Journal of Threatened Taxa

The international journal of conservation and taxonomy

www.threatenedtaxa.org

ISSN 0974-7907 (Online) | ISSN 0974-7893 (Print)

NOTE

A FIRST REPORT OF EGG PARASITISM IN THE TROPICAL TASAR SILKWORM *ANTHERAEA MYLITTA* (DRURY) OCCURRING ON CASHEW

K. Vanitha & S. Santhosh

26 July 2016 | Vol. 8 | No. 7 | Pp. 9045–9047
10.11609/jott.2456.8.7.9045-9047

Journal of Threatened Taxa | www.threatenedtaxa.org | 26 July 2016 | 8(7): 9045–9047

ISSN 0974-7907 (Online)
ISSN 0974-7893 (Print)

A first report of egg parasitism in the Tropical Tasar Silkworm *Antheraea mylitta* (Drury) occurring on cashew

K. Vanitha [1] & S. Santhosh [2]

[1] Crop Protection, Directorate of Cashew Research, Puttur, Karnataka 574202, India
[2] Department of Zoology, Malabar Christian College, Kozhikode, Kerala 673001, India
[1] vanis102@gmail.com (corresponding author),
[2] nairssanthosh@gmail.com

The Tropical Tasar Silkworm *Antheraea mylitta* Drury (Saturniidae: Lepidoptera) is a commercial silk producing insect that has 44 ecoraces in India (Suryanarayana & Srivastava 2005). It is highly polyphagous, reared mostly outdoor and is well adapted to different ecological regions (Agarwal & Seth 1999). Surveys conducted from 2013 to 2015 in the cashew plantations of Puttur and Shantigodu regions of southwestern Karnataka revealed occurrence of *A. mylitta* ecorace KE-02 on cashew (Vanitha et al. 2015). In China, Oak Tasar Silkworm eggs (*Anastatus pernyi,* Saturniidae) were reported to be parasitized by *Anastatus japonicus* Ashmead, and its bionomics and emergence patterns were documented (Wu et al. 2000). In the Andamans, the eggs of a wild silkmoth, *Attacus mcmulleni* Watson (Saturniidae) were found to be parasitized by *Anastatus* spp. (Veenakumari et al. 1992). Our literature survey indicated that so far there is no record of egg parasitoids on *A. mylitta* from any part of the world, though several reports are available on natural enemies occurring on larva, pupa and adult stages of *A. mylitta* (Singh et al. 1992). With this understanding the present investigation was undertaken to explore the occurrence of egg parasitism in *A. mylitta* in the study location.

Materials and Methods: Random surveys were undertaken during 2014 and 2015 at weekly intervals in around 60ha of cashew plantations of the Directorate of Cashew Research, Puttur, Karnataka, India. The region is a hilly track between the west coast and the Western Ghats of India, located at 12.77^{0}N & 75.22^{0}E at an average elevation of 87–90 m. In general, the temperature in the area varies from 16.0–39.0 ^{0}C. The region receives heavy rain during the south-west monsoon between June and September with an annual mean rainfall of 3970mm. The relative humidity varies from 43–98 %, generally above 90% from June–November. The incidence of *A. mylitta* was noticed from July–November, and the egg stage was observed from July to September. Egg laden leaves were collected from the field, kept separately in 500ml transparent glass bottles and covered with a muslin cloth. They were observed daily for any parasitoid emergence.

Based on the number of eggs parasitized out of the total eggs collected, the percentage of parasitism was worked out. The parasitoids were provided with a 10% honey solution soaked in cotton swab to record their longevity. The specimens were preserved in 70 per cent alcohol, later curated and card mounted following the guidelines of Narendran (Narendran 2001). Observations were made using a Leica M205A stereozoom microscope and the specimens were

DOI: http://dx.doi.org/10.11609/jott.2456.8.7.9045-9047 | **ZooBank:** urn:lsid:zoobank.org:pub:D7AA3108-1015-40C4-BD68-E77BDC984ECA

Editor: K. Veenakumari, NBAIR, Bengaluru, India. **Date of publication:** 26 July 2016 (online & print)

Manuscript details: Ms # 2456 | Received 28 January 2016 | Final received 18 May 2016 | Finally accepted 29 June 2016

Citation: Vanitha, K. & S. Santhosh (2016). A first report of egg parasitism in the Tropical Tasar Silkworm *Antheraea mylitta* (Drury) occurring on cashew. *Journal of Threatened Taxa* 8(7): 9045–9047; http://dx.doi.org/10.11609/jott.2456.8.7.9045-9047

Funding: The Research project is funded by Department of Science & Technology, Government of India under SERB-Young Scientist Scheme (SB/YS/LS-42/2014).

Conflict of Interest: The authors declare no competing interests.

Acknowledgements: Authors gratefully thank the Director, Directorate of Cashew Research, Puttur and Prof TCN Trust for Animal Taxonomy, Calicut, Kerala for the facilities provided. Authors also thank DST, India for the funding provided.

deposited in Prof. T.C. Narendran Trust for Animal Taxonomy, Calicut, Kerala for future examinations.

Results: It was noticed that female Tropical Tasar Silkworm moths laid eggs individually both on the upper as well as lower the surface of young and semi-matured cashew leaves (Image 1a), but 70% of eggs was seen on semi-matured leaves. From the healthy unparasitized eggs, the yellowish silkworm larvae hatched within 6–7 days (Image 1b). Upon hatching, the larvae fed more than half the portion of chorion and gradually fed on tender cashew leaves provided to them. Whereas, from a few eggs, parasitic wasps emerged by chewing out a tiny hole of 0.8mm through the lateral side of the chorion (Image 1c). The parasitoids were identified as *Anastatus leithi* (Walker) (Eupelmidae: Chalcidoidea) (Image 1d), which is a solitary koinobiont endoparasitoid.

A total of five parasitoids had emerged out of 42 field collected eggs (Fig. 1), in which two emerged during August 2014 and three during August–September 2015. The average time taken for parasitoid emergence was 17–20 days and at the most 24 days. All the parasitoids that emerged were females. They lived up to 14 days under lab conditions when fed with a honey solution. The mean body length of the parasitoids was 3.292±0.1 mm (Image 3a). The present specimens confirmed as *A. leithi* have the relative lengths of antennal segments as, 0.48: 0.109: 0.12: 0.11: 0.1: 0.115: 0.115: 0.107: 0.08: 0.098: 0.078: 0.0740 (Image 3b). It is a solitary endoparasitoid, stayed less active during the first day of emergence, but remained active thereafter till death. During the present investigation, percent parasitism on Tasar silkworm eggs was recorded at 11.90. This study warrants monitoring in traditional tasar growing areas for the egg parasitoids.

Discussion: This is the first report of egg parasitism in Tropical Tasar Silkworm occuring on cashew anywhere in the world. *Anastatus* spp. parasitizes insect eggs belonging to Blattaria, Hemiptera, Lepidoptera, Neuroptera, Mantodea, Orthoptera, Diptera and Phasmidae (Narendran 2009). *A. leithi* is presently known for its distribution in India as well as Sri Lanka (Noyes 2003). Indian species of *Anastatus* were studied by Hayat (1975), Mani (1989) & Narendran (2009), and 28 species have been described. The taxonomic keys for *A. leithi* were framed based on the characteristics of female leptotype (Narendran 2009). Boucek (1979) stated that *A. leithi* looks very similar to *A. ramakrishnai* Mani. However, it differs from *A. ramakrishnai* by having fore femur without denticle, hyaline band in wings is almost equal in width throughout, median vein almost 2x as wide as long of STV, apex of forewing weakly

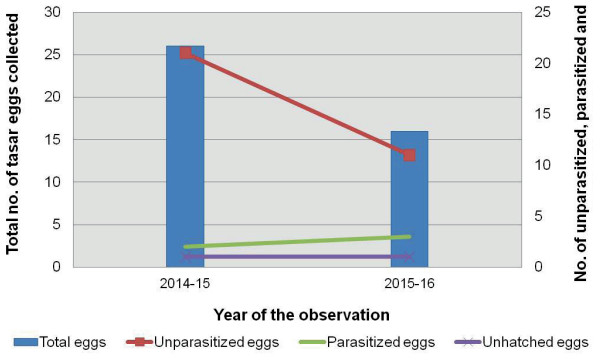

Figure 1. Extent of egg parasitism in tropical tasar silk worm

Image 1. a - unparasitized eggs of *A. mylitta*; b - larva hatched out from an unparasitized egg and its fed chorion; c - Parasitized eggs with emergence hole; d - *A. leithi* female parasitoid

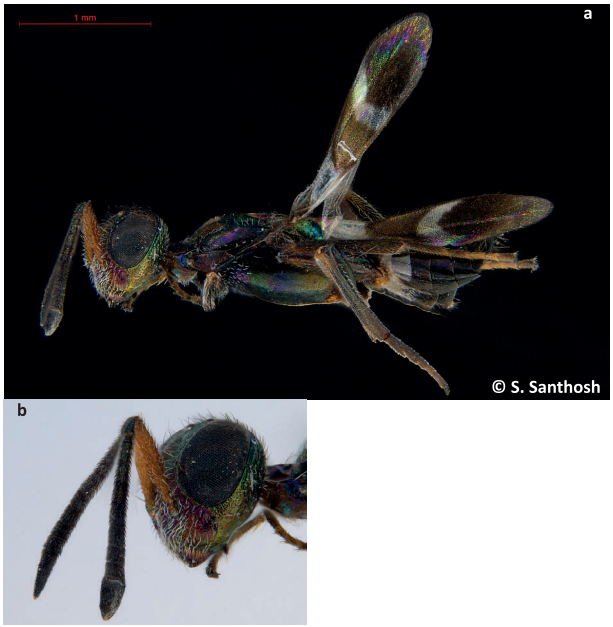

Image 2. a - *Anastatus leithi* female; b - a view of the antennae of *Anastatus leithi*

pigmented and looks lighter than remaining infuscation and ovipositor sheath not concealed (Narendran 2009).

The leptotype of *A. leithi* deposited earlier at the Natural History Museum, London had lost the antennae except the scape and anellus (Narendran 2009). However, the present specimens have intact antennae. In the present study all the five parasitoids that emerged were females. Earlier, Narendran (2009) had reported arrhenotokous parthenogenetic endoparasitism by *Anastatus* spp., hence *A. leithi* females could reproduce without male parasitoids.

A few *Anastatus* species have been used in biological control programmes against insect pests (Boucek 1988). In India, *A. ramakrishnai* was recorded as one of the most successful parasitoids of eggs of pentatomid bugs like *Eupaleopada concinna* Westwood, *Halys dentatus* Fabricius and *Chrysocaris perpureous* Westwood (Velayudhan 1987). In countries like China, eggs of Eri Silkworm *Philosamia cynthia* and Oak Tasar Silkworm *Antheraea pernyi* were commercially used to mass multiply *Anastatus* sp. for their use in pest biocontrol programmes in litchi, longan (Huang et al. 1974) and pine (Zhao et al. 2012). Research is under way in China towards development of in-vitro rearing of *Anastatus* sp. (Cock 1985; Lin & Lin 1998). From that perspective, the rearing possibility of different *Anastatus* species having biocontrol potential may also be explored on *A. mylitta* eggs for their use in potential biological control programmes.

Presently, percent parasitism by *A. leithi* on tasar eggs was recorded at 11.90. So far, *A. leithi* was found to be associated only with blister galls on leaves of *Duranta* sp. (Verbanaceae) (Walker 1872). However, the study regioins had very less duranta plants and were remote from cashew plantations. In the near future, *A. leithi* may perhaps spread to other tasar rearing regions also, and could cause a considerable loss of tasar culture. Hence, this study is important and warrants monitoring in traditional tasar growing areas for this egg parasitoid. However, further investigations are required to understand the host preference, range, life history and extent of parasitism of this particular parasitoid.

References

Agarwal, H. & M.K. Seth (1999). Food plants of the Tasar silkworms, Sericulture in India, Eds.. 761–777.

Boucek, Z. (1979). Description of a new eupelmid parasite (Hymenoptera: Chalcidoidea) of cockroaches in India. *Bulletin of Entomological Research* 69(1): 93–96.

Boucek, Z. (1988). *Australasian Chalcidoidea (Hymenoptera).* A biosystematics revision of genera of 14 families with a reclassification of species. CAB International, Wallingford, Oxon, U.K. Cambrian News Ltd., Aberystwyth, Wales, 832pp.

Cock, M.J.W. (1985). The use of parasitoids for augmentative biological control of pests in the People's Republic of China. *Biocontrol News and Information* 6(3): 213–223.

Hayat, M. (1975). Some Indian species of *Anastatus* (Hymenoptera: Chalcidoidea, Eupelmidae). *Oriental Insects* 9(3): 261–271.

Huang, M.D., S.H. Mai, W.N. Wu & C.L. Poo (1974). The bionomics of *Anastatus* sp. and its utilization for the control of lichee Stink Bug, *Tessaratoma papillosa* Drury. *Acta Entomologia Sinica* 17(4): 362–375.

Lin, N. & H. Lin (1998). Preliminary report on an artificial egg for *Anastatus* sp. (Hymenoptera: Eupelmidae). *Wuyi Science Journal* 14: 206–211.

Mani, M.S. (1989). *The Fauna of India and adjacent countries, Chalcidoidea (Hymenoptera) Part I and II*. Zoological Survey of India, Calcutta, 1633pp.

Narendran, T.C. (2001). *Parasitic Hymenoptera and Biological Control*. Palani Paramout Publications, Palani, 191pp.

Narendran, T.C. (2009). A review of the species of *Anastatus* Motschulsky (Hymenoptera: Chalcidoidea: Eupelmidae) of the Indian subcontinent. *Journal of Threatened Taxa* 1(2): 72–96; http://dx.doi.org/10.11609/JoTT.o1903.72-96

Noyes, J.S. (2003). Universal Chalcidoidea Database. World Wide Web electronic publication. http://www.nhm.ac.uk/chalcidoids. 2003, Version as on September 2015.

Singh, R.N., C.M. Bajpayee, J. Jayaswal & Thangavelu (1992). Perspective of biological control in tasar culture, *Indian Silk* 31(7): 48–50.

Suryanarayana, N., & A.K. Srivastava (2005). Monograph on tropical tasar silkworm. Central Tasar Research and Training Institute, Central Silk Board, India.

Vanitha, K., P.L. Saroj & P.S. Bhat (2015). Indian tropical tasar silkworm on cashew plantations. *ICAR Newsletter* 22(1): 8–9.

Veenakumari, K., P. Mohanraj & R.S. Peigler (1992). Life history of *Attacus mcmulleni* (Saturniidae) from the Andaman Islands, India. *Journal of Research on the Lepidoptera* 31(3/4): 169–179.

Velayudhan, R. (1987). Host preferences in some pentatomids and related impact on the fecundity of their parasitoids. *Proceedings of Indian Academy of Sciences (Animal Sciences)* 96: 281–291.

Walker, F. (1872). Notes on Chalcididae. Part V- Encyrtidae, Myinidae, Eupelmidae, Cleonymidae, Spangiidae, Ormyridae, Encyrtidae, London, 55–70pp.

Wu, Z.Q., L.X. Dong & L. Boqing. (2000). Preliminary study on the method to lure *Anastatus japonicus* Ashmead using eggs of tussah worm. *Journal of Fujian Agricultural University* 29(1): 50–53.

Zhao, D., J. Gao, Y, Wang, J. Jiang & R. Li (2012). Morphology and volatile compounds of metathoracic scent gland in *Tessaratoma papillosa* (Drury) (Hemiptera: Tessaratomidae). *Neotropical Entomology* 41(4): 278–282; http://dx.doi.org/10.1007/s13744-012-0041-0

Journal of Threatened Taxa

OPEN ACCESS

ISSN 0974-7907 (Online); ISSN 0974-7893 (Print)

July 2016 | Vol. 8 | No. 7 | Pages: 8953–9052
Date of Publication: 26 July 2016 (Online & Print)
DOI: 10.11609/jott.2016.8.7.8953-9052
www.threatenedtaxa.org

Article

Bats (Mammalia: Chiroptera) of the southeastern Truong Son Mountains, Quang Ngai Province, Vietnam
-- Nguyen Truong Son, Thomas J. O'Shea, Jeffery A. Gore, Csorba Gabor, Vuong Tan Tu, Tatsuo Oshida, Hideki Endo & Masaharu Motokawa, pp. 8953–8969

Communication

An assessment of human-elephant conflict and associated ecological and demographic factors in Nilambur, Western Ghats of Kerala, southern India
-- C.K. Rohini, T. Aravindan, P.A. Vinayan, M. Ashokkumar & K.S. Anoop Das, Pp. 8970–8976

Review

An updated checklist of shrimps on the Indian coast
-- Vijay Kumar Deepak Samuel, Chemmencheri Ramakrishnan Sreeraj, Pandian Krishnan, Chermapandi Parthiban, Veeramuthu Sekar, Kanagaraj Chamundeeswari, Titus Immanuel, Patro Shesdev, Ramachandran Purvaja & Ramachandran Ramesh, Pp. 8977–8988

View Point

Can philately sensitise people to wildlife / conservation? An introduction to thematic philately and a visual treatise concerning the variety of philatelic material available on owls (Aves: Strigiformes)
-- M. Eric Ramanujam, Pp. 8989–9003

Short Communications

Noteworthy additions to the flora of Uttarakhand, western Himalaya, India
-- Ishwari D. Rai, Gajendra Singh & Gopal S. Rawat, Pp. 9004–9008

Seed germination studies on *Gymnacranthera canarica* (King) Warb. - a Vulnerable tree species of a highly threatened *Myristica* swamp ecosystem
-- K. Keshavachandra & G. Krishnakumar, Pp. 9009–9013

A first note on foliicolous lichens of Assam, India
-- Pooja Gupta & G.P. Sinha, Pp. 9014–9023

Notes

A recent record of the Indo-Pacific Humpback Dolphin *Sousa chinensis* (Osbeck, 1765), (Mammalia: Cetartiodactyla: Delphinidae) from the western shores of Kachchh, Gujarat, India
-- Devanshi Kukadia, Mayurdan K. Gadhavi, N. Gokulakannan, G.V. Gopi, Gautam Talukdar & K. Sivakumar, Pp. 9024–9026

A confirmation of the occurrence of *Euploea sylvester hopei* Felder & Felder, 1865 (Double-branded Blue Crow) from Kaptai National Park, Rangamati District, Bangladesh
-- Tahsinur Rahman Shihan, Pp. 9027–9029

A century later: Tricolored Pied Flat *Coladenia indrani uposathra* Fruhstorfer, 1911 (Hesperiidae: Pyrginae) and Crenulate Oakblue *Apporasa atkinsoni* Hewitson, 1869 (Lycaenidae: Theclinae) reported from Manipur, India
-- Baleshwor Singh Soibam, Harmenn Huidrom & Jatishwor Singh Irungbam, Pp. 9030–9033

On the distribution of *Aeshna petalura* Martin, 1908 (Odonata: Anisoptera: Aeshnidae) in the Indian subcontinent
-- R. Babu & G. Srinivasan, Pp. 9034–9037

Notes on the occurrence of *Mortonagrion aborense* Laidlaw, 1914 (Odonata: Coenagrionidae) from lower West Bengal, India
-- Arajush Payra & Ashish D. Tiple, Pp. 9038–9041

First record of *Speculitermes chadaensis* Chatterjee & Thapa, 1964 (Isoptera: Termitidae) from the Western Ghats, India
-- Poovoli Amina, K. Rajmohana & K.V. Bhavana, Pp. 9042–9044

A first report of egg parasitism in the Tropical Tasar Silkworm *Antheraea mylitta* (Drury) occurring on cashew
-- K. Vanitha & S. Santhosh, Pp. 9045–9047

***Gentiana saginoides* Burkill (Magnoliopsida: Gentianales: Gentianaceae) rediscovered from Sunderdhunga Valley in Uttarakhand 155 years after description: notes on its population status**
-- Dharmendra S. Rawat, Charan S. Rana, Harish Singh & Manish Karnatak, Pp. 9048–9052

zooh! ZÜRICH

WILD ZOO Threatened Taxa

Journal of Threatened Taxa

OPEN ACCESS

ISSN 0974-7907 (Online); ISSN 0974-7893 (Print)

July 2016 | Vol. 8 | No. 7 | Pages: 8953–9052
Date of Publication: 26 July 2016 (Online & Print)
DOI: 10.11609/jott.2016.8.7.8953-9052
www.threatenedtaxa.org

Article

Bats (Mammalia: Chiroptera) of the southeastern Truong Son Mountains, Quang Ngai Province, Vietnam
-- Nguyen Truong Son, Thomas J. O'Shea, Jeffery A. Gore, Csorba Gabor, Vuong Tan Tu, Tatsuo Oshida, Hideki Endo & Masaharu Motokawa, pp. 8953–8969

Communication

An assessment of human-elephant conflict and associated ecological and demographic factors in Nilambur, Western Ghats of Kerala, southern India
-- C.K. Rohini, T. Aravindan, P.A. Vinayan, M. Ashokkumar & K.S. Anoop Das, Pp. 8970–8976

Review

An updated checklist of shrimps on the Indian coast
-- Vijay Kumar Deepak Samuel, Chemmencheri Ramakrishnan Sreeraj, Pandian Krishnan, Chermapandi Parthiban, Veeramuthu Sekar, Kanagaraj Chamundeeswari, Titus Immanuel, Patro Shesdev, Ramachandran Purvaja & Ramachandran Ramesh, Pp. 8977–8988

View Point

Can philately sensitise people to wildlife / conservation? An introduction to thematic philately and a visual treatise concerning the variety of philatelic material available on owls (Aves: Strigiformes)
-- M. Eric Ramanujam, Pp. 8989–9003

Short Communications

Noteworthy additions to the flora of Uttarakhand, western Himalaya, India
-- Ishwari D. Rai, Gajendra Singh & Gopal S. Rawat, Pp. 9004–9008

Seed germination studies on *Gymnacranthera canarica* (King) Warb. - a Vulnerable tree species of a highly threatened *Myristica* swamp ecosystem
-- K. Keshavachandra & G. Krishnakumar, Pp. 9009–9013

A first note on foliicolous lichens of Assam, India
-- Pooja Gupta & G.P. Sinha, Pp. 9014–9023

Notes

A recent record of the Indo-Pacific Humpback Dolphin *Sousa chinensis* (Osbeck, 1765), (Mammalia: Cetartiodactyla: Delphinidae) from the western shores of Kachchh, Gujarat, India
-- Devanshi Kukadia, Mayurdan K. Gadhavi, N. Gokulakannan, G.V. Gopi, Gautam Talukdar & K. Sivakumar, Pp. 9024–9026

A confirmation of the occurrence of *Euploea sylvester hopei* Felder & Felder, 1865 (Double-branded Blue Crow) from Kaptai National Park, Rangamati District, Bangladesh
-- Tahsinur Rahman Shihan, Pp. 9027–9029

A century later: Tricolored Pied Flat *Coladenia indrani uposathra* Fruhstorfer, 1911 (Hesperiidae: Pyrginae) and Crenulate Oakblue *Apporasa atkinsoni* Hewitson, 1869 (Lycaenidae: Theclinae) reported from Manipur, India
-- Baleshwor Singh Soibam, Harmenn Huidrom & Jatishwor Singh Irungbam, Pp. 9030–9033

On the distribution of *Aeshna petalura* Martin, 1908 (Odonata: Anisoptera: Aeshnidae) in the Indian subcontinent
-- R. Babu & G. Srinivasan, Pp. 9034–9037

Notes on the occurrence of *Mortonagrion aborense* Laidlaw, 1914 (Odonata: Coenagrionidae) from lower West Bengal, India
-- Arajush Payra & Ashish D. Tiple, Pp. 9038–9041

First record of *Speculitermes chadaensis* Chatterjee & Thapa, 1964 (Isoptera: Termitidae) from the Western Ghats, India
-- Poovoli Amina, K. Rajmohana & K.V. Bhavana, Pp. 9042–9044

A first report of egg parasitism in the Tropical Tasar Silkworm *Antheraea mylitta* (Drury) occurring on cashew
-- K. Vanitha & S. Santhosh, Pp. 9045–9047

***Gentiana saginoides* Burkill (Magnoliopsida: Gentianales: Gentianaceae) rediscovered from Sunderdhunga Valley in Uttarakhand 155 years after description: notes on its population status**
-- Dharmendra S. Rawat, Charan S. Rana, Harish Singh & Manish Karnatak, Pp. 9048–9052

zooh! ZÜRICH

WILD ZOO Threatened Taxa