

New distributional records of Bees (Hymenoptera: Apoidea) from Purna Wildlife Sanctuary, Dang, Gujarat, India

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Abstract

The study was conducted from 2018 to 2020 to explore the distributional records of hymenopteran fauna from various localities of Purna Wildlife Sanctuary, Dang, Gujarat. The distributional records about 13 species of Hymenoptera (Apoidea) are provided covering 3 families and distributed over 07 genera, which are being reported for the first time from the Sanctuary. The species include the representatives of the families Apidae, Megachilidae and Halictidae covering seven genera viz. *Amegilla*, *Apis*, *Euaspis*, *Xylocopa*, *Nomia*, *Megachile* and *Pseudapis*.

Keywords: Apoidea, Bees, Dang, Gujarat, Hymenoptera, Purna Wildlife Sanctuary

Introduction

The order Hymenoptera includes about 1,00,000 species which contain the most advanced and highly specialized insects that show greater adaptation to the environment (Aland *et al.*, 2010). It is one of the largest orders of the class Insecta and is the most diverse group widely distributed in the state of Gujarat, India. The order Hymenoptera includes bees, wasps, horntails, sawflies, and ants. The hymenopteran species are economically, medically, and biologically very important (La Salle and Gauld, 1993; Priyadarsanan *et al.*, 1998; Byarugaba, 2004). The loss of hymenopteran pollinators would hurt food production and the maintenance of biodiversity (Klein *et al.*, 2006). The role of bees and wasps as key pollinators in both cultivated and uncultivated plants is well recognized (Watson *et al.*, 2011). The bees play an important role in ecosystem services and play a key part in the survival of terrestrial ecosystem integrity through their major role in plant reproduction (Potts *et al.*, 2009). The bees are considered indicator species and depend exclusively on the variety of flora of a particular area (Priyadarsanan, 1999).

Purna Wildlife Sanctuary, Gujarat, is located between 20°51'N 73°32'E and 21°31'N 73°48'E with an area of approx. 160.8 Square Kilometers surrounded by the Western Ghats mountain range in the states of

Maharashtra and Gujarat. The Purna Wildlife Sanctuary is very rich in moist deciduous forests and southern dry deciduous forests (Singh *et al.*, 2000; Anonymous, 2001). The topography of the sanctuary is irregular and hilly with Gira and Purna Rivers meandering through it. The northern area has the catchment of Gira while the southern area forms the catchment of Purna. Floral diversity like *Pterocarpus marsupium*, *Bombax ceiba*, *Terminalia bellirica*, *Anogeissus latifolia*, *Dalbergia latifolia*, *Terminalia tomentosa*, *Lannea cormandlica*, *Madhuca indica*, *Tectona grandis*, *Lagerstroemia parviflora*, and *Endrocalamus strictus* are predominately found across the sanctuary. Thus, the main aim of this study was to evaluate the distributional records of hymenopterans from Purna Wildlife Sanctuary, Gujarat, India.

Materials and Methods

This study is mainly based on the specimens collected from various localities of the Purna Wildlife Sanctuary, Gujarat, India. The sampling was made by sweeping a hand net and later the specimens were killed using a killing bottle containing fumes of ethyl acetate. Later on, the collected material was transferred and deposited in the National Zoological Collection at the Zoological Survey of India, Desert Regional Centre, Jodhpur, Rajasthan, India. All the collected specimens were

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stretched and pinned properly in the laboratory and were identified with the help of the literature available (Gauld and Bolton, 1988; Gupta, 1993; Michener, 2000 & 2007) and deposited at NZC, DRC, Zoological Survey of India, Jodhpur, Rajasthan.

Survey Area

Map showing the study area for the sampling of hymenopteran fauna of Purna Wildlife Sanctuary, Dang, Gujarat (Figure 1).

Sample Collection

Results

The systematic account for the identified and newly distributed species of Hymenoptera of Purna Wildlife Sanctuary is presented:

Systematic Account

Order HYMENOPTERA

Superfamily APOIDEA

Family APIDAE

Subfamily APINAE

Tribe *Apini*

Genus *Apis* Linnaeus, 1758

1. *Apis cerana* (Fabricius, 1798) (Figure 1)

Synonymy

Apis cerana Fabricius, 1793

Apis indica Fabricius, 1798

Apis socialis Latreille, 1804

Apis gronovii Guillou, 1841

Apis perrottetii Guérin-Ménéville, 1844

Apis sinensis Smith, 1865

Material examined: INDIA: Gujarat: Dang: Purna Wildlife Sanctuary: Mahal campsite, 2 exs., 20.ii.2020, 20°54.481' N, 073°38.750' E, Coll. S. Kumar & party, NZC Regd. No. 10435/A; RFC-163, Ahwa west Range, Locality-1, 2 exs., 10.xii.2020, 20° 52.103' N, 073°40.362' E. Coll. H. S. Banyal & party, NZC Regd. No. 10510/A; Compartment-175, Kalibel Range, 4 exs., 5.xii.2020, 20°54.785' N, 073°39.426' E, Coll. S. Kumar & party, NZC Regd. No. 10670/A; RFC 7, Sigana Range, 2 exs., 7.xii.2020, 20°56.817' N, 073° 35.957' E, Coll. S. Kumar & party, NZC Regd. No. 10755/A; RFC-69, Bheskatri Range, 1 ex., 7.xii.2020, 20°56.352' N, 073°33.473' E, Coll. S. Kumar & party, NZC Regd. No. 10896/A.

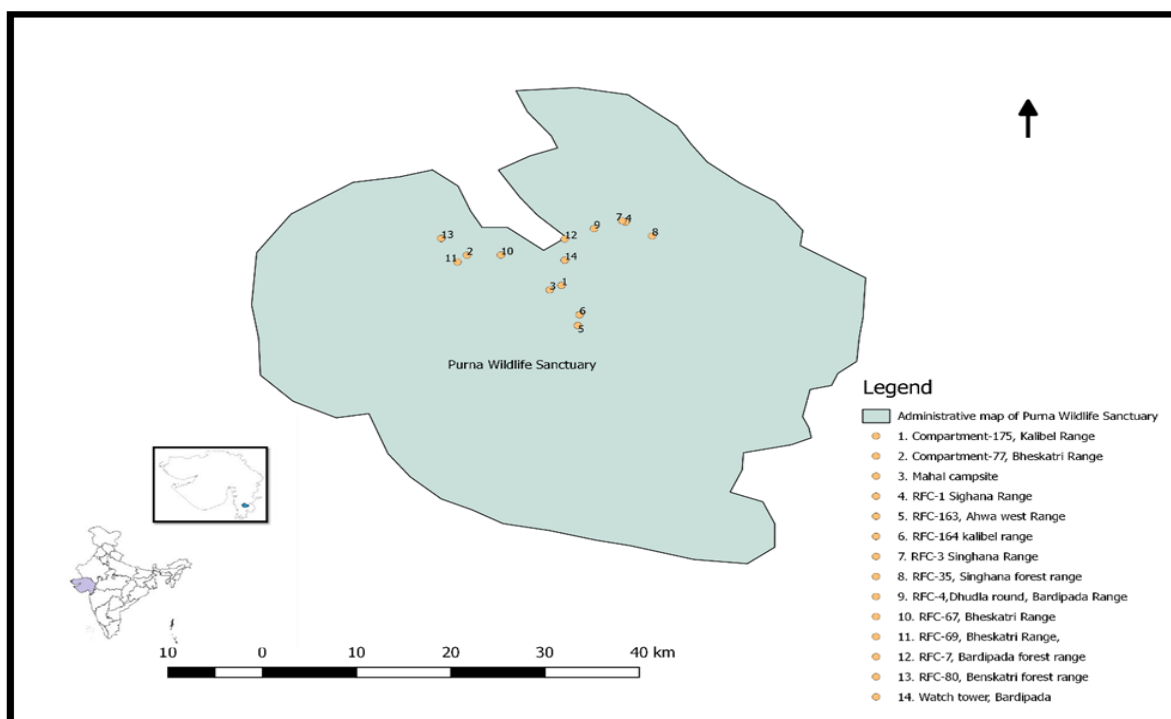


Figure 1: Map showing study area for sampling of Hymenopteran fauna of Purna Wildlife Sanctuary, Dang, Gujarat.

Distribution: All over India. **Elsewhere:** Indonesia, Pakistan, Bhutan, Nepal, Myanmar (Saini et al, 2020).

New Distribution: Recorded for the first time from Purna Wildlife Sanctuary, Dang, Gujarat.

2. *Apis florea* Fabricius, 1787 (Figure 2)

Synonymy

Apis semirufa Hoffmannsegg, 1818

Apis lobata Smith, 1854

Apis floralis Horne and Smith, 1870

Apis testacea Bingham, 1898

Apis nursei Cockerell, 1911

Micrapis florea (Fabricius) by Ashmead, 1904

Material examined: INDIA: Gujarat: Dang: Purna Wildlife Sanctuary: Mahal campsite 1 ex., 20.ii.2020, 20°54.481' N, 73°38.750' E, Coll. S. Kumar & party, NZC Regd. No. 10436/A; RFC-163, Ahwa West Range, Locality-1, 1 ex., 10.xii.2020, 20°52.103' N, 73°40.362' E, Coll. H.S. Banyal & party, NZC Regd. No. 10511/A; RFC-1 Sighana Range, 1 ex., 6.xii.2020, 20°59.019' N, 73°43.087' E, Coll. S. Kumar & party, NZC Regd. No. 10666/A; RFC-67, Bheskatri Range, 1 ex., 7.xii.2020, 20°56.817' N, 73°35.957' E, Coll. S. Kumar & party, NZC Regd. No. 10894/A.

Distribution: India: Gujarat, Rajasthan, Meghalaya, Arunachal Pradesh, Manipur, Tripura, Sikkim, Assam, Nagaland, Mizoram. **Elsewhere:** Afghanistan, Bhutan, Pakistan (Saini et al, 2020).

New Distribution: Recorded for the first time from Purna Wildlife Sanctuary, Dang, Gujarat.

Tribe *Anthophorini*

Genus *Amegilla* Friese, 1897

3. *Amegilla cingulata* (Fabricius, 1775) (Figure 3)

Synonymy

Anthophora emendata Smith, 1879

Anthophora emendata gilberti Cockerell, 1905

Anthophora lilacina Cockerell, 1921

Material examined: INDIA: Gujarat: Dang: Purna Wildlife Sanctuary: Compartment-77, Bheskatri Range, 2 exs., 8.xii.2020, 20°56.801' N, 73°34.018' E, Coll. S. Kumar & party, NZC Regd. No. 10671/A; Watch tower, Bardipada, 1 ex., 9.xii.2020, 20°56.470' N, 73°39.611'

E. Coll. S. Kumar & party, NZC Regd. No. 10751/A; RFC 7 Singhana Range, 2 exs., 7.xii.2020, 20°56.817' N, 73°35.957' E, Coll. S. Kumar & party, NZC Regd. No. 10756/A; RFC-3 Singhana Range, 2 exs., 6.xii.2020, 20°59.101' N, 73°42.899' E, Coll. S. Kumar & party, NZC Regd. No. 10892/A.

Distribution: All over India. **Elsewhere:** Myanmar, Sri Lanka, Philippines, Africa, Mediterranean basin, Canary Islands, southern Europe to Japan, Korea, and northeast China, south to Yemen, Indonesia, New Guinea, Australia, Solomon Islands, and Pakistan (Bodlah et al., 2016).

New Distribution: Recorded for the first time from Purna Wildlife Sanctuary, Dang, Gujarat.

4. *Amegilla violacea* (Lepeletier, 1841) (Figure 4)

Synonymy

Megilla albopunctata Illiger, 1806

Anthophora violacea Lepeletier 1841

Material examined: INDIA: Gujarat: Dang: Purna Wildlife Sanctuary: RFC-4, Dhudla round, Bardipada Range, 3 exs., 7.xii.2020, 20°58.579' N, 73°41.288' E, Coll. S. Kumar & party, NZC Regd. No. 10668/A.

Distribution: India: Gujarat, Delhi, Rajasthan, Tamil Nadu, West Bengal, Punjab, and Maharashtra. **Elsewhere:** Sri Lanka (Saini et al, 2020).

New Distribution: Recorded for the first time from Purna Wildlife Sanctuary, Dang, Gujarat.

Tribe *Xylocopini*

Genus *Xylocopa* Latreille, 1802

5. *Xylocopa fenestrata* (Fabricius, 1798) (Figure 5)

Synonymy

Apis fenestrata Fabricius, 1798

Xylocopa gardineri Cameron, 1902

Material examined: INDIA: Gujarat: Dang: Purna Wildlife Sanctuary: FRC-35, Singhana forest range, 1 ex., 21.ii.2020, 20°58.094" N, 73°44.610" E, Coll. S. Kumar & party, NZC Regd. No. 10439/A; FRC-7, Bardipada forest range, 2 exs., 18.ii.2020, 20°57'88.9" N, 73°39'60.8" E, Coll. S. Kumar & party, NZC Regd. No. 10443/A; RFC-163, Ahwa west Range, Locality-1, 4 exs., 10.xii.2020, 20°52.103' N, 73°40.362' E, Coll. H. S. Banyal & party, NZC Regd. No. 10512/A; RFC-1 Sighana Range, 2 exs., 6.xii.2020, 20°59.019' N, 73°43.087' E, Coll. S. Kumar & party,

NZC Regd. No. 10665/A; Watch tower, Bardipada, 1 ex., 9.xii.2020, 20°52.103' N, 73°40.362' E, Coll. S. Kumar & party, NZC Regd. No. 10750/A; Compartmt-77, Bheskatri Range, 2 exs., 8.xii.2020, 20°56.801' N, 73°34.018' E, Coll. S. Kumar & party, NZC Regd. No. 10752/A; RFC 7 Sigana Range, 1 ex., 7.xii.2020, 20°56.817' N, 73°35.957' E, Coll. S. Kumar & party, NZC Regd. No. 10753/A; RFC-164, 1 ex., 10.xii.2020, 20°52.823' N, 73°40.461' E, Coll. S. Kumar & party, NZC Regd. No. 10761/A.

Distribution: India: Andhra Pradesh, Bihar, Delhi, Goa, Haryana,

Jharkhand, Jammu and Kashmir, Karnataka, Kerala, Maharashtra, Madhya Pradesh, Odisha, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh, Uttarakhand, and West Bengal. *Elsewhere:* Afghanistan, China, Iraq, Iran, Madagascar, Maldives, Myanmar, Nepal, Pakistan, and Sri Lanka (Putatunda & Kapil, 1988; Ascher & Gupta, 2019).

New Distribution: Recorded for the first time from Purna Wildlife Sanctuary, Dang, Gujarat.

6. *Xylocopa violacea* (Linnaeus, 1758) (Figure 6)

Synonymy

Xylocopa femorata Fabricius, 1804

Material examined: INDIA: Gujarat: Dang: Purna Wildlife Sanctuary: FRC-80, Bheskatri forest range, 1 ex., 19.ii.2020, 20°57.927" N, 73°32.545" E, Coll. S. Kumar & party, NZC Regd. No. 10437/A; RFC-4, Dhudla round, Bardipada Range, 1 ex., 7.xii.2020, 20°58.579' N, 73°41.288' E, Coll. S. Kumar & party, NZC Regd. No. 10668/A; RFC-164, 1 ex., 10.xii.2020, 20°52.823' N, 73°40.461' E, Coll. S. Kumar & party, NZC Regd. No. 10762/A.

Distribution: India: Himachal Pradesh, Chhattisgarh, Punjab, Jammu & Kashmir, Tamil Nadu. *Elsewhere:* Antigua, Barbuda, Albania, Austria, Algeria, Belgium, Azerbaijan, Belize, Bosnia, Herzegovina, Bulgaria, France, Georgia, Greece, Germany, Iraq, Hungary, Iran, Israel, Ireland, Italy, Luxembourg, Jordan, Macedonia, Macedonia, Poland, Morocco, Portugal, Slovakia, Romania, Spain, Slovenia, Sweden, Switzerland, Syria, Tunisia, Tajikistan, Turkey, Ukraine, United Kingdom (Ascher & Gupta, 2019).

New Distribution: Recorded for the first time from Purna Wildlife Sanctuary, Dang, Gujarat.

Family MEGACHILIDAE

Subfamily MEGACHILINAE

Tribe ANTHIDIINI

Genus *Euaspis* Gerstaecker, 1858

7. *Euaspis carbonaria* (Smith, 1854) (Figure 7)

Synonymy

Stelis carbonaria Smith, 1854

Parevaspis carbonaria (Smith, 1854)

Material examined: INDIA: Gujarat: Dang: Purna Wildlife Sanctuary: FRC-80, Bheskatri forest range, 2 examples, 19.ii.2020, 20°57.927" N, 73°32.545" E, Coll. S. Kumar & party, NZC Regd. No. 10438/A.

Distribution: India: Arunachal Pradesh, Andhra Pradesh, Gujarat, Bihar, Haryana, Jharkhand, Himachal Pradesh, Maharashtra, Madhya Pradesh, Punjab, Odisha, Rajasthan, Uttar Pradesh, Uttarakhand, and West Bengal. *Elsewhere:* Pakistan, Sri Lanka and Myanmar (Gupta, 1993; Saini *et al*, 2019).

New Distribution: Recorded for the first time from Purna Wildlife Sanctuary, Dang, Gujarat.

Tribe *Megachilini*

Genus *Megachile* Latreille, 1802

8. *Megachile cephalotes* Smith, 1853 (Figure 8)

Synonymy

Chalicodoma (*Callomegachile*) *cephalotes* (Smith, 1853)

Material examined: INDIA: Gujarat: Dang: Purna Wildlife Sanctuary: RFC-69, Bheskatri Range, 1 ex., 7.xii.2020, 20°56.352' N, 73°33.473' E, Coll. S. Kumar & party, NZC Regd. No. 10895/A.

Distribution: India: Chhattisgarh, Chandigarh, Haryana, Gujarat, Jammu & Kashmir, Himachal Pradesh, Kerala, Jharkhand, Maharashtra, Punjab, Madhya Pradesh, Rajasthan, Tamil Nadu, Uttarakhand, West Bengal. *Elsewhere:* Pakistan (Batra, 1967; Gupta, 1993; Saini *et al*, 2019).

New Distribution: Recorded for the first time from Purna Wildlife Sanctuary, Dang, Gujarat.

9. *Megachile disjuncta* Fabricius, 1781 (Figure 9)

Synonymy

Apis disjuncta Fabricius, 1781

Trachusa disjuncta (Fabricius, 1781)

Chalicodoma (*Callomegachile*) *disjunctum* (Fabricius, 1781)

Material examined: INDIA: Gujarat: Dang: Purna Wildlife Sanctuary: RFC 7 Sigana Range, 1 ex., 7.xii.2020, 20°56.817' N, 073°35.957' E, Coll. S. Kumar & party, NZC Regd. No. 10754/A.

Distribution: India: Bihar, Arunachal Pradesh, Gujarat, Chandigarh, Haryana, Himachal Pradesh, Maharashtra, Jammu & Kashmir, Punjab, Puducherry, Tamil Nadu, Sikkim, Uttarakhand, Uttar Pradesh. *Elsewhere:* Japan, Bhutan, Madagascar, Indonesia, Mauritius, China, Nepal, Seychelles, Myanmar, Thailand, Sri Lanka, Vietnam (Saini et al, 2019).

New Distribution: Recorded for the first time from Purna Wildlife Sanctuary, Dang, Gujarat.

10. ***Megachile lerma*** Cameron, 1908 (Figure 10)

Synonymy

Chalicodoma (*Callomegachile*) *lerma* (Cameron, 1908)

Material examined: INDIA: Gujarat: Dang: Purna Wildlife Sanctuary: RFC-72, Bheskatri Range, 1 ex, 8.ix.2021, 20°57.720' N, 073°34.943' E, Coll. I. Sharma & party, NZC Regd. No. 12287/A.

Distribution: India: Gujarat, Maharashtra, Karnataka and Chandigarh (Kumari & Kumar, 2014; Veereshkumar, 2015; Saini et al., 2020; Ascher & Pickering, 2021).

New Distribution: Recorded for the first time from Purna Wildlife Sanctuary, Dang, Gujarat.

Family HALICTIDAE

Subfamily NOMIINAE

Genus ***Nomia*** Latreille, 1804

11. ***Nomia aurata*** Bingham, 1897 (Figure 11)

Synonymy

Gnathonomia aurata (Bingham, 1897)

Nomia nasicana Cockerell, 1911

Material examined: INDIA: Gujarat: Dang: Purna Wildlife Sanctuary: RFC-1 Sighana Range, 1 ex., 6.xii.2020, 20°59.019' N, 073°43.087' E, Coll. S. Kumar & party, NZC Regd. No. 10667/A.

Distribution: India: Puducherry, Karnataka, Uttarakhand; Tamil Nadu. *Elsewhere:* China, Myanmar, Cambodia, Laos, Malaysia, Thailand (Pauly, 2009; Saini et al, 2019)

New Distribution: Recorded for the first time from Purna Wildlife Sanctuary, Dang, Gujarat.

12. ***Nomia curvipes*** (Fabricius, 1793) (Figure 12)

Synonymy

Andrena curvipes Fabricius, 1793

Nomia indica Lepeletier, 1841

Nomia combusta Smith, 1875

Nomia calida Westwood, 1875

Nomia varipes Cameron, 1898

Nomia eburnigera Cockerell, 1911

Nomia histrionica Cockerell, 1919

Material examined: INDIA: Gujarat: Dang: Purna Wildlife Sanctuary: RFC-3 Singhana Range, 6 exs., 6.xii.2020, 20°59.101' N, 073°42.899' E, Coll. S. Kumar & party, NZC Regd. No. 10893/A.

Distribution: India: Tamil Nadu, Punjab, Pondicherry, Gujarat, Uttar Pradesh. *Elsewhere:* Sri Lanka (Saini et al, 2020).

New Distribution: Recorded for the first time from Purna Wildlife Sanctuary, Dang, Gujarat.

Genus ***Pseudapis*** Kirby, 1900

13. ***Pseudapis oxybeloides*** (Smith, 1875) (Figure 13)

Synonymy

Nomia oxybeloides Smith, 1875

Nomia latispina Cameron, 1898

Nomia lepidota Cockerell, 1905

Nomia biroi Friese, 1913

Material examined: INDIA: Gujarat: Dang: Purna Wildlife Sanctuary: RFC 7 Sigana Range, 2 exs., 7.xii.2020, 20°56.817' N, 073°35.957' E, Coll. S. Kumar & party, NZC Regd. No. 10763/A.

Distribution: India: Punjab, Madhya Pradesh, Rajasthan, Tamil Nadu, West Bengal, Gujarat *Elsewhere:* Pakistan, Sri Lanka, Bangladesh (Saini et al, 2019).

New Distribution: Recorded for the first time from Purna Wildlife Sanctuary, Dang, Gujarat.

		
Figure 1. <i>Apis cerana</i> (Fabricius, 1798).	Figure 2. <i>Apis florea</i> Fabricius, 1787.	Figure 3. <i>Amegilla cingulata</i> (Fabricius, 1775).
		
Figure 4. <i>Amegilla violacea</i> (Lepeletier, 1841).	Figure 5. <i>Xylocopa fenestrata</i> (Fabricius, 1798).	Figure 6. <i>Xylocopa violacea</i> (Linnaeus, 1758).
		
Figure 7. <i>Euaspis carbonaria</i> (Smith, 1854).	Figure 8. <i>Megachile cephalotes</i> Smith, 1853.	Figure 9. <i>Megachile disjuncta</i> Fabricius, 1781.
		
Figure 10. <i>Megachile lerma</i> Cameron, 1908.	Figure 11. <i>Nomia aurata</i> Bingham, 1897.	Figure 12. <i>Nomia curvipes</i> (Fabricius, 1793).
		
Figure 13. <i>Pseudapis oxybeloides</i> (Smith, 1875).		

Plate 1. Photographs of the species recorded from Purna WL Sanctuary, Gujarat

Discussion

The present study was carried out in Purna Wildlife Sanctuary, Gujarat from 2018 to 2020, and 64 specimens were collected from the surveyed area. The specimens were identified up to species level and it was reported the occurrence of thirteen species of hymenopteran bees belonging to seven genera *Amegilla*, *Apis*, *Euaspi*, *Xylocopa*, *Nomia*, *Megachile* and *Pseudapis* are recorded first time from Purna Wildlife Sanctuary, Gujarat. The terrain of the sanctuary is more favourable for these species. Most of the fauna present in this ecosystem can be observed in the evening and early morning hours only. So, different faunal groups mainly entomofauna were observed as per standard methodologies mostly during the said period. The Sanctuary includes many unique

animals, particularly insects. The present scheme can be extended in the adjoining areas of the sanctuary to know the insect diversity in a wholesome scenario with special reference to hymenopteran pollinators.

Photographs of all species are shown in Plate 1.

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