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A new record of six larval instars in *Attacus atlas* L. (Saturniidae) from North Eastern India

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Abstract
Attacus atlas, popularly known as Atlas moth is a polyphagous wild silkmoth found throughout the Asia is a source of vanya silk commonly known as "Fagara silk" in India and "Kotkori Muga" in Assam. The life history was conducted on *Citrus lemon*, a 5th moult and 6 six larval instars were observed. The longest larval duration was observed in the 6th instar which was 14 to 15 days followed by third and fifth instar larva. Total larval duration was 72-79 days. Highest body weight of 6th instar larvae of *Attacus atlas* was found to be 30.39 g.

Keywords: *Attacus atlas*, life history, moultinism, vanya silk.

1. Introduction
Sericigenous insect have been an object of research since many centuries as they produce commercial silk. There are over 1500 sericigenous species belonging to the family Saturniidae [1]. *Attacus atlas* L. is a wild silkmoth popularly known as "Atlas Moth" or Deo Muga or Kotkari muga in Assam. It is widely distributed in south eastern Asia, and abundantly found in India and Indian Ocean Archipelago [2, 3]. The genus *Attacus* L. containing the largest moths of the world comprises of 15 known species [2]. Out of this only one species, namely *Attacus atlas* is known to occur in India [4]. The silk of this moth is secreted as broken strands having greater durability and used to make fine decorations in fabrics.
The larvae of *A. atlas* is highly polyphagous and fairly good number of references are available about the host plant diversity and distribution of *A. atlas* [2, 3 5, 12]. The larval duration for *A. atlas* was ranged from 32 to 45 days on *Sapium insigne* Benth [13]. but it could range from 50 to 58 days in Indonesian climate while reared on Clove plant [14]. Since the genus *Attacus* belongs to the largest moths of the world, it was not uncommon to observe 5 moults in some of the species. It is necessary to attain the size and for physiological development. Veenakumari *et al.*, [15] reported 5 moults in *A. mcmulleni* with a larval duration of 43 days reared on the leaves of *Rhizophora apiculata*, *Rhizophora mucronata*, *Zanthoxylum* sp. and *Vitex glabra*. Biology of *Attacus atlas* was studied by many researchers in the climatic condition of NE India [12, 16, 17] in different host plants. Nevertheless, there is no information of life history and bionomics of *A. atlas* on *Citrus lemon* is available from North Eastern India. Hence a study was carried out to evaluate the biology and bionomics of *A atlas* feeding on *Citrus lemon*, which reveals that *A. atlas*, has a 5th moult and 6 larval instars.

Materials and Method
Initially a female gravid moth was collected from Samaguri area of Nagaon district of Assam and kept in the moth cage at Molecular Biology and Seri-Biotechnology Laboratory of Department of Zoology, Nowgong College, Nagaon, Assam at room temperature. Fortunately, it was fertile and laid eggs. The oval, dorsoventrally flattened, dull white coloured eggs were collected and incubated at room temperature. After 10 days of incubation period the newly hatched larvae were released on *Citrus lemon* plant. The larvae were reared on the same tree under nylon net cover till cocooning. Morphometric parameters were recorded and mean values and standard deviation were calculated from computed data.

Results and Discussion
Egg: The eggs are oval, slightly flattened dorsoventrally, pinkish grey with a brownish strip and polygonal punctuations. The eggs measure 0.26 ± 0.009 cm and 0.24± 0.007 cm in length and breadth respectively and weight is about 0.0078± 0.001 g. The embryonic period is 10-11 days.

1st instar: Head is smooth and black. Body is pinkish grey with brownish strips. Black irregular markings can be seen on the inter-segmental region. Tubercles are whitish with black setae. The larvae measures 1.12 ± 0.28 cm and 0.19± 0.07 cm in length and breadth respectively and weight is about 0.017± 0.02 g. The first instar larval duration is 4-5 days.

2nd instar: The larva is dull white irregular markings and whitish tubercles. Deep orange elongated markings appear on anterior and posterior lateral region of the body. Pro-thoracic hood is soft, transparent and whitish in colour. The larvae measures 1.96 ±0.40 cm and 0.72±0.29 cm in length and breadth respectively and weight 0.32 ±0.10 g. Duration of this stage is 8-10 days.

3rd instar: The body is icy white to greenish with or without white fleshy tubercles. The length, breadth and weight of the larvae are 3.82±1.14 cm, 1.2±0.22 cm and 3.612±0.98 g respectively. Instar duration is 13-14 days.

4th instar: The larva is greenish and the whole body is covered with lime like powder. The length, breadth and weight are 6.38±0.69 cm, 1.8±0.28 cm and 18.0±0.28 g respectively. This instar lasts for 10-11 days.

5th instar: The larval body is greenish, but covered with a lime like sticky powder. The dorsal tubercles are whitish; whereas lateral tubercles are blue with black tips. The thoracic legs are conical and carry sharp distal claws. Each abdominal segment from 6th to 9th bears a pair of abdominal legs, which are fleshy and flat at the end. Terminal end looks like a disc with a series of inwardly curved hooks arranged in a semi circle. While dorsal tubercles project backward, the lateral tubercles project forward. The length, breadth and weight are 10.06 ± 0.82 cm, 2.08 ± 0.11 cm and 25.08 ± 1.22 g respectively. This instar lasts for 12-13 days.

6th instar: The larva is same as the fifth instar larva. The difference is observed in terms of size, weight and larval duration only in sixth instar. The length, breadth and weight are 12.8 ± 0.89cm, 2.87 ± 0.11cm and 30.39 ± 1.5 g respectively with a larval duration of 14-15 days.

Pupa and cocoon: Pupa is reddish brown in colour. The length, breadth and weight is 3.44 ± 0.48 cm, 1.96 ± 0.28 cm and 11.29 ± 0.79 g in male and 5.12 ± 0.31 cm, 2.56 ± 0.15 cm and 13.86 ± 0.65 g in female pupa respectively. Pupal diapause is observed in winter. Cocoons are grey in colour and elongated. Distinct peduncle is found. The length, breadth and weight are 8.2 ± 1.02 cm, 2.8 ± 0.22 cm and 12.98± 0.89 g for male cocoon and 9.24 ± 1.18 cm, 3.46 ± 0.32 cm, 15.65 ± 0.66 g in female.

Adult: The ground colour of both male and female moth is red orange to tomato red. The basal area of the forewing has brown edges with red and pale black lines and middle area is red brown. A large transparent hyaline spot is present at the end of the cell with black edge. Apical area has yellow to pink shade. A yellow brown marginal band with a highly wavy black line is present in both the fore and hind wings. The wing span of the male and female moths is 19.1-25.5 cm and 20.9-27.4 cm respectively. The orange brown coloured antenna is about 19 to 20 mm in length and 3 to 4 mm in breadth.

Table 1: Morphometric parameters of *Attacus atlas* feeding on *Citrus lemon*

Sl No	Stages		Morphometric characters (Mean ± SD)				Duration (Days)
			Description of different stages	Length (cm)	Breadth (cm)	Weight (g)	
1	Egg		Dull white, dorsoventrally flattened	0.26 ± 0.009	0.24 ± 0.007	0.0078± 0.001	10 to 11
2	Larval Instars	1st	Pinkish grey with a brownish strip. Black irregular markings on the inter-segmental region	1.12 ± 0.28	0.19 ± 0.07	0.017 ± 0.02	4 to 5
		2nd	Dull white with black irregular marking. Deep orange marking appear on anterior and posterior lateral region of body	1.96 ± 0.40	0.72 ± 0.29	0.323 ± 0.10	8 to 10
		3rd	Icy white to greenish	3.82 ± 1.14	1.2 ± 0.22	3.612 ± 0.98	13 to 14
		4th	Greenish, body is covered with lime like powder	6.38 ± 0.69	1.8 ± 0.28	11.56 ± 0.28	10 to 11
		5th	Greenish, Dorsal tubercles are white and laterals are blue with black strip	10.06 ± 0.82	2.08 ± 0.11	25.08 ± 1.22	12 to 13
		6th	Greenish, Dorsal tubercles are white and laterals are blue with black strip	12.8 ± 0.89	2.87 ± 0.11	30.39 ± 1.5	14 to 15
3	Pupa	Male	Reddish Brown	3.44 ± 0.48	1.96 ± 0.28	11.29 ± 0.79	21-25 (Pupal diapause)
		Female	Reddish Brown	5.12 ± 0.31	2.56 ± 0.15	13.86 ± 0.65	23-27 (Pupal diapause)
4	Cocoon	Male	Grey	8.2 ± 1.02	2.8 ± 0.22	12.98± 0.89	5 to 6
		Female	Grey	9.24 ± 1.18	3.46 ± 0.32	15.65 ± 0.66	8 to 10

Fig 1: Different Stages of *Attacus atlas*

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References

1. Nassig WA, Lempe REJ, Kager S. Heterocera Sumatrana. The Saturniidae of Lepidoptera, 1996, 10.
2. Peigler RS. A revision of the Indo-Australian genus Attacus. Lepidoptera Research Foundation, Inc. Beverly Hills, California, 1989.
3. Lampe REJ. Die Saturniiden der Cameron-und Genting-Highlands in West Malaysia (Lepidoptera: Saturniidae). Neue Entomologische Nachrichten. 1984; 11:16.8 col.pls.

4. Arora GS, Gupta IJ. Taxonomic studies of some of the Indian non-mulberry silk moths (Lepidoptera: Saturniidae) Memoirs Zool. Surv. India. 1979; 16:1-63.
5. Jolly MS, Sen SK, Sonwalkar TN, Prashad GK. Non-Mulberry Sericulture, FAO, 1979, 4.
6. Chowdhury SN. Muga Silk Industry. Directorate of Sericulture, Govt. of Assam, 1981, 8-11.
7. Thangavelu K. Wild sericigenous insect of India- a need for conservation. Wild silk moths. 1991, 71-77.
8. Bhattacharya A, Singh BK, Das PK. Biodiversity of wild silk moths in Assam (North East India) Annals of Forestry. 2004; 12:208-216.
9. Singh KC, Suryanarayan N. Wild silk moth wealth of India. In; Advances in Tropical Sericulture (eds. S.B. Dandin *et al*.). Central Sericultural Research & Training Institute, Mysore, 2005, 419-421.
10. Singh KC, Chakravorty R. Seri-biodiversity of North-Eastern India-an update. In: Biodiversity Conservation and Future Concern. (eds.) J.P. Handique and M.C. Kalita, Guwahati University, Guwahati, 2006, 8-19.
11. Sahu AK, Bindroo BB. Wild silk moth Biodiversity in the North Eastern Region of India: Need for Conservation. Indian Silk, 2007, 16-19.
12. Chutia BC, Kakati LN, Singh KC. Biodiversity of wild silk moths in Nagaland. J Bombay Nat Hist Soc. 2009; 106(1):112-117.
13. Bhawane GP, Mamlayya AB, Koli YJ, Phondei YA, aland SR, Gaikwad SM. Life History of *Attacus atlas* Linn (Saturniidae: Lepidoptera) on Sapium insigne Benth. From western Ghats, Maharastra. The Bioscan. 2011; 6(3):497-500.
14. Nazar A. The biology of *Attacus atlas* Linn, a pest of Clove leaves. Pemberitaan Penititian Tanaman Industri. 1990; 16(1):35- 37.
15. Veenakumari K, Mohanraj P, Peigler RS. Life history of *Attacus memulleni* (Saturniidae) from the Andaman Islands, India. Journal of Research on the Lepidoptera. 1992; 31(3-4):169-179.
16. Sarkar BN, Chutia BC, Ghose J, Barah A. Life History of *Attacus atlas* L. (Lepidoptera: Saturniidae) in *Litsea monopetala* Juss. In North-East India. J Bombay Nat Hist Soc. 2010; 107(1):42-44.
17. Saikia B, Handique R. Biology of a wild silkmoth, *Attacus atlas* L. International Journal of Wild silk Moths and Silk. 2000; 5:345-347.