Life Cycle of Non Mulberry Silkworms

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NON MULBERRY SILKWORMS

TASAR	MUGA	ERI
WILD	SEMI DOMESTICATED	DOMESTICATED
Tropical Silkworm *A. Mylitta*, (India) Temperate Silkworm *A. Proyli*, (India) *A. Pernyi*, (China, Russia) *A. Yamamai*, Japan)	*A. assamensis*	*Philosamia ricini*

Tasar Silkworm

These are reared in the tropical and temperate zones. Four species form the genus ***Antherea*** are used for commercial production. They are as follows.

Tropical tasar silkworm ***A. Mylitta*** (India)

Temperate Silkworm ***A. Proyli*** (India)

A. Pernyi (China, USSR)

A. Yamamai (Japan)

Antherea comprises more species than any other genus of sericigenous insects. So far thirty five species have been recorded. These are uni or bivoltine types.

Tropical Tasar *(A. mylitta)*

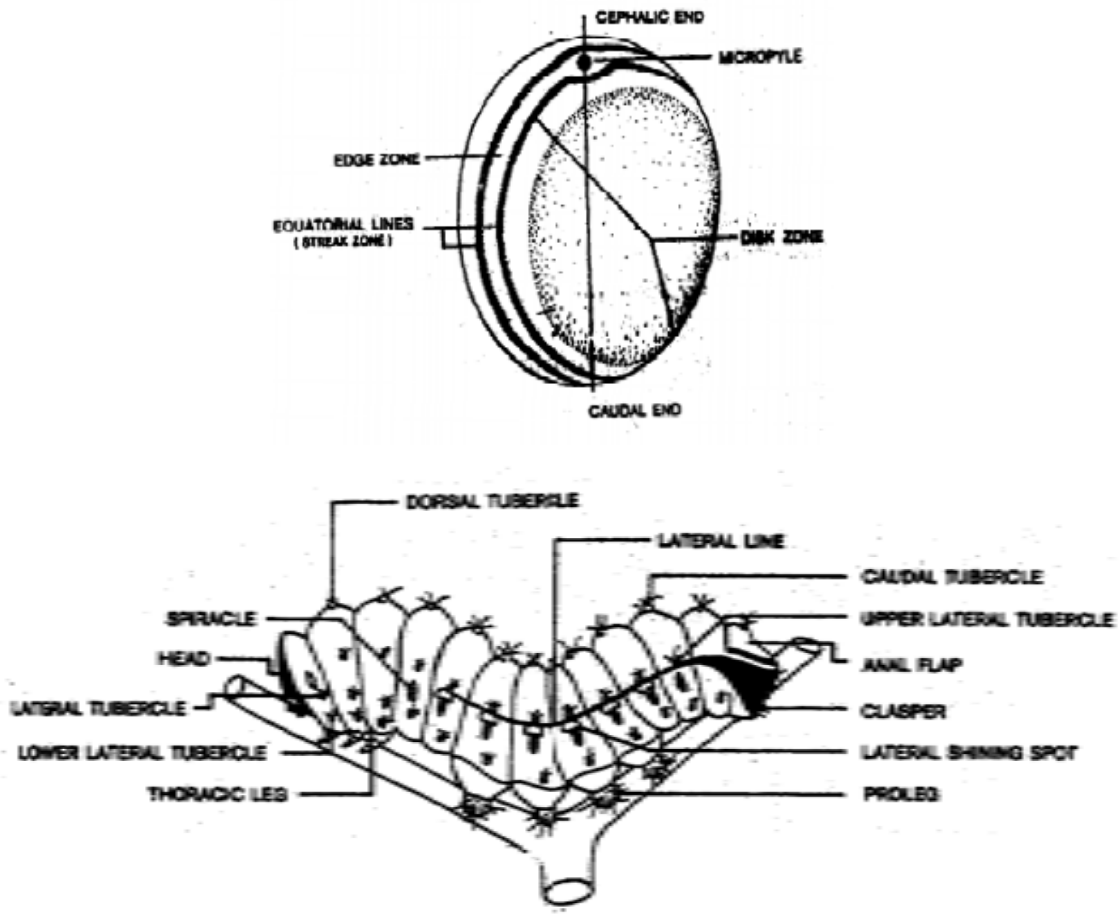
The major cocoon-producing states are Bihar, Orissa, West Bengal, Maharashtra, Andhra Pradesh and Karnataka. *A. mylitta* feeds on Teminalia and produces a special type of silk. The life cycle is as follows.

LIFE CYCLE AND MORPHOLOGY

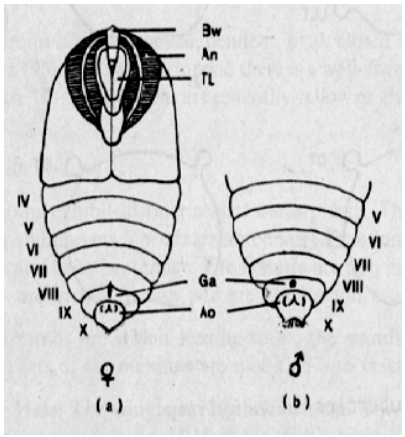
Eggs are oval, dorsoventrally flattened and bilaterally symmetrical along the anteroposterior axis. Each measures 3mm in length and 2.5mm in diameter, weighing 10 mg. eggs are white, light yellow or creamy. Two brownish parallel lines along the equatorial plane of the egg divide the surface into three zones (disk, streak, edge). Eggs hatch in 3-5 days.

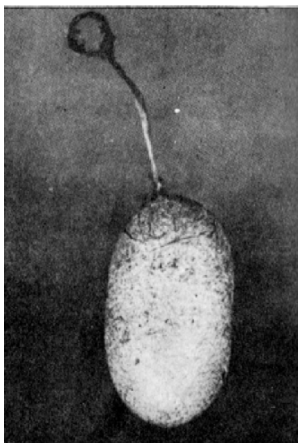
Larvae are cruciform and possess a hypognatus head with biting and chewing mouth parts. Newly hatched larva is dull brownish yellow with black head, measures 7 x 1 mm and weighs about 8 mg, after 48 hrs larval body turns green and head becomes brown. Occasionally yellow, blue and almond coloured larvae are also found. Mature larva weighs 50 grams and measures 13 x 2.1 cm. each larvae passes five instars. The larval duration is 26-28 days (first crop); 42- 45 days (second crop); 55-60 days (third crop). The prothoracic hood of the first instar larvae dorsally bears an oval black spot, which early in the seconds instar becomes M-shaped, later on V-shaped with two dots. These are absent in third instar, but appear in the fourth and fifth instars as two semi lunar red markings. The anal flap has a triangular black mark early in the first instar, which becomes V-shaped and brownish from second instar onwards. Sexual marking appear lat in the fifth instars as milky white spots on the ventral surface of the eighth

and ninth abdominal segments in all instars the larvae possess five types of tubercles (dorsal, upper lateral, lateral, lower lateral, caudal). They are black in the first instar, orange red in the second and violet in the third to the fifth. White, minute hairs are distributed irregularly all over the body. Setae are of two kinds. Silver shining spots appear during the third instar of second to seventh abdominal segments.



<u>*A. mylitta* egg and larva</u>





Female and male pupa **Cocoon**

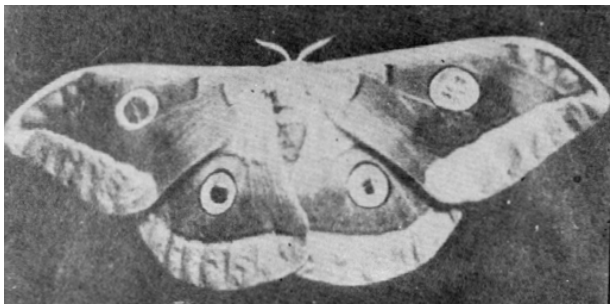
Pupa is segmented, dark brown colour body measuring 4.5x2.3 cm and weighs 10.3 grams. The sexual markings are on eighth and ninth segments.

Cocoon is single shelled, oval, closed and reelable, non-flossy with fine grains. The anterior end has dark brown peduncle with a ring at the distal end. Cocoons are yellow or grey.

It is chiefly the BV variety is used for commercial purposes. The cocoons of bv variety harvested in Nov/Dec go in to diapause and moth emerge in May/June of the following year. The rearing of the worms from the eggs produced in May/June is completed by June/July. This is summer crop and moth emerges in 15-20 days and the layings prepared are used for second crop during sep/Oct.

Moths exhibit sexual dimorphism. The females are bigger (4.5cm) with a bipectinate antennae (1.5cm long) and broad abdomen. Males are smaller (4.0cm) with broad antennae and narrow abdomen. Male wing span is about 16 cm. the area of fore wing is about 2121 mm^2 with a centrally positioned ocellus (70mm^2). While hind wing is about 1584 mm^2 with an ocellus of 50mm^2. Female wing span is 18 cm. The fore wing is about 2350 mm^2 with ocellus (85mm^2). The hind wing is 1850mm^2 size with ocellus (25mm^2).

The colour of ocelli is same in both sexes. Wing scales, wing venation are specific. The last four abdominal segments (7-10) are modified to form the genetalis.

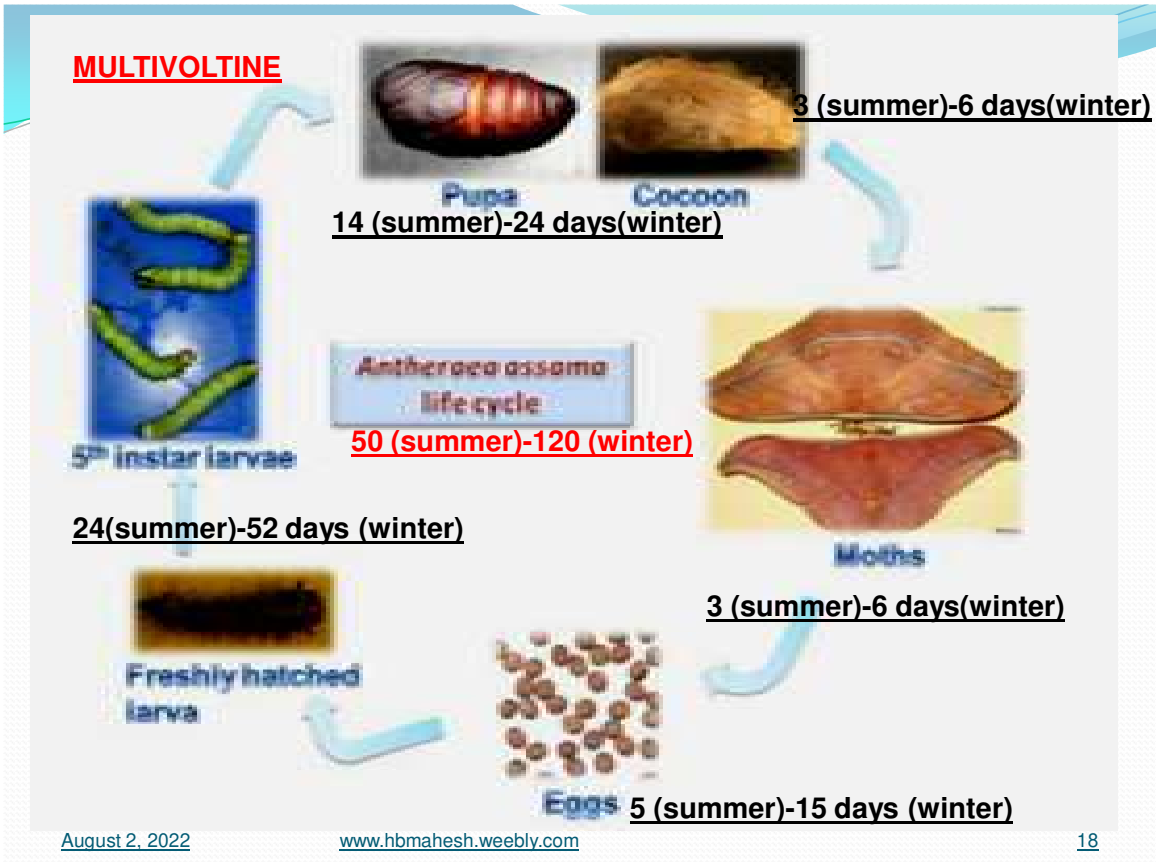


Male **Female**

Muga Silkworm

The golden yellow silk is secreted by multivoltine silkworm ***A. assamensis***, distributed in Assam. If the larvae are fed on mejankori leaves (Litsea citrate)/ ***A. assamensis*** produces mejankori silk. This silk is very much admired for its durability, luster and creamy white shade.

LIFE CYCLE AND MORPHOLOGY



The eggs are brownish measuring 2.8x2.5 mm in size and 9mg in weight. The duration of egg stage may last from 7 days summer and 16 days in winter.

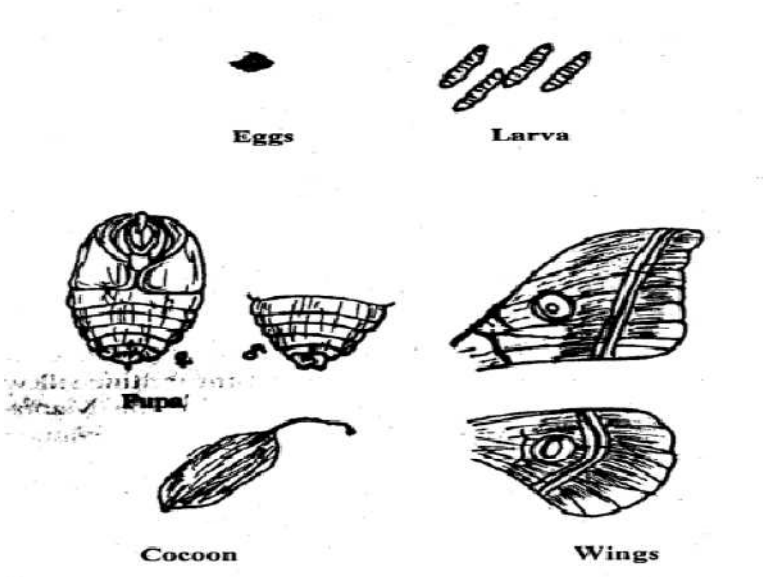
Newly hatched larva has prominent black intersegmental markings on yellowish body and brown head. It measures 7 mm length and weights 7mg. The mature larvae measures 9X2cm in length and weighs 15 gm. The larval duration is 24 days in summer and 52 days in winter. In third instar the prothorasic hood markings consists of two prominent rectangular black marks which are replaced by semilunar dark brown markings in the remaining instars. The anal flap carried rectangular black mark (III instar) which becomes U-shaped in IV instar and finally changes to a 'V' (V instar).

The pupa is copper brown measuring 3.2 x 1.8 cm and weighs about 5.7 gm. The pupal duration is 14 days in summer and 24 days in winter.

The cocoon is single shelled, light brown, oblong, closed, reelable and slightly flossy with a weak penduncle. It is golden brown or glossy white measures 5.2 x 2.4 cm and weighs 6.3 gm.

The moth is a non feeding stage and dies within 7 days to 12 days after emergence. Female moths are longer (3.5cm) than males (3 cm). The wings are brown rarely with a pinkish tinge. Wing span in males is about 13 cm and 15 cm in females.

Wing area	**Male**	**Female**
Fore wing	1662 mm^2	1857mm^2
Hind wing	1181 mm^2	1351 mm^2

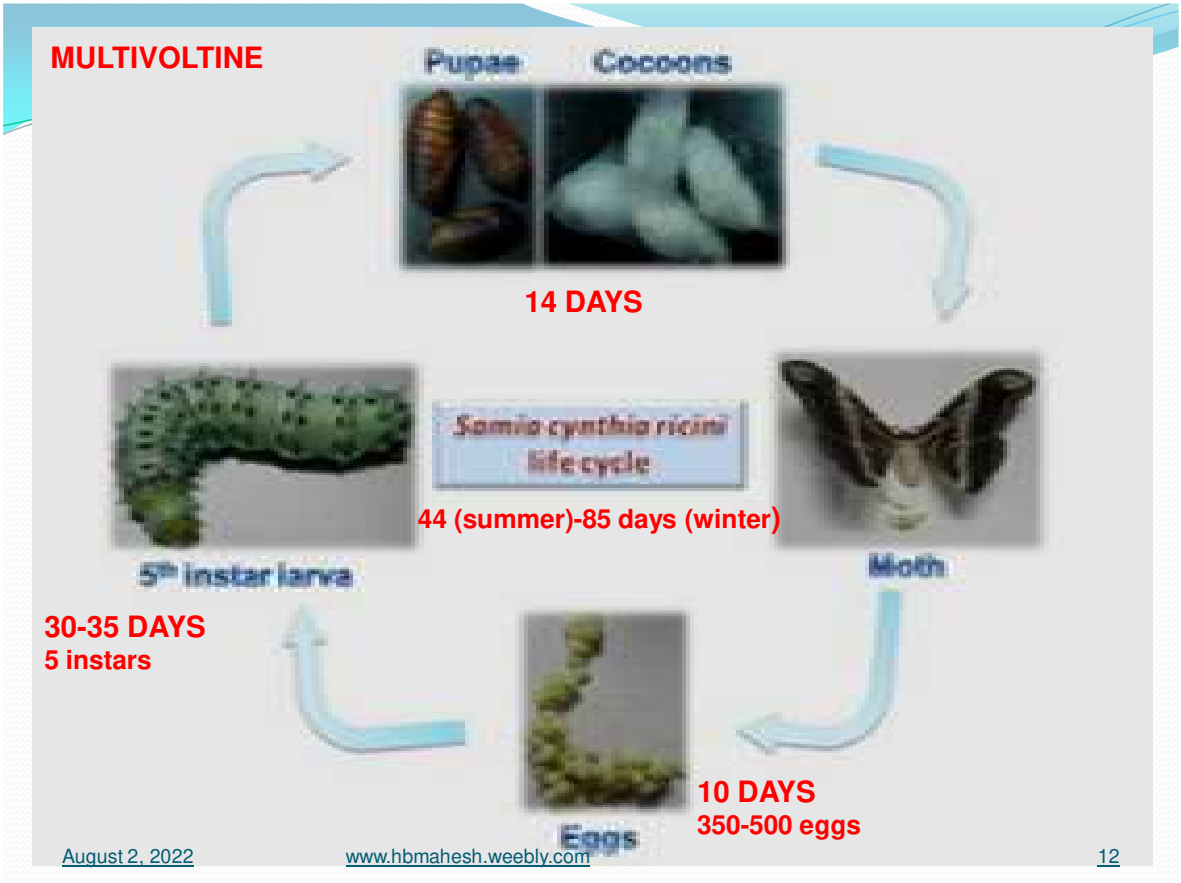


Life Cycle of Muga

Eri Silkworm

The white or brick red eri silk (endi, errandi) is produced by *Philosamia ricini*, a domesticated multivoltine silkworm. It is widespread in Assam and also practiced in Bihar, West Bengal, Manipur, Orissa and Tripura. Among the non-mulberry varieties, eri has the disadvantage of higher production costs because it is made from domesticated silkworms.

LIFE CYCLE AND MORPHOLOGY



The eggs are ovoid, candid white measure 1.5 x 1.0 mm and weight 6 mg. The duration of egg stage is 10 days.

On hatching the larva is greenish yellow measuring about 5 x 1 mm and weigh 1.5 mg. the larval body colour changes gradually to pure yellow by the end of third day. The larval duration lasts from 30-35 days. From third instar onwards the body colour segregates into yellow, cream, green, blue or white. Mature larvae measures about 7.0 x 1.5 cm and weighs 8 gm. Is translucent and covered with a white powdry substance. Spotted and unspotted larvae are

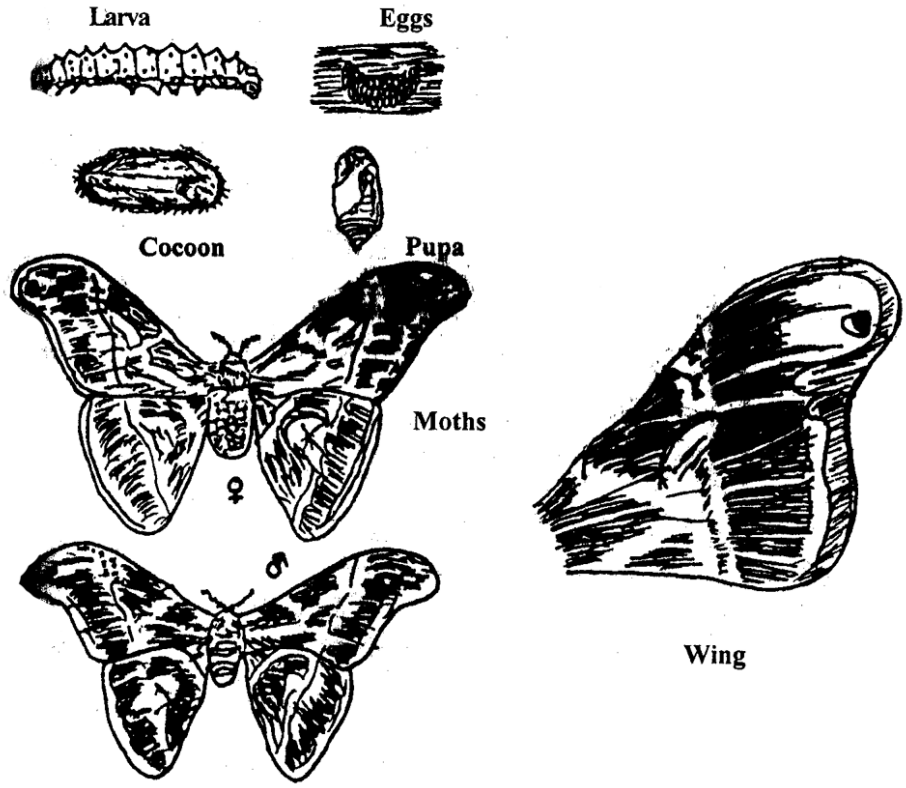
found. The spots are of various types i.e. single, double, zebra and semizebra. The prothoracic hood of the first-instar larva has a black dorsal band, which splits up into a pair of crecent shaped markings in the second and third instar. These markings disappear at the fourth instar. The planta, anal flap and claspers are light yellow throughout the larval span. The tubercles, setae are also present.

Pupa measures about 2.8 x 1.5 cm and weight about 2.6 gm. The duration pupal stage is 14 days.

Cocoons are elongated, soft, wooly, pedunclelessly, open mouthed and unreelable. It measures 4.0 x 2.5 cm and weigh 3 gm.

The male moth is 2.5 cm long while female is 3 cm.

	wing span	**fore wing**	**hind wing**
Male	13 cm	1242 mm^2	890 mm^2
Female	15 cm	1465 mm^2	1037 mm^2



Eri Life Cycle