. *divergens heliophila* Boisduval, [1875], *Nephele hespera* (Fabricius, 1775), *Agrius convolvuli* (Linnaeus, 1758), *Pergesa acteus* (Cramer, 1779), *Rhagastis acuta* (Walker, 1856), *Theretra castanea* Moore, 1872, *Theretra clotho* (Drury, 1773), *Marumba dyras* (Walker, 1856), *Theretra gnoma* (Fabricius, 1775), *Theretra nessus* (Drury, 1773), *Theretra oldenlandiae* (Fabricius, 1750), *Theretra pallicosta* (Walker, 1856), *Theretra shendurneensis* (Sondhi, Kitching, Basu & Kunte, 2017), *Amplipterus panopus* (Cramer, 1779), *Ambulyx belli* (Jordan, 1923), *Ambulyx moorei* (Moore, 1858), *Ambulyx substrigilis* (Westwood, 1847), *Clanis titan* (Rothschild & Jordan, 1903), *Acherontia lachesis* (Fabricius, 1978), *Marumba nympa* (Rothschild & Jordan, 1903), *Dolbina manjunatha* (Haxaire & Melichar, 2013), *Megacorma obliqua* (Walker, 1856), *Meganoton nyctiphanes* (Walker, 1856), *Psilogramma vates* (Butler, 1875).

Hawkmoths of Kanyakumari District, Tamil Nadu, India

^[10] Conducted a survey from 2011-2015 of Kanyakumari District, Tamil Nadu, India in order to record the hawkmoths diversity of the area. They represented a list of 27 species of hawkmoths (Sphingidae) under three subfamilies and all the species were the new records for Kanyakumari district named as *Neogurelca hyas* (Walker, 1856), *Acosmeryx akanshi* (Melichar, Řezáč, Manjunatha & Horecký, 2014), *Hippotion celerio* (Linnaeus, 1758), *Hippotion roseta* (Swinhoe, 1892), *Hippotion velox* (Fabricius, 1793), *Theretra castanea* (Moore, 1872), *Theretra latreillii lucasii* (Walker, 1856), *Theretra nessus nessus* (Drury, 1773), *Theretra silhetensis silhetensis* (Walker, 1856), *Angonyx krishna* (Eitschberger & Haxaire, 2006), *Daphnis nerii* (Linnaeus, 1758), *Daphnis hypothous crameri* (Eitschberger & Melichar, 2010), *Macroglossum assimilis* (Swainson, 1821), *Macroglossum belis* (Linnaeus, 1758), *Macroglossum gyrans* (Walker, 1856), *Enpinanga assamensis* (Walker, 1856), *Ambulyx matti* (Jordan, 1923), *Amplipterus panopus karnatakaensis* (Melichar & Řezáč, [2014]), *Marumba dyras dyras* (Walker, 1856), *Marumba nympa* (Rothschild & Jordan, 1903), *Psilogramma vates* (Butler, 1875), *Psilogramma renneri* (Eitschberger, 2001), *Acherontia styx* (Westwood, 1847), *Acherontia lachesis* (Fabricius, 1798), *Agrius convolvuli* (Linnaeus, 1758), *Megacorma obliqua obliqua* (Walker, 1856), *Dolbina manjunatha* (Haxaire & Melichar, 2013).

Hawkmoths of Bhubaneswar, Odisha, India

^[17] Presented a checklist of 154 moth species from Bhubaneswar, Odisha, out of total 7 species were identified under family Sphingidae named as *Hippotion celerio* (Linnaeus, 1758), *Macroglossum* sp., *Theretra lucasii* (Walker, 1856), *Theretra oldenlandiae* (Fabricius, 1775), *Acherontia styx* (Westwood, 1847), *Psilogramma* sp., *Daphnis nerii* (Linnaeus, 1758).

Hawkmoths fauna of Jharkhand, India

^[34] Recorded 11 species of moths which were identified under 4 families. Out of which 4 species were recorded under family sphingidae named as *Deilephila nerii* (Linn.), *Acherontia atropos* (Linn.), *Acherontia styx* (Westwood), *Deilephila lineata* (Linn.) ^[25]. Recorded 74 species of moths belonging to 15 different families from the Topchanchi Wildlife Sanctuary, Jharkhand. In family sphingidae, 5 species were recorded *Theretra nessus* (Drury, 1773), *Ambulyx subocellata* (Felder, 1874), *Theretra oldenlandiae* (Fabricius, 1775), *Polyptychus dentatus* (Cramer, 1777), *Pergesa acteus* (Cramer, 1779). ^[30] recorded 89 species of lepidopteran insects including 30 species of butterflies and 59 species of moths from palkot wildlife sanctuary, Jharkhand. As far as moths are concerned, family Sphingidae was dominated with 10% (comprising 6 species) of total collected species of moths named as *Pergesa acteus* (Cramer), *Theretra oldenlandiae* (Fabricius), *Theretra alecto* (Linnaeus), *Ambulyx subocellata* (Felder), *Psilogramma menephron* (Cramer), *Acherontia styx* (Westwood) ^[29]. Recorded 140 species of moths from Koderma district of Jharkhand. Out of total, 7 species of moths belong to family sphingidae named as *Acosmeryx anceus*, (Stoll, [1781]), *Theretra alecto*, (Linnaeus, 1758), *Theretra nessus*, (Drury, 1773), *Theretra oldenlandiae*, (Fabricius, 1775), *Pergesa acteus*, (Cramer, 1779), *Psilogramma menephron*, (Cramer, 1780), *Acherontia styx*, (Westwood, 1847).

Hawkmoths of West Bengal, India

^[22] After reviewing the published data, a total of 1058 moths' species were identified under 36 families reported from West Bengal & a preliminary list was prepared. Out of total, about 88 species of family Sphingidae were identified named as *Acosmeryx anceus* (Stoll, 1781), *Ampelophaga khasiana* (Rothschild, 1895), *Acosmeryx anceus subdentata* (Rothschild & Jordan, 1903), *Ampelophaga rubiginosa* (Bremer & Grey, 1853), *Acosmeryx naga* (Moore, 1857), *Ampelophaga thomasi* (Cadiou & Kitching, 1998), *Acosmeryx omissa* (Rothschild & Jordan, 1903), *Cechenena lineosa* (Walker, 1856), *Dahira tridens* (Oberthur, 1904), *Cechenena minor* (Butler, 1875), *Daphnis hypothous* (Cramer, 1780), *Cephonodes hylas* (Linnaeus, 1771), *Daphnis nerii* (Linnaeus, 1758), *Deilephila elpenor* (Linnaeus, 1746), *Deilephila rivularis* (Boisduval, 1875), *Elibia dolichus* (Westwood, 1848), *Eupanacra busiris busiris* (Walker, 1856), *Eupanacra malayana* (Rothschild & Jordan, 1903), *Eupanacra moseri* (Gehlen., 1930), *Eupanacra mydon* (Walker, 1856), *Eupanacra perfecta* (Butler, 1875), *Eurypteryx bhaga* (Moore, 1866), *Gurelca hyas* (Walker, 1856), *Hayesiana triopus* (Westwood, 1847), *Hippotion boerhaviae* (Fabricius, 1775), *Hippotion celerio* (Linnaeus, 1758), *Hippotion velox* (Fabricius, 1793), *Hyles livonica* (Esper, 1780), *Lepchina tridens* (Oberthur, 1904), *Macroglossum aquila* (Boisduval, 1875), *Macroglossum assimilis* (Swainson, 1821), *Macroglossum belis* (Linnaeus, 1776), *Macroglossum bombylans* (Boisduval, 1875), *Macroglossum glaucoptera* (Butler, 1875), *Macroglossum gyrans* (Walker, 1856), *Rhagastis gloriosa* (Butler, 1875), *Macroglossum insipidainspida* (Butler, 1875), *Macroglossum pyrhosticta* (Butler, 1875), *Macroglossum troglodytus* (Boisduval, 1875), *Macroglossum variegatum* (Rothschild & Jordan, 1903), *Neogurelca hyas hyas* (Walker, 1856), *Nephele didyma* (Fabricius, 1775), *Nephele hespera* (Fabricius, 1775), *Rhagastis confusa* (Rothschild & Jordan, 1903), *Pergesa*

acteus (Cramer, 1779), *Rhagastis acuta* (Walker, 1856), *Rhagastis lunata* (Rothschild, 1900), *Rhagastis olivacea* (Moore, 1872), *Rhagastis velata* (Walker, 1866), *Theretra alecto* (Linnaeus, 1758), *Theretra clotho* (Drury, 1773), *Theretra latreillei* (MacLeay, 1827), *Theretra latreillei lucasii* (Walker, 1856), *Theretra lycetus* (Cramer, 1775), *Theretra nessus* (Drury, 1773), *Theretra oldenlandiae* (Fabricius, 1775), *Theretra silhetensis* (Walker, 1856), *Agnosia omeus* (Westwood, 1848), *Ambulyx liturata* (Butler, 1875), *Ambulyx maculifera* (Walker, 1866), *Ambulyx matti* (Jordan, 1923), *Ambulyx sericeipennis* (Butler, 1875), *Ambulyx substrigilis* (Westwood, 1848), *Amplipterus mansonii* (Clark, 1924), *Amplipterus panopus* (Cramer, 1779), *Anambulyx elwesi* (Druce, 1882), *Callambulyx rubricosa* (Walker, 1856), *Clanis bilineata* (Walker, 1866), *Clanis phalaris* (Cramer, 1777), *Craspedortha porphyria* (Butler, 1876), *Cypa decolor* (Walker, 1856), *Leucophlebia lineata* (Westwood, 1848), *Marumba bengalensis* (Hampson, 1912), *Marumba cristata* (Butler, 1875), *Marumba spectabilis* (Butler, 1875), *Marumba dyras dyras* (Walker, 1856), *Marumba indieus* (Walker, 1856), *Parum porphyria* (Butler, 1876), *Polyptychus dentatus* (Cramer, 1777), *Rhodoprasina floralis* (Butler, 1877), *Sataspes infemalis* (Westwood, 1848), *Acherontia laethesis* (Fabricius, 1798), *Acherontia styx* (Westwood, 1847), *Agrius convolvuli* (Linnaeus, 1758), *Apoealypsis velox* (Butler, 1877), *Megaconna obliqua* (Walker, 1856), *Meganoton analis* (Felder, 1874), *Psilogramma menephron* (Cramer, 1780).

^[5] Reported 407 moths species belonging to 24 families from the Darjeeling hills, West Bengal, India. 10 species were identified under family Sphingidae named as *Daphnis nerii* (Linnaeus, 1758), *Hippotion boerhaviae* (Fabricius, 1775), *Macroglossum corythus* (Walker, 1856), *Acosmeryx shervillii* (Boisduval, 1875), *Macroglossum bombylans* (Boisduval, 1875), *Theretra clotho* (Drury, 1773), *Theretra nessus* (Drury, 1773), *Cechetra scotia* (Rothschild, 1920), *Acherontia lachesis* (Fabricius, 1798), *Agrius convolvuli* (Linnaeus, 1758).

Hawkmoths fauna of Assam, India

^[1] Reported 333 moths of Tinsukia district of Assam, India. Out of total, 45 species were identified under family Sphingidae named as *Acherontia styx* (Westwood 1847), *Acherontia lachesis* (Fabricius, 1798), *Argius convolvuli* (Linnaeus, 1758), *Psilogramma increta* (Walker 1865), *Psilogramma discistriga* (Walker 1865), *Dolbina inexacta* (Walker 1865), *Clanis titan* (Rothschild and Jordan, 1903), *Polyptychus trilineatus* (Moore, 1888), *Marumba spectabilis* (Butler 1875), *Marumba dyras* (Walker, 1856), *Amplipterus panopus* (Cramer 1779), *Ambulyx ochracea* (Butler, 1885), *Ambulyx substrigilis* (Westwood 1848), *Ambulyx liturata* (Butler 1875), *Ambulyx sericeipennis* (Butler 1875), *Ambulyx moorei* (Moore, 1858), *Daphnusa ocellaris* (Walker, 1856), *Callambulyx rubricosa* (Walker 1856), *Angonyx testacea* (Walker, 1856), *Enpinanga assamensis* (Walker, 1856), *Neogurelca hyas* (Walker, 1856), *Neogurelca himachala* (Kirby 1892), *Hippotion rosetta* (Swinhoe 1892), *Theretra nessus* (Drury, 1773), *Theretra boisduvali* (Bugnion 1839), *Theretra latreillei* (W.S. MacLeay, 1827), *Theretra silhetensis* (Walker, 1856), *Theretra oldenlandiae* (Fabricius 1775), *Theretra suffusa* (Walker, 1856), *Pergesa acteus* (Cramer, 1777), *Rhagastis castor* (Walker, 1856), *Cechenena lineosa* (Walker, 1856), *Eupanacra mydon* (Walker, 1856), *Eupanacra busiris* (Walker, 1856), *Eupanacra automedon* (Walker, 1856),

Acosmeryx shervillii (Boisduval, 1875), *Acosmeryx anceus* (Stoll, 1781), *Elibia dolichus* (Westwood 1847), *Ampelophaga dolichoides* (Felder 1874), *Ampelophaga rubiginosa* (Bremer & Grey 1852), *Daphnis nerii* (Linnaeus, 1758), *Cephanodes hylas* (Linnaeus 1771), *Macroglossum pyrhosticta* (Butler 1875), *Macroglossum sitiene* (Walker 1856).

Hawkmoths fauna of Sikkim Himalaya, India

^[12] collected total of 22 species of hawkmoths from the different zones of Sikkim Himalaya. Recorded hawkmoth fauna from study site were *Acosmeryx castanea* (Rothschild & Jordan, 1903), *Langia zenzeroides formosana* (Clark, 1936), *Acosmeryx naga* (Moore, 1858), *Marumba cristata* (Butler, 1875), *Acosmeryx sp.*, *Ambulyx cericeipennis okurai* (Okana, 1959), *Ambulyx sericeipennis (tobii Inove, 1970, Ambulyx sp., Cechenena lineosa* (Walker, 1856), *Cechenena sp., Hyles gallii* Rottemburg, 1775, *Ambulyx ochracea* (Butler, 1885), *Hyles hippophaes bienerti* (Standinger, 1874), *Macroglossinae nephele hespera* (Fabricius, 1775), *Marumba jurenica* (Rothschild & Jordan, 1912), *Meganoton sp., Rhyncholoba acteus* (Cram.), *Smerinthus kindermannii* (Lederer, 1853), *Xylophanes libya* (Druce, 1878), *Theretra nessus* (Drury, 1773), *Theretra oldenlandiae* (Fabricius, 1775), *Theretra sp.*

Hawkmoths of Nicobar, India

^[27] Updated the sphingidae checklist of nicobar with 28 species identified under 18 genera. They reported *Ambulyx tattina* (Jordan) for the first time from India. The reported species are *Agrius convolvuli convolvuli* (Linnaeus, 1758), *Meganoton nyctiphanes* (Walker, 1856), *Apocalypsis velox* Butler, 1876, *Acosmeryx shervillii* (Boisduval, 1875), *Psilogamma discistriga* (Walker, 1865), *Acherontia lachesis* (Fabricius, 1798), *Psilogamma increta* (Walker, [1865]), *Psilogamma andamanica* (Brechlin, 2001), *Cephanodes picus* (Cramer, 1777), *Daphnis hypothous crameri* (Eitschberger & Melichar, 2010), *Daphnis placida placida* (Walker, 1856), *Eupanacra busiris busiris* (Walker, 1856), *Cechenena helops helops* (Walker, 1856), *Pergesa acteus* (Cramer, 1779), *Theretra clotho* (Drury, 1773), *Theretra lucasi* (Walker, 1856), *Theretra oldenlandiae oldenlandiae* (Fabricius, 1775), *Theretra silhetensis* (Walker, 1856), *Theretra nessus* (Drury, 1773), *Hippotion celerio* (Linnaeus, 1758), *Hippotion rosetta* (Swinhoe, 1892), *Hippotion velox* (Fabricius, 1793), *Amplypterus panopus* (Cramer, 1779), *Clanis phalaris* (Cramer, 1777), *Polyptychus trilineatus* Moore, 1888, *Marumba dyrus dyrus* (Walker, 1856), *Ambulyx tattina* (Jordan, 1919), *Ambulyx substrigilis substrigilis* (Westwood, 1847).

Conclusion

The main aim of this review was to record the past and present diversity of hawkmoth fauna from different states of India. In this paper, all the published data on hawkmoths diversity from 2011-2022 is reviewed. India has a very rich fauna of hawkmoths but as compared to other moths' families, there is very less literature available on family Sphingidae. So, an attempt is made to understand the diversity patterns of hawkmoths all over India. As we know hawkmoths are very beneficial insects as they act as bioindicators of environmental health as well as are good pollinators. Further extensive surveys and systematic studies can reveal not only the presence of greater diversity of

hawkmoths but the endemism as well. Present study concluded that hawkmoths abundance is due to the host plants diversity in the area which needs to be conserved due to increasing human activities.

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