"*Nepita Conferta* A House Moth Caterpillar Causing Contact And Air Borne Lepidopterism In India And Its Manahgement"

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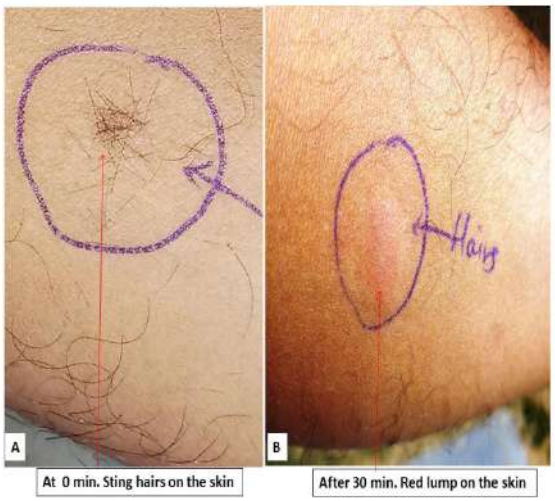
Abstract:
Caterpillars are immature stages of moths and butterflies. A new species of a house hold caterpillar mostly found under the clay roof tiles of wooden house and buildings in India. This species is reported in village Tighara and surrounding villages in District Seoni and District Balaghat of state Madhay Pradesh in central India (DMS 22° 5′ 24″ N, 79° 33′ 0″ E). This Caterpillar is more harmful for humans which are living with them in the same places and they remains for long times of years even in their dead conditions. These caterpillars completes their life cycle in non-living things like wooden materials, houses and everywhere where sweeping is not possible. When the urticating hairs comes in contact via air or direct touch with human skin by any means the urticating hairs that releases Thaumetopoein causes itching ,irritation and contact dermatitis (COD) for a week. We intendant to this research because this caterpillar species is new for scientists and unreported yet in scientific Journals. It appears in a large numbers in August and September month. So many villagers affected by Contact Dermatitis (COD) disease for several years because the dry caterpillar's hairs also cause contact and air born dermatitis.

Key words: Caterpillar, *Contact Dermatitis (COD)*, Urticating hairs, *Thaumetopoein*, Moth, Lepidoterism



1. Introduction

About more than 165000 species of caterpillar [1-4] in the order Lepidoptera [4] Phylum –Arthopada, of Class-Insecta exists. Caterpillars are immature larval stage of moth and butterflies. After hatching from their eggs, caterpillars go to 4-5 metamorphosis stages [5-7] called instar before they pupate in cocoon. The adult moth comes out from the cocoon [8-9] and after reproduction gives eggs for new generation of larval stages. Caterpillars of most of the order Lepidoptera are herbivorous, some are insectivorous and some are depends on feed of other animal products. Caterpillars are serious of agriculture pests many of them species destroy vegetables worldwide. Moth species are well known for destroying nature for fruits and other agriculture products. Some caterpillars are beneficial for world economy like cotton wool caterpillar.

Caterpillars are the soft skin larval stages of moth and flies. The larva of Order Lepidoptera bears fine hairs on their ventral surface these fine hairs are called urticating hairs [10] with the help of these hairs; larva shows defensive weapons [11] from the predators and completes its metamorphosis. Every year in the world people are affected by *Lepidoterism* contact skin dermatitis by several species of caterpillars [12-14]. Most of the species of caterpillar are depends on vegetables for feeding when people comes in contact with the caterpillars their urticating hairs they pierce the skin releasing poison to human skin like legs, hands, neck and wherever is possible after some time itching and rashes causes dermatitis Caterpillar dermatitis or lepidopterism (Lepidoptera means butterflies) is a toxic-irritant, or rarely allergic, reaction triggered by the release of histamine, thaumetopoein and other kinins from the hairs of butterflies and caterpillars [15-17].

Scientists have found skin related dermatitis by caterpillar in pine plant. Pine tree related caterpillar outbreak was first reported in İstanbul, Turkey caused by *Thaumetopoea pityocampa* caterpillars [18-19]. Caterpillar species from approximately 12 families of moths or butterflies worldwide can inflict serious

human injuries ranging from urticarial dermatitis and atopic asthma to osteochondritis, consumption coagulopathy, renal failure, and intracerebral hemorrhage. Unlike bees and wasps, envenoming or stinging caterpillars do not possess stingers or modified ovipositors attached to venom glands, but instead bear highly specialized external nettling or urticating hairs and breakaway spines or setae to defend against attacks by predators and enemies [20]. The first description related to skin itching related pine caterpillar were given by entomoogists [21-23].

The oak processionary caterpillar (*Thaumetopoea processionea* Lepidoptera) is found in several European countries. It is lives in oak forests or on single oak trees. The larva of from the 3rd to 6th developmental stage (instar) develops poisonous hair (setae), filled with an urticating toxin that may lead to serious dermatitis, conjunctivitis, and pulmonary affection (summarized as *lepidopterism*) on contact with the setae. In June 2004 more than 40 people including young children developed symptoms of *lepidopterism* [24-25] after resting within 20 m of an infested oak tree. Only a few people had touched the caterpillars. *Lepidopterism*, an airborne disease caused by the setae of the processionary caterpillar, is a growing public health problem because of the increasing numbers of outbreaks [26].

Lepidopterism by contact with oak processionary caterpillars is becoming more frequent in Germany and is often described in the lay press. The hairs of the adolescent caterpillars cause localized and generalized mechanic-irritative, toxic and allergic skin reactions. We describe the oak processionary caterpillar dermatitis in a married couple caused by indirect contact via their dog's saliva, after the dog had oral contact with an abandoned caterpillar nest in winter and became ill. Accordingly, the recommendation for prophylaxis by avoiding contact with oak processionary caterpillars has to be extended beyond the direct contact with caterpillars in summer [27].

A species of Caterpillar *Thaumetopoea pinivora* reported in pine tree have led to outbreaks of dermatitis in forest workers in [28]. Caterpillar dermatitis is a skin allergic reaction triggered by the releasing steroids histamine, thaumetopoein from the urticating hairs of caterpillars. Many entomologists of France have observed the problem of caterpillar dermatitis in west and south areas of France [29-30]. In Italy, the Apulia region is reported as medical matter, which is sometimes referred to by the media as a proper “nightmare”]. Contact causes immediate stinging and wheal formation, which may take up to 5 days to resolve [31-33]. Garden hairy caterpillar infected a 3 year-old girl by urticarial hairy of caterpillar widely distributed in south-eastern Australia [34] similarly some common incidents caused by caterpillar hair infection reported in many scientific journals and a serious matter of research. A 10-year-old boy affected with itchy rash in the trunk for 4 days duration. On observation it was noted that he had been in contact with Caterpillar. The diagnosis of Caterpillar Dermatitis was made. Rash improved with symptomatic treatment for 5 days [35]**.** Long years ago Knight described the skin rashes caused by white-marked tussock moth caterpillars *Haemerocampa leucostignma* among 7 people in the U.S.A.

In Modern Practice in Dermatology (Mitchell-Heggs, 1950) dermatitis caused by caterpillar is discussed by Dr. Sydney Thompson, and eight species of caterpillar are discussed, including the oak egger. The brown tail moth caterpillar *Euproctis chrysorrhoea* is a common cause of such rashes in the U.S.A. and Europe (Tyzzer, 1907), and Smith (1966) described that four gardeners who developed dermatitis from these caterpillars, present on vegetation they were handling, though one of the gardeners had only worked beneath a tree on which there were numerous caterpillars [36].

The dermatitis occurs after contact with the caterpillar, but it may develop after handling the cocoons and even from contact with the hairs deposited on clothing or towels, or carried by the wind. Hairs from adult moths have no nettling effect, but in the family Lymantridae, which includes the brown and yellow tail moths, the emerging female collects on her anal tuft caterpillar setae left in the cocoon. Later these are deposited round the eggs she lays [37] (Eltringham, 1914 ; Clements, 1951). These ex-caterpillar hairs carried by moths may give rise to reactions, and Hill et al. (1948) describe an outbreak affecting 31 people on board an oil tanker which was invaded by a swarm of moths in South America. [38] Eltringham, H. (1914). Trans. ent. Soc. Lond., 423. Clements, A. N. (1951). Proc. roy. ent. Soc. Lond. (A), 26, 104.

Notably the cases recorded by Gianotti (1955, 1956), and Crosti and Gianotti (1956). It has been suggested by Niels Hjorth (1966) that some of these cases could be caused by contact with caterpillar hairs [39].

In our research work our motive is to investigate and report a new moth species by and its life cycle and nomenclature in brief. It is commonly known as *Kambal Kida* in regional language because in Hindi language in India term *Kambal* refers to blanket, made with coarse fabric which is irritated to skin. It is a woolen sheet that is often wears by men and women in winter season, and another term *Kida* refers to insect in Hindi Language in India. Which is still not have reported in any Journal and medical history. We intendant to this research because this caterpillar species is new for scientists and unreported yet in scientific Journals. It appears in a large numbers in August and September month. So many villagers affected by Contact Dermatitis (COD) disease for several years because the dry caterpillar’s hairs also cause contact and air born dermatitis.

Caterpillar of this moth causes contact and air borne dermatitis in children, young and old person in their residential house every year in some part of the India. It exists in this earth completes its life cycle and shows Lepidopterism [40] like other caterpillar reported in scientific Journal. Some specialty of this species like feeding habit and habitat, Cocoon formation, sex and its degradation after death invites attention for reporting scientists, so that further research can brought in future related to this new creature.

2. Materials and Methods

2.1 Materials

Adult Caterpillar was observed, at 26°C and 60–80% relative humidity. Larvae were fed Lichen and moss outside wall of the laboratory. This moth and caterpillars were found in Tighara Village , Block Barghat, Dist. Seoni ,state MP of India (DMS 22° 5′ 24″ N, 79° 33′ 0″ E) in July-September month 2020. The present study was conducted in July, Agust, September 2020. The caterpillar has two generations been in the lab before this study. Adult caterpillar put into an open mouth container at 24 ºC for 15 days observation. Photographic mobile camera used of Samsung Galaxy J7 Max 13-megapixel (f/1.7), hand lenses, compound microscope and simple microscope has been used for observation.

2.2 Methods

1. Microscopic Observation of Moths and Caterpillars

Moth and Caterpillar are found in JULY-August month in Seoni and Balaghat and other district of MADHYAPRADESH in INDIA. We caught some Moth and caterpillars from our house for external morphological study observation and other study like skin dermatitis.

2. Itching and Rashes test.

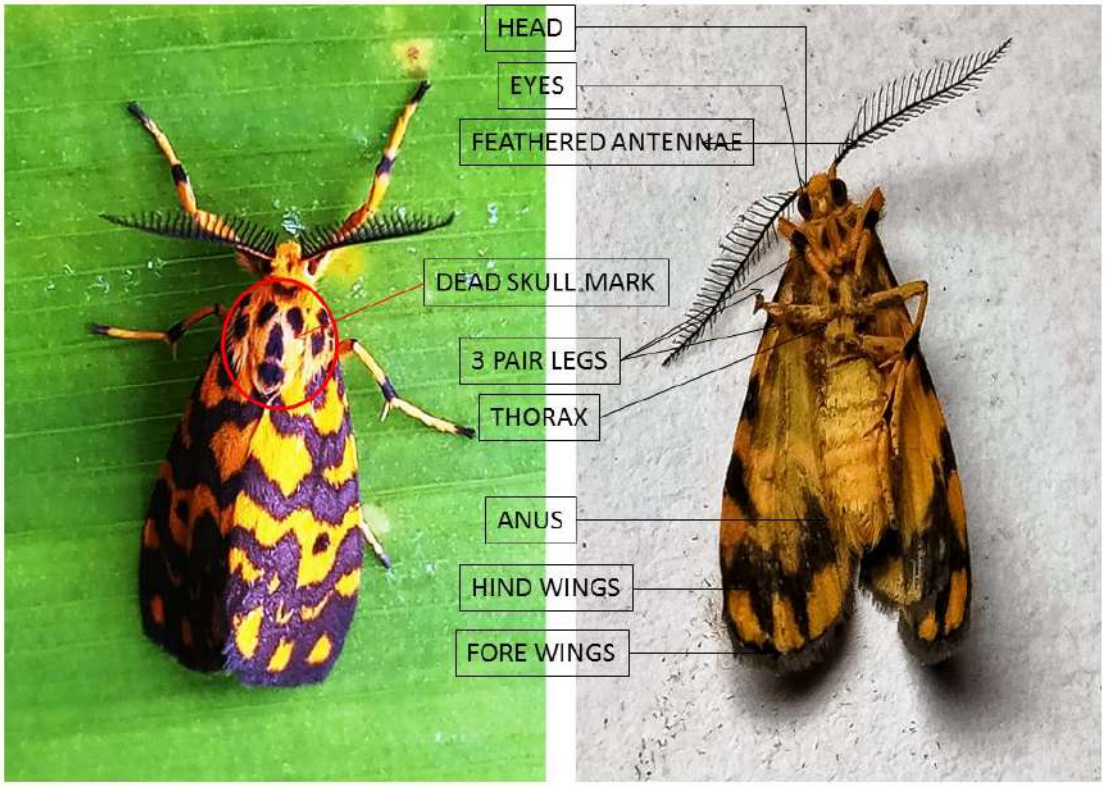
For the test of contact dermatitis we selected 15 people groups and some hairs from the same caterpillar put on the left and right hand skin and observation was taken by microscopic study and questionnaire conducted about pain feeling. After the experiment Silver-nano-kind crystalline gel based cream applied on the rashes against allergic infection.

We have done microscopic study of the whole life cycle of Moth including eggs, hatched larva, male and female caterpillar, cocoon and dead caterpillars

3 Results and Discussion

3.1 Male moth

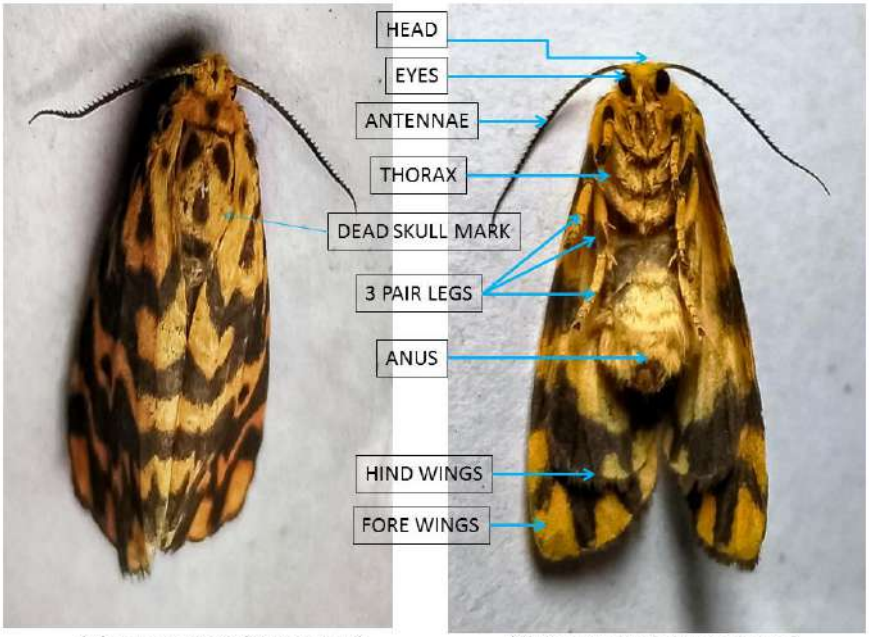
Male and female moths are the same in morphological character except some characteristics features, the size of male is about 1.3 cm in length and 0.7 cm in width. Male moth is small in size than the female moth as depicted in fig. 1. Male moth is more active than female moth. A characteristic and distinguished feature can be seen in male moth, that is antennae, male moth bears one pair of antennae, A pair of feathery antennae is present on the head of the adult male moth[41] Antennae consists a central stem and numerous side branches of tiny hairs. See fig 1 the male moth uses it's antennae to detect pheromones released from nearby female moths in order to find a mate, as scent [42].



(A) Male Moth (Dorsal view) (B) Male Moth (Ventral view)

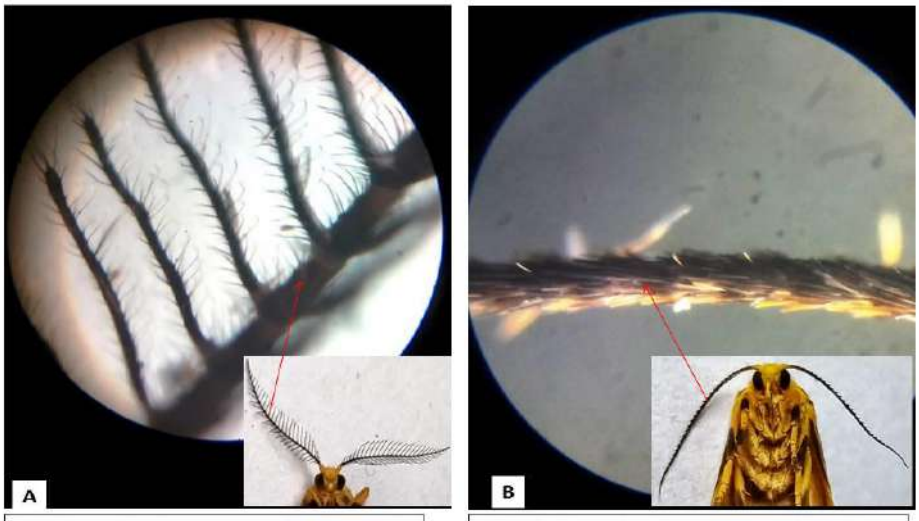
3.2 Female moth

Female moth is very similar to male moth in external morphological characters; the size of male is about 1.7 cm in length and 1 cm in width. Female moth is some wide and long in size than the male moth see fig. 2.



(A) Female Moth (Dorsal view) (B) Female Moth (Ventral view)

The only morphological way to distinguished from male and female moth is antennae of female moth, when we studied it in a compound microscope it looks like a single un-branched fiber as depicted in fig. 3 (A) , in which some tiny fibrils attached without branch or feather like structure as compared to male moth antennae see fig 3(B).



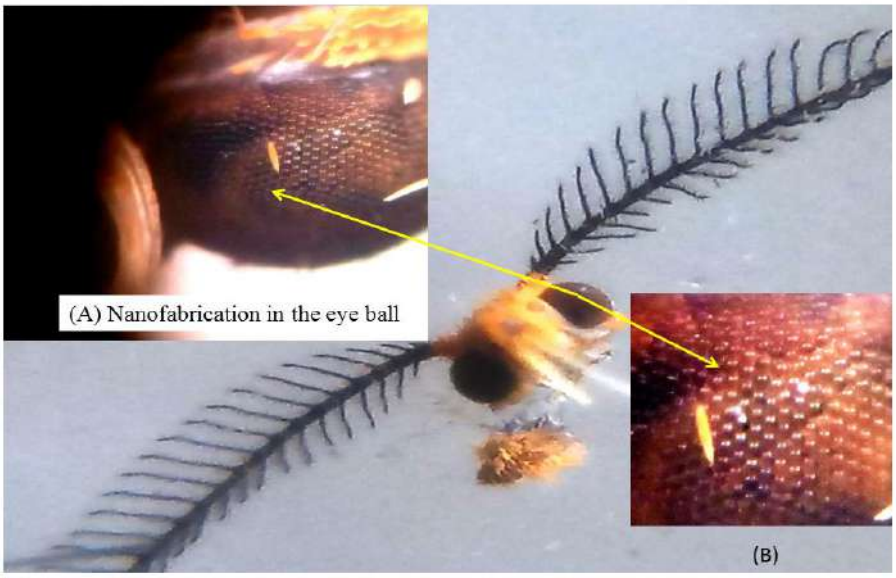
(A) Branched antennae of male moth (B) Un-branched antennae of female

3.3 THE BODY

The whole body of an adult moth has divided in three divisions which is called Tagmata, this tagmata has head, thorax abdomen as shown in fig 1. The whole body is orange in colors and covered by fine orange colored scales. The head has one pair of small compound eyes and other mouth parts are present. Moth has four wings which are divided in fore-wing and hind-wing on both the left and right side of the thorax. Moth wings are covered by orange color scales which gives orange colors to wings. Colored wings having black long and narrow strips like in *Panthera Tigris* .Basal streak of wings is similar to other species of moth and wings ends with fringes, and three pairs of legs [43].

3.3 Microscopic study of head

Head consists two black antennae (as discussed above) and two compound black brown eyes as depicted in fig. 4. With the help of compound microscope image it reveals that, it has ball like structure with some well-arranged dot patterns like moth-eye nanofabrication in the eye ball [44].



Eye of Male moth (A) inset of eye ball, (B) Nanofabrication on eye ball

3.4 Mouth

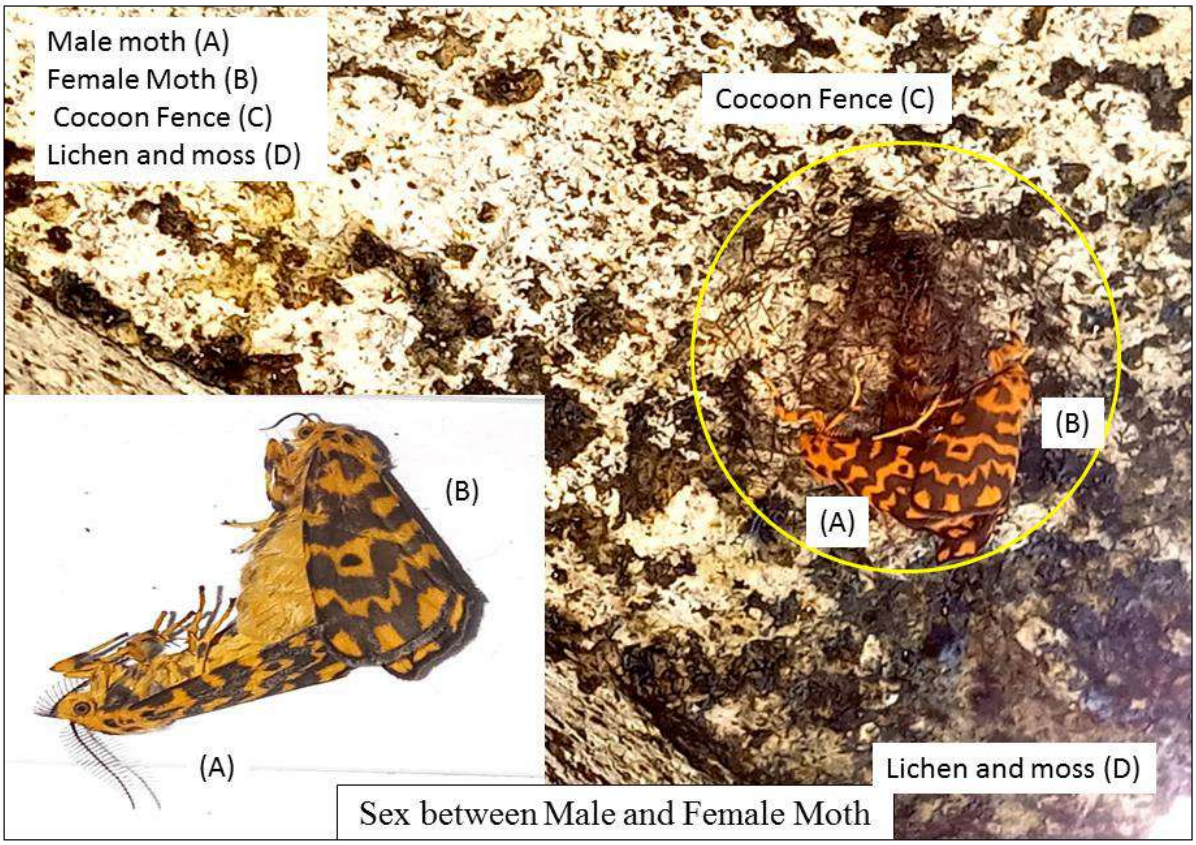
Just below the head there is a narrow opening of mouth aperture which has white bifurcated tube like organ called proboscis or 'haustellum', which is curved in the end and make hook like structure. This shows up-down movement inside the mouth for sucking purpose by muscular action. Each tube is inwardly concave, thus forming a central tube up which moisture is sucked. Suction takes place due to the contraction and expansion of a sac in the head [45]. Moth of this caterpillar is very similar to species *Spilosoma oblique* of order Lepidoptera which belongs to family Erebidae and genus Spilosoma. See fig. 4 and it also shows similarity with species. *Spilosoma erythrophleps* [46-49]. Abdomen consists the posterior abdominal segments, which are extensively modified for reproduction process. All other segments and body organs are similar and showing characteristics of family Erebidae.

3.5 Sex

The male and female moth matting in the month of June and August in humid environment. Before the competition of copulation process, male and female moth seeks the copulating sites, which are oval shape fences or birth place of male or female Cocoon made by the Caterpillars clearly shown in fig. 5.

Moth in the fences

For male and female moth before moth looks like same in morphology but female is large in some extent than the male moth, as described in above section. When the female is ready to mate, she releases pheromones from a gland close to her abdomen. The male receives them through his antenna, according to the Encyclopedia Smithsonian website. The pheromones have an odor that informs male moths that the female is ready. The scent is species-specific and is rarely confused by other male moths outside of the female's species. Male and female mats oppositely to each other, male moth insert its small abdomen into female moth's wide abdomen in "V" position which is clearly shown in fig. 6 (A), (B) the total copulating time is unknown.



The seeking of mating site or oval fences by the male and female moth may be possible by their eye vision or by the released pheromones after the metamorphosis into male or female moth because this is the birth place of any one of them, so it is possible that something is left in terms of pheromones or sex attractant chemical released during metamorphosis. The particular mating site (oval fences) become safe because any one of them male or female reaches through the pheromones scent in search of sex-partner to the oval fences, and it waits for mating partner for male or female. This mating site is safe for the following reasons. (A) Mating of moth takes long time about at least one day in this duration oval shape fences becomes shield from predators and other enemies. (B) When active male moth leaves the female moth into the mating site after mating. Female moth spends some time so that it gets ready for giving eggs; this is another reason for protection from enemy. (C) Female moth gives her egg into this oval shape fences for protection purpose.

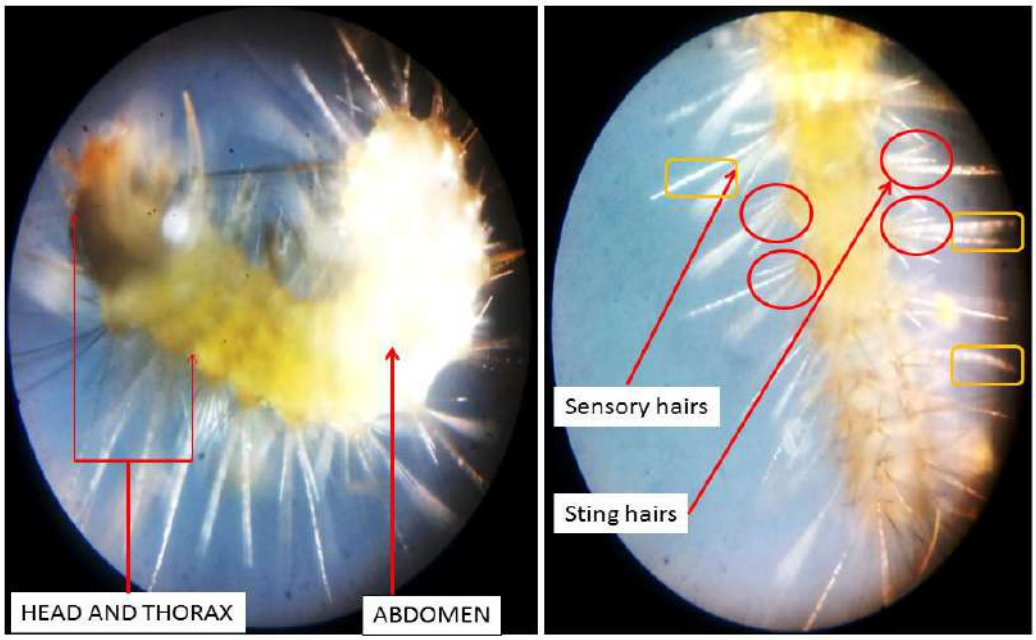
3.6 The eggs

Female moth gives about 400-500 eggs at one time and flew in the garden, which is depicted in fig 7 (A). Fig 7 (B) reveals that eggs are small in size of 0.5mm, which is rounded and black cum brown in the color and a small black spot can be seen on the upper layer of the egg see fig 7 (C) [50]. Moth gives her eggs on the mucilaginous transparent liquid film, in which eggs are attached for hatching. The deposited eggs have to be fixed to the respective host plant surfaces to avoid the risk of dislocation or abrasion. Therefore, during oviposition, an adhesive substance, also known as spumaline (Hinton 1981), is often secreted by specific abdominal glands associated with the female reproductive system (reviewed by Betz 2010), glueing single eggs or egg clusters to the host surface. The eggs hatched in 4 days from the ovulation, hatching takes place in moist and warm weather, the specific temperature is not clear but about 26 ^{0}C, and 80 percent humidity is required[51- 58] .

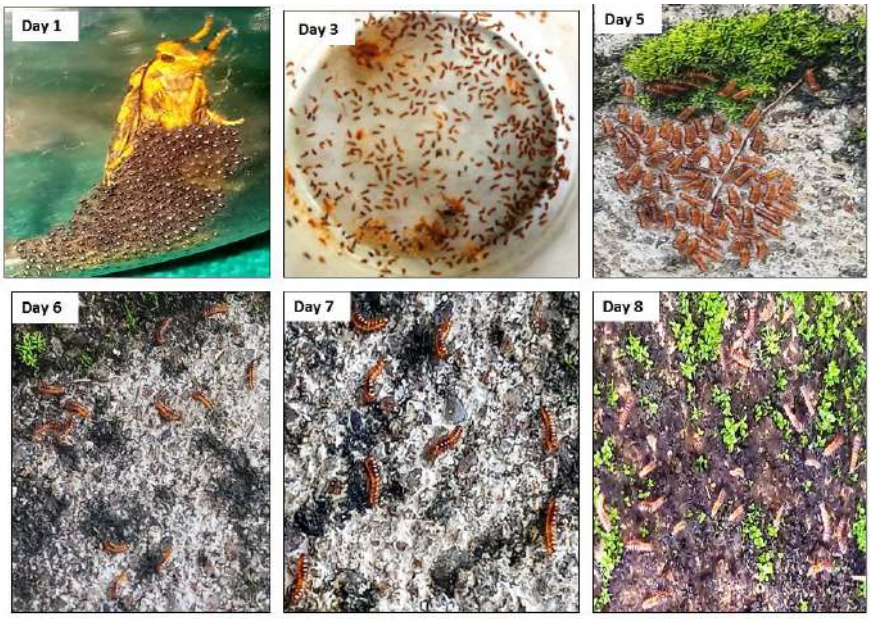
3.7 The larva

After the hatching of eggs the larva of small size 0.4 X 0.1mm in length and width respectively appears from the eggs, Larva can be seen by simple microscope as shown in the Fig. 8

Compound microscopic recorded video shows its movement clearly. In the very earlier stage of the larva both long and needle shaped hairs develops on the ventral surface of the skin. Four small circles present on the each segment of the body and each circle consists long and niddle shape small hairs, which can be seen from the 48 hours of the eggs hatching and looks like skin pores of the skin and white in the color. The head, trunk and legs are starts to develop in the early stage of larva, which are the primary signs of larval development except pigmentation, as shown in the fig. 8



Caterpillars increase day by day about 0.1 mm in length and width in size as shown in fig. 9 (A). they starts feeding on lichen, mass and dead particulates after 5 to six day because in these days their feeding organs are going to developed larva can survive for 4 days without any feeding.



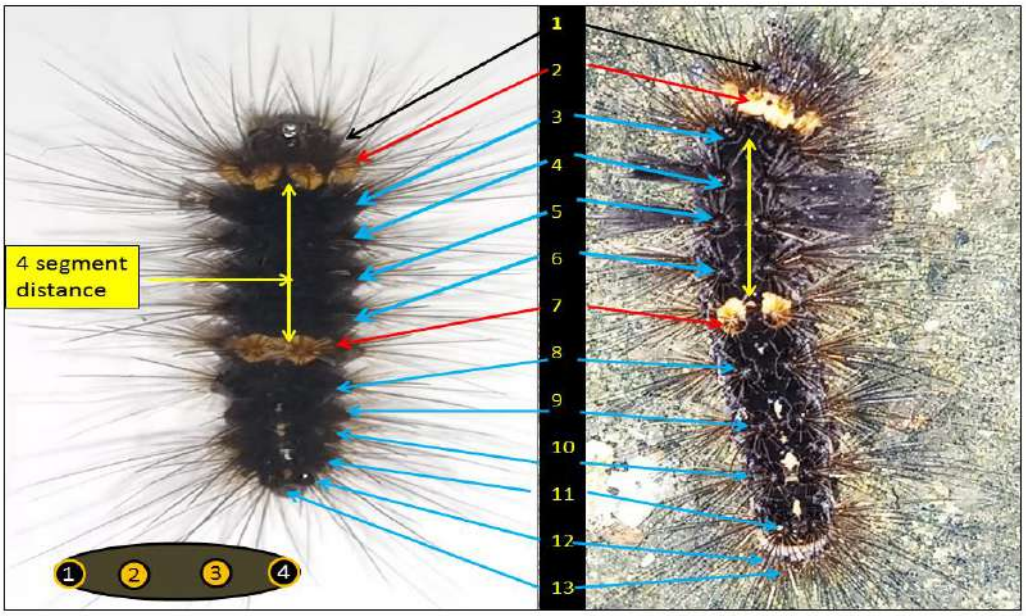
The color change pattern observed from light-yellow to black-brown with yellow bands can be seen from 1st day to 8th day in caterpillar's development. Larva gradually develops in its 12 day the length of larva becomes about 1.5 cm which can be seen clearly in fig. 9 (B). Larva becomes adult in about 20 days and divided into head, thorax and anus.The survival temperature for this larva is 24 ^{0}C and moist environment is favorable for its growth.

Larvas of these caterpillars are of two types first type of larva gets matured in about one month and easily forms cocoon where they forms pupa and pupa changed into female moth. This moth gives eggs in early periods of 7-9 days. These eggs are hatched into first generation larva.

3.8 Second generation larva

When larva of first generation gets matured in long days about 10 months changed into pupa and then transformed in moth. Moth of this generation gives first generation larva. Segments can be presented as: Fig. 10 (A) shows the dorsal surface of a caterpillar in which

13 segments are present and covered with whorl of sting and sensory hairs. Two brown colored rings are present by maintain the distance of 4 segments which is described in fig. 10 (A) by notation (1) (2) (3) (4).



In another slide of fig 10 (B) shows full lengths of caterpillar indicating segments clearly. Fig.10 clearly shows the ventral surface of the caterpillar divided into 13 segment segments segment 1 has mouth and 2, 3,4 which contains three thorax pair of legs. By gaping in 5 and 6 segment other segments 7,8,9 and 10 contains prolegs with hooks which helps in sticking for the body again by gape of two segment 11and 12, segment 13 contains anal one pair proleg or clasper. Work division can be clearly observed in these segments.

3.9 Feeding behavior and distribution.

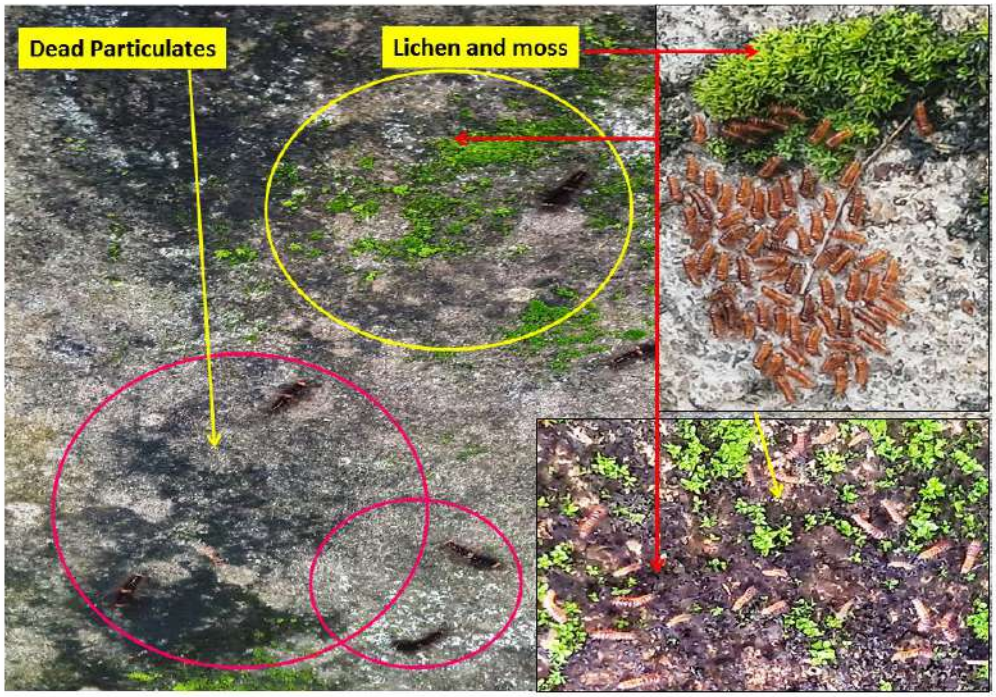
Most of the caterpillar has mouth aperture by which they take their foods, consuming only one type or a family of plants. A few species are carnivorous. Caterpillars spend their entire larval stage eating in preparation for their pupa stage and metamorphosis to adulthood. [61-64].

The specialty feeding seen in this case that, the caterpillar do not depends upon lichen or fungi for foraging food because as sun light increases in the day the caterpillar gets down to the rough floor of the house and moves in all the directions, where they find shadow they stay under the shadow of the roofs in the house see Fig 11.

Distribution of Caterpillars on the roof of the houses

In this situation we do not observed any direct feeding behavior by this caterpillar after observation by normal eyes, there is no signs of eating we find on the surface, on which it crawls. For making real to this observation we distribute different plant leaves, wheat flour, sugar and table salt to different caterpillar but they were unaffected by this feeding supplements. In that way we assumed that, they may be eat dead particulate matter, lichen and moss [65] because lichen and moss are generally well developed in June –July months in India.

In villages, most of the roofing construction of houses made by wooden material like Bamboo, when it gets wet in rainy season, some algal growth can be seen on it. Similarly some species of moss and lichen also developed on the clay roofing tile, wall made by bricks of without cement plaster, soil and cement construction ceilings and wooden house [66-68]. This brought a strong evidence for caterpillar feeding because, moth gives her eggs on the moss and lichen in the moist environment under the clay roof tiles see Fig.11(B)



This is reveals in our observations that caterpillars spent its early stage on such area, and when caterpillar becomes adult and hide in such places, where dead particulate matters are present. But we are very clear from our observations, to say that there are no direct sign marks of feeding which, justify for feeding of all these material as discussed above. Caterpillar may be feed on moss, lichen dead particulate matters and moist air because all these possibilities making essential for its living.

In our observation we have selected 20 adult caterpillars in a 250 ml glass beaker and kept it empty which is covered by watch glass so that air can pass through the beaker, at room temperature about 24 ^{0}C at rainy season and leave it for 5 days. We observed their living locomotion in each 8 hour time-interval daily as a result; we find that 50 percent caterpillars were alive.

External morphology

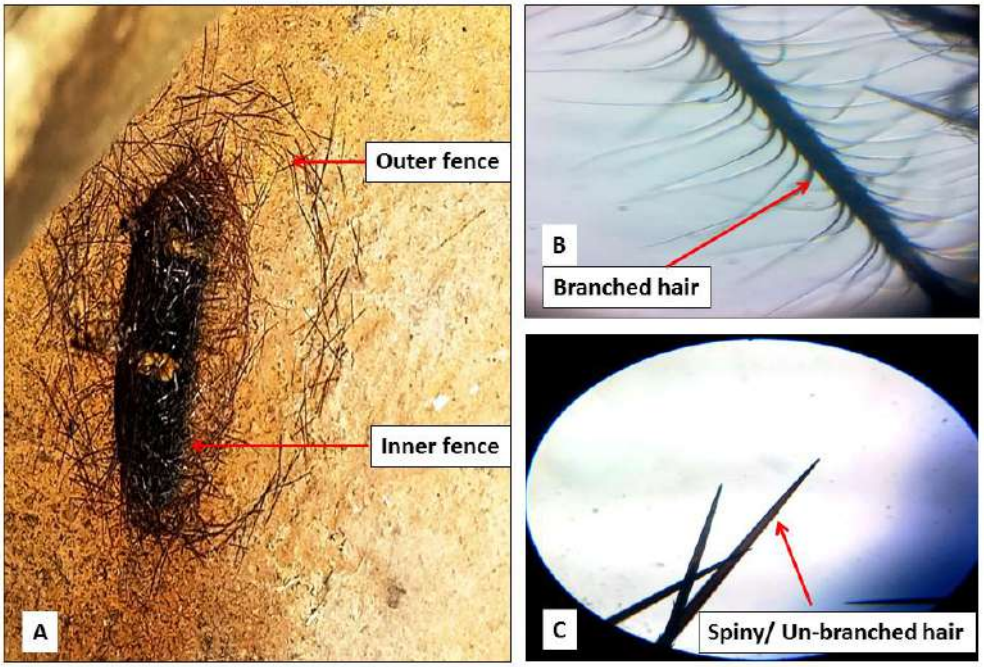
3.10 Microscopic Study of Cocoon Formation.

Small larva feeds on lichen, moss and dead particulates becomes adult in 25-30 days. All adult caterpillars do not able to make cocoon because some of them entangled in spiders network and some become dead by environmental factors like intense light, very high temperature and inability to hide themselves, but some caterpillars which have the survival nature, starts to form cocoon after stopping the feeding. Caterpillars find the safest place for cocoon formation and initially they start to removes their hairs and make two oval shape fences. In our microscopic study by simple and compound microscope we have taken some hairs from the both oval fences in a separate microscopic glass slide and observed. From the microscopic examination we have concluded that cocoon is covered by two fences, the outer and inner oval fences. Before the formation of these fences caterpillar secretes gummy and transparent liquid from the mouth, so that the long and short hairs can stick in it and give the oval shape fences.

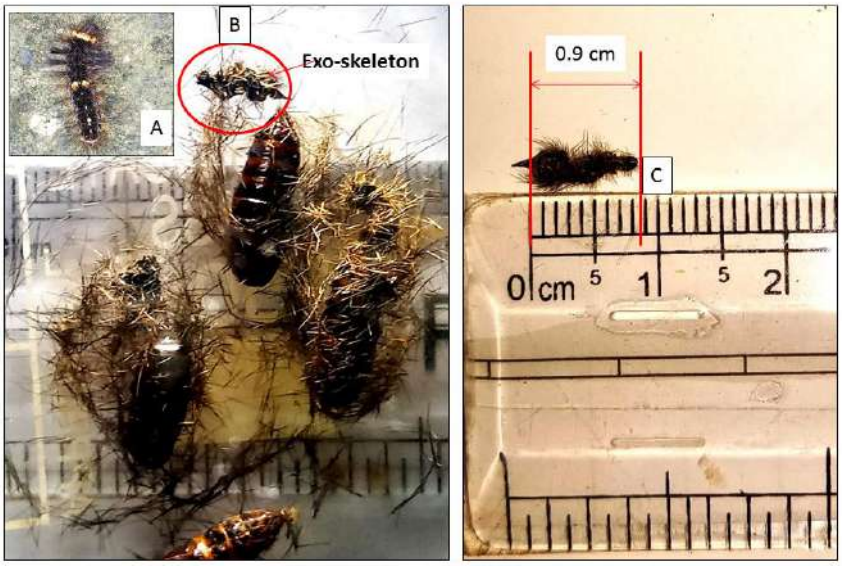
For the justification of the gummy and transparent liquid secretion we have removed some long and short hairs of adult caterpillar and taken on the glass slide and inverted it rapidly, and observed by simple microscope. Result reveals that only a few hairs left on the glass slide and all the hairs gets sliding from the slide surface, while inverting the glass slide. But hairs of oval shaped fences are not removed easily by forceps, even slightly brushing on oval shaped fences; we could not remove hairs from it.

For another clarification, we have kept 5 adult caterpillars in 250 ml glass beaker after one day we have found that the oval shape fences of hairs were formed vertically and there are no colorful marks on the surface of the wall. Mostly caterpillars form their cocoon by hanging on the roofs and on the walls. It is clear that caterpillar does secrete gummy and transparent liquid so that all the hairs does not dispersed into air and cocoon may be un-affected by predators.

The outer oval shape fence is formed by the long sensory and un-branched hairs, clearly shown in fig 12(B), which are the primary defense system of caterpillar and they are loosely attached to the body. The inner and narrow oval shape fence is formed by short and spiny hairs (See Fig 12 (C)) because these spines are short in length and removes after the long hairs, so that they form inner and narrow oval shape fences and covers the whole body surface of caterpillar. These fences are unaffected by environmental changes like weather and temperature, that's why the cocoon remains safe for metamorphosis into moth.



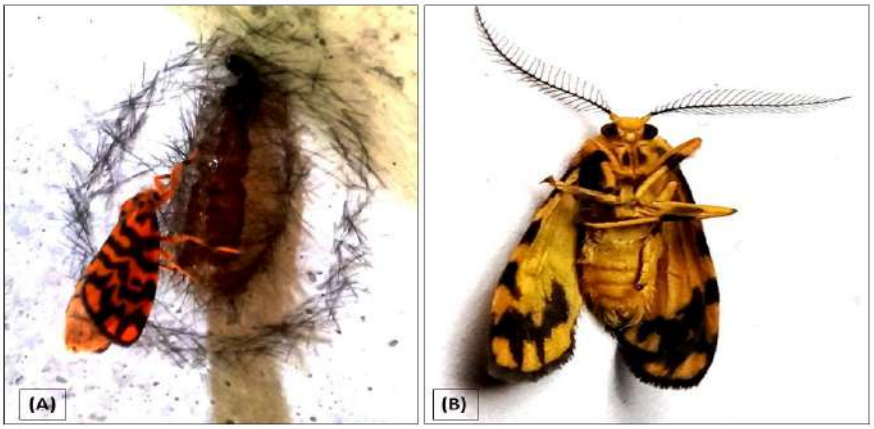
At the initial stage of cocoon formation caterpillar forms fences as described in above paragraph. The caterpillar starts removing their exoskeleton into 5-10 days. This exoskeleton or the residual caterpillar ex-body which have the size 0.9 cm long remains in the oval fences which can be seen in fig no. After simple microscopic examination we have observed that, this exo-skeleton or residual ex-caterpillar body is completely hollow in which skin consist dry hairs, head, trunk and legs (see fig.13).



3.11 The Pupa

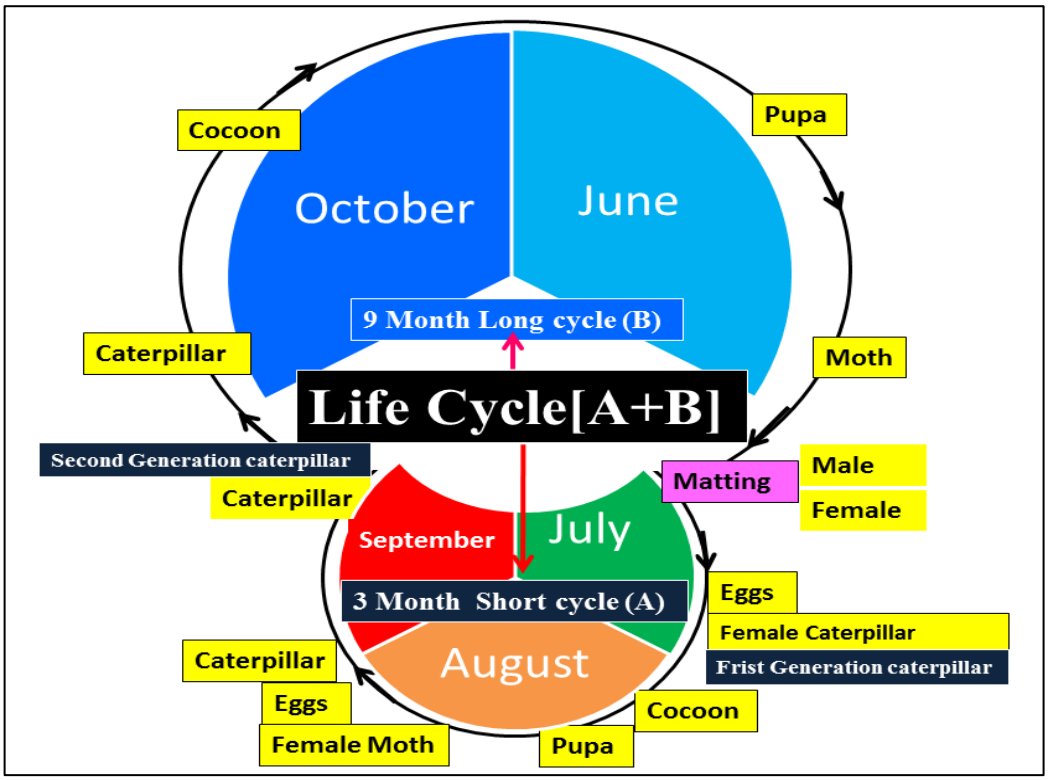
Adult male and female caterpillar forms separate cocoon [69] [70] in which caterpillar changes into pupa Introduction to the Study of Insects (Sixth ed.). Pupal stage ends in weeks, months, or even years, depending on temperature and the species of caterpillars.[71-72] then pupa changes into the moth .Two oval shape fences protects to the caterpillar from predators as describes in previous chapeter. After some days about 5-8 days adult caterpillar changes into the pupa by metamorphosis, in this stage some metabolic enzymes of caterpillar digests the whole body for pupa formation, (see fig.14) and after 8-10 days pupa changes into Moth.[73] like other species of order Lepidoptera.

The pupae is cylindrical shaped and 1cm long, which can be divided into head, thorax and trunk two parts makes upper portion which is orange in color, and lower part is long which have four black bands on orange skin shape which has rings of orange and black color. In this species we have observed that pupa is formed by two types the first type of pupa formation discussed above and second type of pupa forms in about 8 month period this also the novel thing in this species when susceptible temperature and environment becomes favorable moth comes out from the pupa see fig. 14(B) and covering body of pupa remains in the oval fence for long time which is indicated in fig 14(C). Emergent new moth comes from the pupa have been seen in fig 15 (A) and15 (B).



4 Life cycles

Theses caterpillars complete its life cycle in two pathways (A) Short time lifecycle and (B) long time life cycle (see fig.16.)



The short life cycle begins at the end of June, when the moisture-rich temperature rises at the beginning of the rainy season, in the months of July. From October to June caterpillars adapt themselves to the low temperature of winter and the increased temperature of summer season pupas turn into moths. At this time male and female moths come out of the pupa, male and female moths can be seen on the vegetable, which mostly have sex in their cocoon place. In the month of July, the female lays eggs in moist places for their

feeding means, which after some time turn into larvae and adult caterpillars. The specialty of these caterpillars is that in their thorax region, broom hairs are found in the left and right lateral side, and their size larger than caterpillars of long cycle, and their life cycle is 20 to 25 days. These are called female caterpillars, which is mentioned next paragraph. In July, the number of these caterpillars is less. In August, the adult female caterpillar forms cocoons on the walls in moist places and in 5-7 days the female moth comes out from the pupa. This female moth lays 500-600 eggs without mating with the male moth, thus in late August and early September these small eggs are hatched into small larva as depicted in figure 16, where petri-plate showing huge larva as shown in red zone. We have noticed that moth gives its eggs in moist and shelter place like under the clay roofing tiles where some lichens or green algae is already developed due to the rainy season and moist environment. Their number is very high in the month of September. The numbers of small larva after hatching from the eggs stay in same place near about 12-15 hours. In the morning as sun rises and some temperature get increases tiny larva shows slow locomotion to different areas by the speed of 0.2 cm/s. Likewise they go away from the cold and rainy surface. As larva spends 5- 10 days, it elongated in shape and size about 2 mm to 3 mm in size and 1.5 cm to 2 cm in length in this stage the creeping speed of larva we have noticed about 0.5 cm/s., there is a consistency of size and length of this caterpillar that it is neither increases in length nor in width to become an adult caterpillar. We do not notice any pine processing or colonization motion or aggregation during locomotion; they crawl on the surface independently.

(B) Long time life cycle

Now these caterpillars grow by relying on lichen, black fungus, dead particulates for their food, these caterpillars lack broom hairs in thorax lateral region and size is somewhat small. They are unable to tolerate strong sunlight, due to which they are seen in abundance on the walls of the houses and enter the houses where they enter the long cycle from October to June. In the places where the researcher has reported them, the winter season starts from October, and the summer season starts in February-March, thus these caterpillars metamorphosis after being affected by the temperature difference of both the seasons. Struggling to adapt to adversity enter the small cycle. Figure (16), Showing the complete life cycle of a moth in two pathways (A) Short time lifecycle and (B) long time life cycle.

It is necessary to clarify here that why does this moth make first generation larvae and second generation larvae? In the month of June-July, when the moth lays eggs, then the numbers of female caterpillars are high and male caterpillars are less. This is the reason that in the early days of their development, humans ignore them due to their low numbers, in these days these female caterpillars quickly grow into female moths and without any mating, about 500 to 600 lays eggs which turn into caterpillars in large numbers. In this way, their floods start appearing on the walls or on top of the houses in a house, which becomes difficult to control.

The first generation larva gets clarified from the larva produced in the month of July.

When adult male caterpillars were kept in a ventilated beaker under favorable conditions for 15 days, there was no change in them, but some adult female caterpillars were kept under favorable conditions in a ventilated beaker, it was found that Caterpillars pupate in 6-7 days and then become female moths on the 9th day and lay about 500-600 eggs in 12-15 days. When these eggs turn into larvae, they grow into male and female larvae, which are called second generation larvae above. Again these second generation larvae were kept in a ventilated beaker for 15 days after becoming adult, and then it was found that there is no change in them, this proves that the metamorphosis of these larvae takes a long time. Thus the larvae produced in June-July month are called first generation larva and the larvae produced during early metamorphosis in August-September month are called second generation larva.

5 Spreading of hairs on house hold things.

When living caterpillar creeps or crawls on the house floor or wall or the house roofing its hairs luxtate from its body and flew in the air with house dust particles. The dead caterpillar curl into a coil and this coil moves from one place to another place on the floor of the house, and hairs of this caterpillar flew in the air flow with house dust and mist in the house, roofs and in all different places in the house hold things like furniture, bed sheets, sofa covers, clothing and fans and on the all thing where house dust and mist is possible. also spreads its hairs, because light weighted narrow body easily luxtate hair from the body and can easily stuck by any house hold material, which are remains stay with house environment for long time or years if proper dusting or washing have not done.

Often creeping caterpillars blow down from the roofs on the house hold thing like bed sheet, furniture, sofa covers, clothing as a result a bunch of urticating hairs deposited, in these things even after the caterpillar removal. These unseen hairs remains with this things and whenever people uses this material for daily use purpose, get contacted by urticating hairs as a result itching and rashes developed in the contact area.

5.1 Spreading of hairs on house hold things by Cocoon

These caterpillar hide themselves in unsweep area like inner corner of furniture, bottom of sofa and bed, door corner where they secretes transparent gummy substance around the body. The utricating hairs and sensory hairs stacked in it and form two oval shape fences. In all the metamorphosis process Utricating hairs remains stay in fences for long time about 1-2 years and most of them flew in the house by room dusting or any other housekeeping process.

5.2 Microscopic Observation of dead caterpillars

When this caterpillar becomes dead by any means like rise of temperature of sunlight in day time they creeps in search of shelter so that they can save them from high temperature about 30 ^{0}C, the body fluid of caterpillars becomes dry and caterpillars becomes dead. The dead body of these caterpillar losses its weight becomes lighted weighted and narrow size from the living body some time body takes curved or ring shape and remains safe for a long time in environment because there is no predator found in its living and dead stage .The reason for it because its whole upper body is covered by wooly urticating hairs which saves it from other predators like birds and spiders ,wall lizards and ants see Fig. 17.

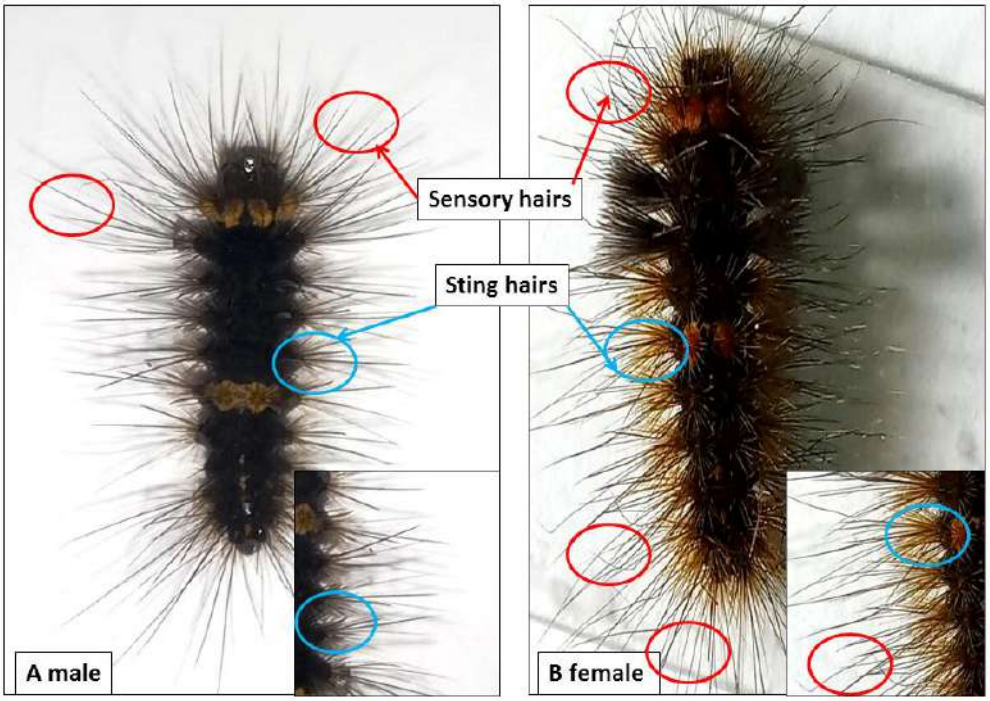
The dead body which is light weighted, narrow in size or sometime ring shape remains safe in the environment because their hair bristles becomes dense by narrow size or ring like size makes shielding for enemy predators see Fig. 17.

These caterpillars always found in wall, floors and shelters like houses roofs which are already safety places for hiding .An amazing and interesting observation we have done that when naturally or artificially dead caterpillars are kept in moist and soil for 15 days, there is microorganism and fungi growth have not been observed on its body and hairs. The light weighted body stuck in the wall or with rough surface and sometime flew in the air with spreading hairs to the house which causes skin dermatitis. This specialty makes this caterpillar harmful for human health.

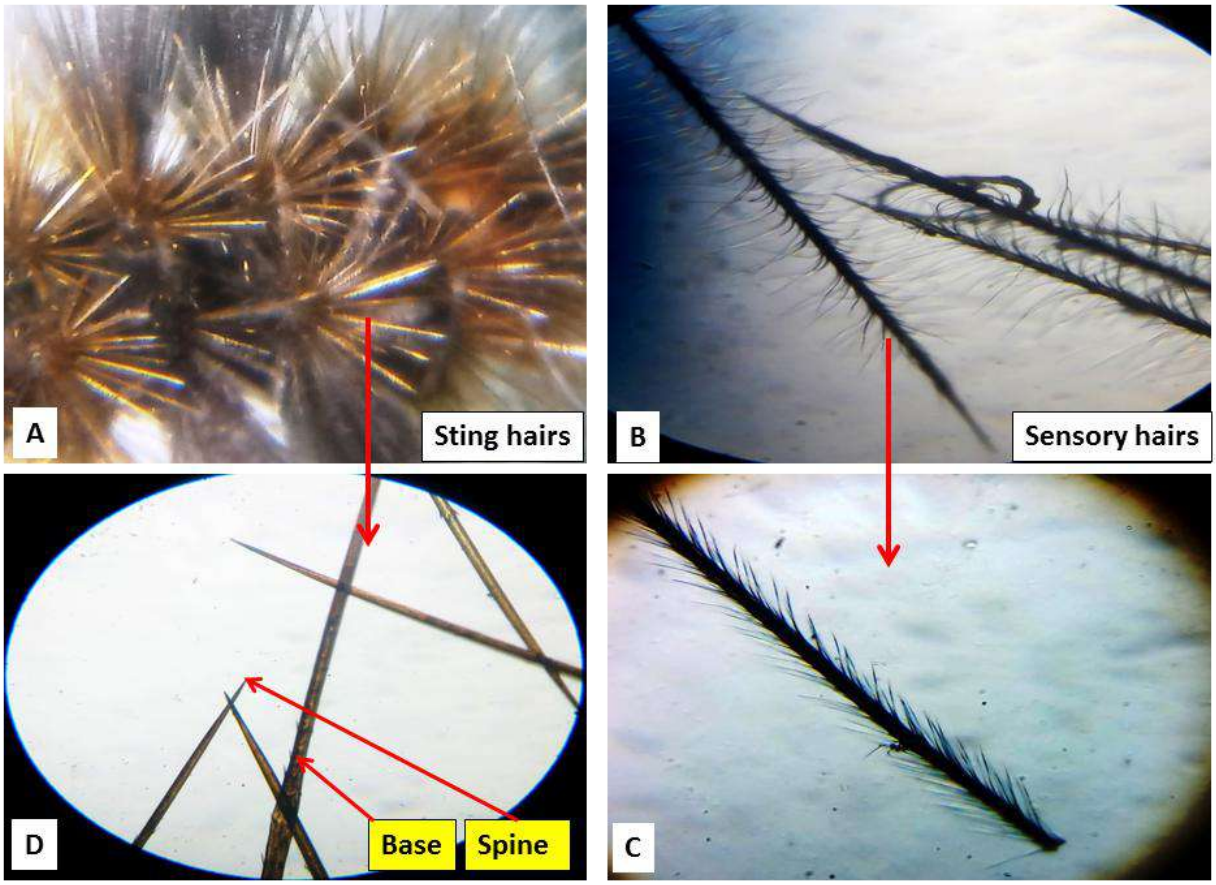
5.3 Mode of skin dermatitis

5.3.1 (A) sensory hairs

Caterpillar skin covered with two types of hairs (A) sensory hairs (B) Niddle shaped or utricating hairs. Sensory hairs are long about 0.5 mm. it covers the whole ventral surface of the caterpillar body and do not participate in skin irritation or COD because these are branched and soft enough that cannot penetrate the human skin and pores and they cannot release any dermatitis causing agent like *thaumatopoein* as shown in fig.18 (A) and (B).



Sensory hairs helps it in locomotion and play in defense system when any object comes in sensory hair's contact, it changes its path while feeding.



(A) Sensory hairs (B) Niddle shaped or Utricating hairs.
(A) Sensory hairs

5.3.2 (B) Niddle shaped or Utricating hairs.
These hairs also cover the whole ventral surface of the body, and developed in the bunch from in a whorl. Each segment has 4 whorls, two on the center and two whorls present in the lateral side of the body segment. These hairs are solid, cylindrical and looks like spiny needles have diameter about 0.03-0.05 mm. and length is 0.5 mm. this hair has a basal portion and apical portion becomes pointed which makes the tip of the Utricating hair needle. When these needles come in skin contact (except dorsal surface of palm and leg of human body) they insert into skin pores and skin itching starts within minute. Due to the feeling of itching on the skin naturally man starts to rub the same place as a result some needles which lay down on the skin get breaks in small size and again inserted into the inner surface of the skin, as a result continuously skin irritation happens which give red color lumps on the skin and rashes on swollen, blister appears in irritation area. As study reveals that utricating hairs of caterpillar of Order Lepidoptera contains Thaumatopoein protein which causes skin allergy. Fig. 19 Showing we have put some utricating hairs by forceps on the skin and leave it for 10-30 min we observed that skin itching starts within minute and red lumps starting growing on the skin as depicted in the skin see fig. 19. COD can be seen in fig. 19 (A) by red lumps indicated with yellow rings and another slide 19 (B) showin wound type rashes if more itching happens to patient [74].

6 Defense behaviors
This caterpillar is slow in creeping and it stayed often in open surface like floor, moss and lichen walls and roofs. When we have touched its body by any object like needle or forceps this caterpillar show primary defense mechanism toward the enemy and get curl into single coil or ring like structure for protecting its delicate areas like abdominal legs and mouth. [75-77] in our observation we caught 30 male 30 female caterpillar of the same lengths and recorded time for their uncoiling we observed that it takes near about 2- 5 min for becoming the normal state.

7. Manangement and control.
Moths also are eaten by some species of lizards. In our observation we have seen that there are no directly predators like birds and insects eat this caterpillar in this consequences there population increases which may be cause of harmfulness. Caterpillar can controlled by the use of insecticide Chloropyriphos solution in water 1.5ml/L. with the help of this concentration solution when we sprayed by agriculture pump Krishi Sanjivani Lithium Battery Operated Spray Pump for Gardening and Agriculture- (Knapsack Sprayer) the micro droplets of insecticide solution, drops on the caterpillar and also on the surrounded surface where it crawls or stay, the micro droplets of insecticide solution may affect the caterpillar in the following steps. First the extremely intense odor of insecticide inhaled by the caterpillar, produce chemical toxicity to the caterpillar as a result that goes die. Second micro-droplets of insecticide solution both absorbed and adsorbed by the surrounding surface and on the feeding material like lichen, when caterpillar graze on the surface, due to the toxicity of food and surrounding environment caterpillar gets dead.

In our study we selected two types of houses for killing caterpillars House Type A and, House Type B
House Type A is simple cemented house which have roof and outer corner walls are affected by small living caterpillar colony, when we used insecticide spray on the roof and the wall, as discussed above, maximum number of small and adult caterpillars died within 1h. Naturally some number of caterpillars while crawls on the wall, they gets down to the bottom wall of cemented house, or small colonies developed in the bottom wall of cemented house, in both the situation we should spray on the bottom wall, of the house. In this way our spray technique gives complete killing results. [78]

8 Dead head mark
These moths are easily distinguishable by the vaguely human skull-shaped pattern of markings on the thorax. The most notable feature is a patch of black hairs on the thorax that gives the impression of depicting a human skull in which black hairs form eyes, nose and mouth in both the male and female moth.[79]

9 Nomenclature:
We have searched so many articles related to this species but this species is unidentified and unreported yet. Although some similar species of moth present in India like *Spilosoma Obliqua.* But it is completely different from its genus characteristics so we need to introduce a genus and species. We named Taumatopoea[80] because this species contains Taumatopoein proteins in their niddle which causes itching and skin dermatitis, homous word referred to home because this caterpilllar and moth complete its life cycle in house and homes. *Indica,* because this species is going to reporting first from country India.

Taumatopoea Homous Indica.

Order:	Lepidoptera
Superfamily:	Noctuoidea
Family:	Sphingidae
Subfamily:	Arctiinae
Genus:	Taumatopoea
Species:	*Taumatopoea Homous Indica*

One remarkable and unreasonable thing we speculate under analysis that after cutting the head of moth from the thorax its antennae and mouth parts shows organ movement for 45-50 min.
Genus
We need to introduce a new genus for this moth because of following reasons.
1. Female moth can able to gives eggs without mating and these eggs changed into larva.
1. Moth of these genus mates in cocoon fences.
2. And other characteristic is feeding behavior of the caterpillar, if we compare feeding behavior with other moth genus ,they show some morphological differences than this moth.
3. And another reason to give separate genus is habitat of caterpillar it complete its whole life cycle in house accept male and female moth.
4. Without feeding moth can live for 15-20 days at 27 ^{0}C and 82 percent humidity.
5. The thorax of this moth shows similarity with family sphingidae of order lepioptera order that dead human skull is present in both male and female moth.
6. Caterpillars of this moth completely depend on lichen and dead particulate they do not affect any crops in its living about 20 days.
8. larval stages of this caterpillar gives the signs of male and female sex as described in paragraphs male caterpillar do not have the identification sex hairs but female caterpillar has big size and identification sex hairs in thorax in 4-6 segments.
9. These caterpillars show two type of life cycle one is of short duration and other is for long duration.

10. Conclusion:
Microscopic observation of life cycle of this moth reveals that this species is very serious for its COD and spreads its hairs in the whole houses and remains with human beings. Feeding behavior of its caterpillar is different from other caterpillar. It does not affect any crops and vegetable in its life cycle which is beneficial for farmer. The biodegradability of this caterpillar is catches the attraction for researcher. The dual nature in life cycle is also very interesting feature for this species. It is new and unidentified species which requires more study and interest for entomologists so that more research can be done in this field.

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