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## Wild sericigenous insect diversity of Hoollongapar Gibbon Sanctuary, Jorhat, Assam

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### Abstract

A periodic survey was conducted during 2013-2015 to explore the diversity of wild sericigenous insects, i.e. silk producing moths, at Hoollongapar Gibbon Sanctuary, Jorhat, Assam. This study revealed presence of six species of wild sericigenous insects belonging to five genera viz., *Antheraea*, *Samia*, *Actias*, *Attacus* and *Cricula*. It emphasizes the importance of lesser known sericigenous insect diversity of the study area and advocates for their conservation in their ecological environment.

**Keywords:** *Antheraea*, *Samia*, *Actias*, *Attacus*, *Cricula*, host plant, conservation

### 1. Introduction

The moth family Saturniidae comprises at least 1800 species worldwide <sup>[1-3]</sup> of which approximately 1400 species have been described <sup>[4]</sup>. The Saturniidae are of great economic importance, because they include species which produce silk of commercial value. Comprehensive work on sericigenous insects of different regions of the Sub-Himalayan belt of India was carried out by various workers <sup>[5-10]</sup>. It was also reported that about 80 species occur in Asia and Africa that produce wild silk of economic value <sup>[7]</sup>. The salubrious climate of North-Eastern Region of India makes it an ideal home for a number of wild sericigenous insects, as well as domesticated silkworms. A few recent studies <sup>[11-14]</sup> on wild sericigenous insects in the North-Eastern India are available. However, there is no detailed information on the sericigenous insect diversity of Hoollongapar Gibbon Sanctuary, Jorhat (Assam). The sanctuary has a rich biodiversity and is a special habitat for Western Hoolock Gibbon (*Hoolock hoolock*), an ape of India, along with other six primate species found in the N.E. India <sup>[15-17]</sup>. Two hundred nineteen species of birds <sup>[16]</sup>. 172 species of butterflies <sup>[18]</sup> and 95 species of spiders <sup>[19]</sup> have also been recorded from this sanctuary. But till now, no such work has been done to explore the diversity of sericigenous insects. Therefore, a periodic survey was carried out in Hoollongapar Gibbon Sanctuary during 2013-2015 to find out the diversity of wild sericigenous insects and their host plants in this study area.

### 2. Materials and Methods

**2.1 Study area:** Hoollongapar Gibbon Sanctuary lies between 26°40' - 26°45' N and 94°20' - 94°25' E on the southern bank of the river Brahmaputra in Jorhat District of Assam with an area of 20.98 km<sup>2</sup>. <sup>[20, 16]</sup> The forest type of the Sanctuary is Assam plains alluvial semi evergreen forests, sparsely interspersed with wet evergreen forest patches <sup>[20]</sup>. Out of this 20.98 km<sup>2</sup> of the sanctuary, 19.49 km<sup>2</sup> area is covered by tropical semi-evergreen forest <sup>[19]</sup>. The area situated at an elevation of 100-120 m. <sup>[19]</sup> The average rain fall is about 249 cm <sup>[16]</sup> and the average temperature varies from 5 °C (min.) to 38 °C (max.) <sup>[19]</sup>.

**2.2 Survey method and identification procedure:** A periodic survey was conducted with line transects <sup>[21]</sup> method during 2013-2015 for the present study. Transects were chosen in random with semi-quantitative sampling methods to record the sericigenous insects. Sericigenous insects were searched for maximum three hours (1500-1800 hrs) in each compartment, extending the search with different compartment sizes. The survey includes visual searching for the sericigenous insects. During the study period photographs of the moths with the different stages and their host plants were recorded. Collection of specimens is restricted in the Wildlife Sanctuaries and National Parks as per WPA 1972 of India. Therefore, observation and photography is the only way for the authors to identify wild sericigenous insects.

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Based on the available literature on Asian Saturniidae [22-24, 9, 4, 13, 14] the wild sericigenous insects were identified.

### 3. Results and Discussion

During the study period a total of six species of wild sericigenous insects (Table 1; Plates 1-9) belonging to five genera viz., *Antheraea assamensis* (Helfer), *Samia canningi* (Hutton), *Actias selene* (Hübner), *Actias maenas* Doubleday, *Attacus atlas* (Linnaeus), *Cricula trifenestrata* (Helfer) have been recorded from Hoollongapar Gibbon Sanctuary. The host plants of some of these species have also been recorded (Table 1). The distribution of host plants is a major factor of the distribution of sericigenous insects. Most of these host plants are endemic in the sanctuary. Therefore, identification of important ecological zones or habitats of host plants and their conservation will indirectly lead to conservation of wild sericigenous insects. Indigenous knowledge and ethno-botanical values of host plants by local communities may be utilized for bio-diversity conservation. Human interference should be prevented legally for bio-diversity erosion.

Of these 6 silk moths that we found, *Antheraea assamensis* is the well-known and valuable muga silk moth of Assam, *Samia canningi* is the wild ancestor of the eri silkmoth (*Samia ricini* (Wm. Jones)) and therefore a valuable genetic resource for eri culture, and the silks of *Attacus atlas*, *Actias selene*, and *Cricula trifenestrata* have all been occasionally exploited on small scales in several places in tropical Asia (Plates 10-13) [2, 3, 9].

Aroora and Gupta [22] enlisted 17 species of silk moths from India. According to Singh and Suryanarayana [25] India's wild silk moth bio-diversity consists of 47 species. Kakati and Chutia [11] reported 14 species of wild sericigenous insects belonging to 8 genera from Nagaland, India. Devi *et al.* [12] reported 15 species of sericigenous insects belonging to 2 families from Manipur, India. Kalita and Dutta [13] enlisted 12 species of sericigenous insects belonging to 8 genera and 2 families from Assam. Shangpliang and Hajong [14] recorded 15 species of wild silk moths belonging to nine genera from Khasi Hills of Meghalaya.

Present study revealed 6 wild sericigenous insect species in Hoollongapar Gibbon Sanctuary. It represents 50% of

sericigenous insect diversity of Assam recorded by Kalita and Dutta [13]. On the other hand, the study area represents 40% of total diversity of sericigenous insects of Khasi Hills of Meghalaya and Manipur, India. Hoollongapar Gibbon Sanctuary is a small pocket with an area of 20.98 km<sup>2</sup>. This small pocket represents 42.86% of total diversity of sericigenous insects found in Nagaland. The present study shows that Hoollongapar Gibbon Sanctuary has 12.77% diversity of wild silk entomofauna of India.

The genetically useful and important traits of these wild silk moths such as hibernation, reelability may be a sound basis for all future breeding programmes of other domesticated silk moths in evolving commercially and economically desirable improved strains of species [26]. The moths exhibit diversity in their life cycle from egg to adult moth with variations in shape, size and colour among different species. The diversity shows the capacity of the silk moths to adjust to different ecological conditions and reveals the potentiality and genetic adaptability through interaction with environment to struggle and sustain in varying ecological niches [11].

Holloway [27] studied moth as indicator organism for categorizing rain forest and monitoring change and regeneration process. Kitching *et al.* [28] reported moth assemblage as indicators of environmental quality in Australian rain forest. Human intervention to natural forest eco-system leads to rapid erosion of biodiversity [29]. During last five century earth has lost 200 known animal species and 400 known plant species each year [30]. The extinction rate was extraordinarily high with an annual extinction rate of 27,000 species i.e. one species in every twenty minutes [31]. High depletion of natural habitats in the North Eastern Region of India poses a threat to the endemic species throughout the region [32]. Most of the wild silk moths in the family Saturniidae are distributed and confined within South-East Asia [33]. There is no scope of *in-vitro* maintenance of wild silkworm strain due to lack of any domesticated character encoding genes. Further, they are quite susceptible to human handling. Therefore, *in-situ* conservation and maintenances is the only way to restore wild silkworm strain and to germplasm diversity [32].

**Table 1:** Wild Silk moths of Hoollongapar Gibbon Sanctuary, Jorhat, Assam and their Host Plants

S. No.	Silkmoth Species	Host Plants	Local Name
1	<i>Antheraea assamensis</i> (Helfer)	<i>Persea bombycina</i> King	Som
		<i>Litsea monopetala</i> Roxb.	Soalu
		<i>Litsea salicifolia</i> Roxb.	Dighloti
		<i>Litsea citrata</i> Blume	Mejankari
		<i>Actinodaphne obovata</i> (Nees) Blume	Patihonda
		<i>Michelia champaca</i> L.	Titachapa
		<i>Symplocos oxyphylla</i> Wall. ex. DC	Bhomroti
		<i>Zanthoxylum rhesta</i> (Roxb.) DC	Bajramoni
		<i>Gmelina arborea</i> Roxb.	Gamari
		<i>Litsea nitida</i> Roxb.	Katholua
2	<i>Samia canningi</i> (Hutton)	<i>Heteropanax fragrans</i> (Roxb.) Seem	Kesseru
		<i>Ailanthus grandis</i> Prain	Barpat
		<i>Manihot esculenta</i> Crantz	Simalu alu
		<i>Jatropha curcas</i> L.	Bhotera
		<i>Anthocephalus cadamba</i> Miq.	Kadam
3	<i>Actias selene</i> (Hübner)	<i>Azadirachta indica</i> A. Juss.	Mahaneem
		<i>Terminalia arjuna</i> (Roxb. ex. DC) W & A	Arjun
4	<i>Attacus atlas</i> (Linnaeus)	<i>Litsea salicifolia</i> Roxb.	Dighloti
		<i>Dillenia indica</i> L.	Outenga
5	<i>Cricula trifenestrata</i> (Helfer)	<i>Mangifera indica</i> L.	Aam
		<i>Persea bombycina</i> King	Som
6	<i>Actias maenas</i> Doubleday	<i>Azadirachta indica</i> A. Juss.	Mahaneem
		<i>Terminalia arjuna</i> (Roxb. ex. DC) W & A	Arjun



Plate 1: ♀ *Cricula trifenestrata*



Plate 2: ♂ *Cricula trifenestrata*



Plate 3: ♀ *Antheraea assamensis*



Plate 4: ♂ *Antheraea assamensis*



Plate 5: ♀ *Samia canningi*



Plate 6: ♂ *Samia canningi*



Plate 7: ♂ *Actias selene*



Plate 8: *Attacus atlas*





Plate 9: ♂ *Actias maenas*



Plate 10: Cocoon of *Cricula trifenestrata*



Plate 11: Cocoon of *Attacus atlas*



Plate 12: Larva of *Samia canningi*



Plate 13: Larva of *Cricula trifenestrata*

Plate: Wild sericigenous insects of Hoollongapar Gibbon Sanctuary, Jorhat, Assam

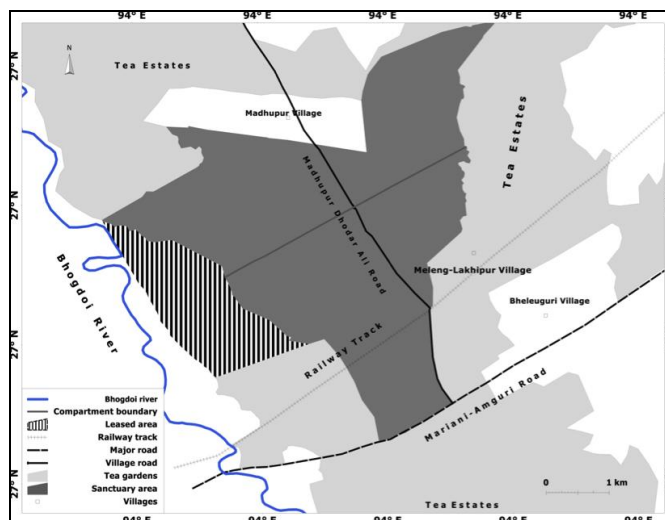


Fig 1: Map of Hoollongapar Gibbon Sanctuary, Jorhat, Assam

#### 4. Conclusion

A total of six species of wild sericigenous insects and nineteen species of their host plants have been recorded from Hoollongapar Gibbon Sanctuary. It will help in indexing the existing wild silk moths and their food plants in the study area. Hoollongapar Gibbon Sanctuary is a small pocket of biodiversity and mapping out of this area as a habitat of wild silk moths will help to develop policy for *in-situ* conservation and it will lead in developing *ex-situ* back up of wild silk moths. On the other hand, present study will help the authority to develop database on seri-biodiversity of the study area and it may help in developing legal framework for conservation purpose. It is known to all that without mass participation of the people living in the fringe area of any wildlife sanctuary, conservation of any species is not possible. Therefore, this study may help the local people to know about the diversity of wild sericigenous insects in their locality and help them to understand their responsibilities for its conservation.

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