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Certain physiological studies on the healthy full grown oak tasar silkworm, *Antheraea proylei* larvae and its food leaves, *Quercus serrata* for crop protection

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Abstract
The Oak tsar silkworm, *Antheraea proylei* is an economically importantinsect. This silkworm and its host plant have become prone to attack ofnumerous pests, predators and microbial diseases. In order to procurehealthy cocoon and better yield, it needs to be protected. The lipid contentin the healthy full grown larval haemolymph, silk glands and food leaves of *Antheraea proylei* Jolly has been determined by extraction withchloroform and methanol following a standard method. The lipid contentin the larval haemolymph varies from 65.69 to 67.21 mg/ml with a meanvalue of 66.54±0.151 and 0.1430 to 0.1436 mg/mg fresh weight in the silkglands with a mean value of 0.1433±0.00006. While the lipidcontent in the food leaves, *Quercus serrata* ranges from 0.0232 to 0.0264mg/mg dry weight with a mean value of 0.0249±0.00038. The multiple correlation coefficient of silkglands on haemolymph and food leaves was found to be R^2= 72.0% and significant at 5% level.

Keywords: certain physiological studies, *Antheraea proylei*, larvae and its food leaves

Introduction
Antheraea proylei Jolly feeds on the leaves of *Quercus serrata* Thumb (Oak) and this Oak tasar silk is supposed to besuperior in quality to other types due to its own lustre anddurability over year. In order to procure healthy cocoons andbetter yield they need proper care, healthy and appropriate qualityof the food leaves, their feeding habits and certain aspects ofdigestive physiology in correlation with their food leaves. Lipidshave an important role in cellular structures, energy storagetransport and metabolic control. Lipids are the main source ofenergy for several physiological processes *viz*., embryogenesis, metamorphosis and reproduction (Gilbert, 1967 [4]; Pant, According to Gupta and Pathak, 1984 [5], the fifth instar mature (Spinning) larva contains the highest amount of lipid. Lipid contentin the body of silkworms like *Antheraeamylitta*, *A.assama*, *Bombyx mori* and *Philosamia ricini* as well as lipids content inthe silkglands of *B.mori* have already been reported by many workers (Dhinakar *et al*. 1991; Sarma *et al*. 1994; Khanikor, 1999) [2, 9, 6] and many others in different insects. However, estimation of the lipid content in *Antheraea proylei* larval haemolymph and silk glands has not been work out so far. The present study, therefore, aims with the determination of lipid content in the haemolymph, silkglands and food leaves of this oak tasar silkworm.

Materials and Methods
The full grown (fifth instar) healthy larvae of *Antheraea proylei* and food leaves were collected from the Regional Tasar Research Station, Imphal, Manipur, India. The haemolymph as well as extract of silkglands were prepared as quickly as possiblewhen they were still alive. The estimation of lipid content was determined by extractionwith chloroform: methanol (2:1 v/v) following the method of Folch *et al.* 1957 [3].

Results and Discussion
The results on lipids content in the larval haemolymph, silk glands and food leaves are given in the table-1.The presentobservations revealed that lipid content in the haemolymph of mature *A. proylei* larvae varies from 65.69 to 67.21 mg/ml with a mean value of 66.54 ±0.151. The results obtained in the presentinvestigations are agreement with those reported by Sarma etal. 1994, who studied the lipid content in *Bombyx mori* larvae (71.680±1.277 mg/ml). Lipid content was found to vary from 0.1430to 0.1436mg/mg fresh weight in silk glands of *Antheraea proylei* larvae with a mean value of 0.1433±0.00006. The present studieswere carried out during spring crop season (March -May) duringwhich the rearing for first crop of oak tasar silkworm was undertaken. The lipid content of the silk glands was higher in springlarvae than the autumn larvae. This seems to have influenced thebiosynthesis activities of the tissues and hence the rateof spinning. This may probably the reason that spring crop in presentcase gives that better harvest. Almost similar observations were made by Dhinakaret. *at. al.* 1991, who also studied seasonal changes in the composition of silk glands in *Bombyx mori*. In viewof these results, it suggests that higher percentage of humidity inthe atmosphere with low photoperiod and cool temperature seemsto generate favourable activities for the silk glands. In contrast, higher photoperiod and higher temperature with low humidity seemto generate unfavourable conditions for the activity of silk glands in oak tasar silkworms. The lipid content in the food leaves of *A. proylei* was found to be in the range of 0.0232 to 0.0264 mg/mgdry weight with a mean value of 0.0249±0.00038. The datarecorded in the present study was in agreement with the resultsreported by Pandey and Goel, 1991 [7] who studied the constituentsof the leaves of Oak tasar silkworm, *Antheraea proylei*.

Table 1: Changes in lipid content of the haemolymph, silkglands and for leaves of full grown *Antheraea proylei* larvae.

No. of observations	Haemolymph (C1) mg/ml	Silkglands (C_2) mg/mg fresh weight	Food leaves (C3) mg/mg dryweight
1	66.73	0.1433	0.0240
2	66.80	0.1436	0.0264
3	65.69	0.1430	0.0256
4	66.71	0.1433	0.0253
5	66.39	0.1432	0.0232
6	67.09	0.1433	0.0263
7	66.34	0.1431	0.0235
8	66.50	0.1433	0.0250
9	67.21	0.1435	0.0259
10	65.93	0.1431	0.0238
Range	65.69-67.21	0.1430-0.1436	0.0232-0.0264
Mean	66.539	0.1433	0.0249
S.E	$\pm$0.151	$\pm$0.00006	$\pm$0.00038

Correlation between the lipid content of larval haemolymph, silkglands and food leaves

Multiple regression of silk glands on haemolymph and food leaves:

The regression equation is C_2=0.124+0.000273 C_1+0.0372 C_3

Multiple correlation coefficient of silkglands on haemolymph and food leaves is R^2=72.0 %

Analysis of variance for the data of Table-1

Table 2

Source of Variance	Degrees of freedom(DF)	Sum of square (SS)	Mean square (MS)	Computed (F)	Percentage (P)
Regression	2	2.16770E-07	1.08385E-07	9.01	0.012
Error	7	8.42318E-08	1.20331E-08		
Total	9	3.01002E-07			

The multiple correlation coefficient of silk glands on haemolymph and food leaves has been found to be R^2=72.0% which indicates that 72.0% the variation in silk glands is accounted by haemolymph and food leaves while 28.0% of the variation in haemolymph is explained by some other factors not considered in the present analysis.

The multiple correlation coefficient is significant at 5 % level.

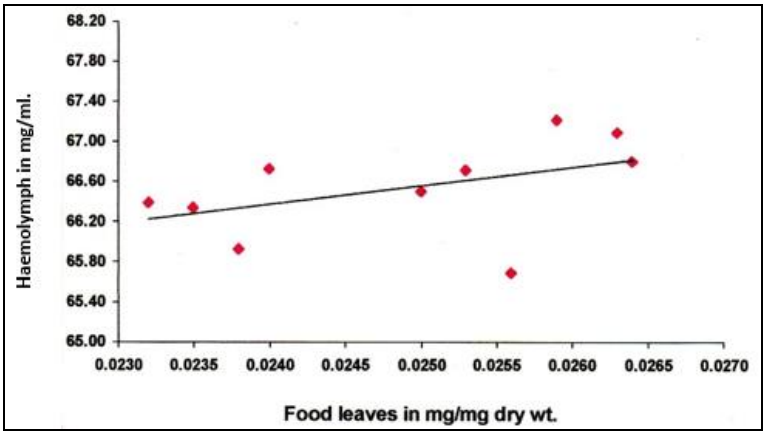

Fig 1: Graph showing regression between the lipids content in the haemolymph and food leaves of *A.proylei* larva

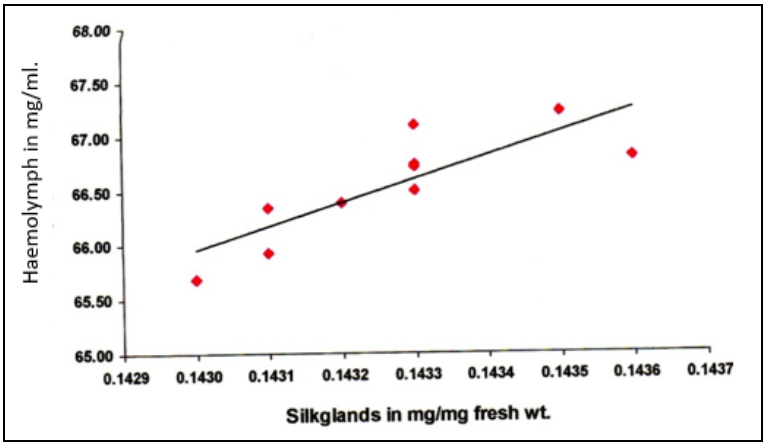

Fig 2: Graph showing regression between the lipids content in the haemolymph and silkglands of *A.proylei* larva.

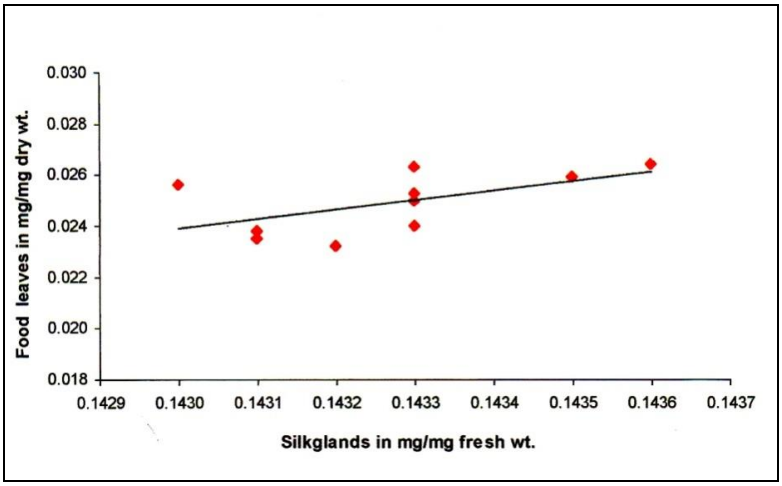

Fig 3: Graph showing regression between the lipids content in the food leaves and silkglands of *A.proylei* larva.

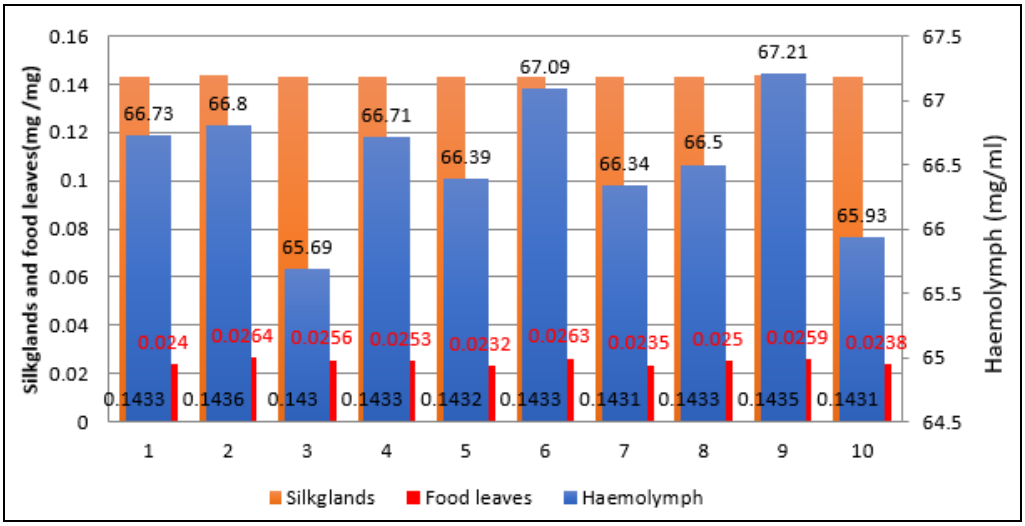

Fig 4: Graph showing correlation between the lipid content in the haemolymph, silkglands and food leaves of the host plant, *Quercus serrata*

According to Benchamin and Anantharaman 1990 there are direct correlation between Mulberry leaf quality and the larval development and growth in Bombyx mori and also reported thatthe lipid content varies from species to species and in some cases within the species. The study thus revealed that almost all the investigate dphysiological parameters depend entirely on the food leaves which ultimately influence the haemolymph and silkglands and all these ultimately help this silkworm in producing healthy cocoon crop.

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References

1. Benchamin KV, Anantharaman KV. Standardisation ofmoulting test to evaluate mulberry leaf quality undertropical condition. Indian J. Seric,1990:29(2):225-262.
2. Dhinakar GM, Changamma C, Reddanna P, Govindappa S. Seasonal changes in the organic composition of silkgl and of silkworm, *Bombyx mori* L. Indian J.Seric,1991:30(1):42-45.
3. Folch J, Lees M, Stanley GHS. A simple method for the isolation and purification of total lipids from animal tissues. J.Biol. Chem,1957:226:497-509.
4. Gilbert, L.I. Lipid metabolism and function in insects.Advances of Insect Physiology,1967:4:69-211.
5. Gupta S, Pathak JPN. Correlation between lipid andwater contents of Bivoltine strain (NB_{18}) of silkworm, *Bombyx mori* L. during its different development alstages. Indian J. Seric,1984:23:42-45.
6. Khanikor D. Some biochemical studies in the fat bodies of two silk worm species (*Philosamia ricini* and *Antheraea assama*, Lepidoptera:Saturniidae) in relation to their food plants. Ph.D. Thesis, Dibrugarh Univ, India, 1999.
7. Pandey RK, Goel RK. Constituents of the young and old leaves of primary food plants of oak Tasar silkworm, *Antheraea proylei*.J. Indian J.Seric,1991:30(1):70-71.
8. Pant R. Some biochemical aspects of the Eri silkworm, *Philosamia ricini* Sericologia,1984:24:53-91.
9. Sarma BJ, Samson MV, Sivaprasad V, Balavenkatasubbaiah M, Dutta RK. Biochemical changes in the haemolymph of the silkworm, *Bombyx mori* L., duringthe progressive infection of nuclear polyhedrosis virus (Bm NPV), Sericologia,1994:34(3):539-541.