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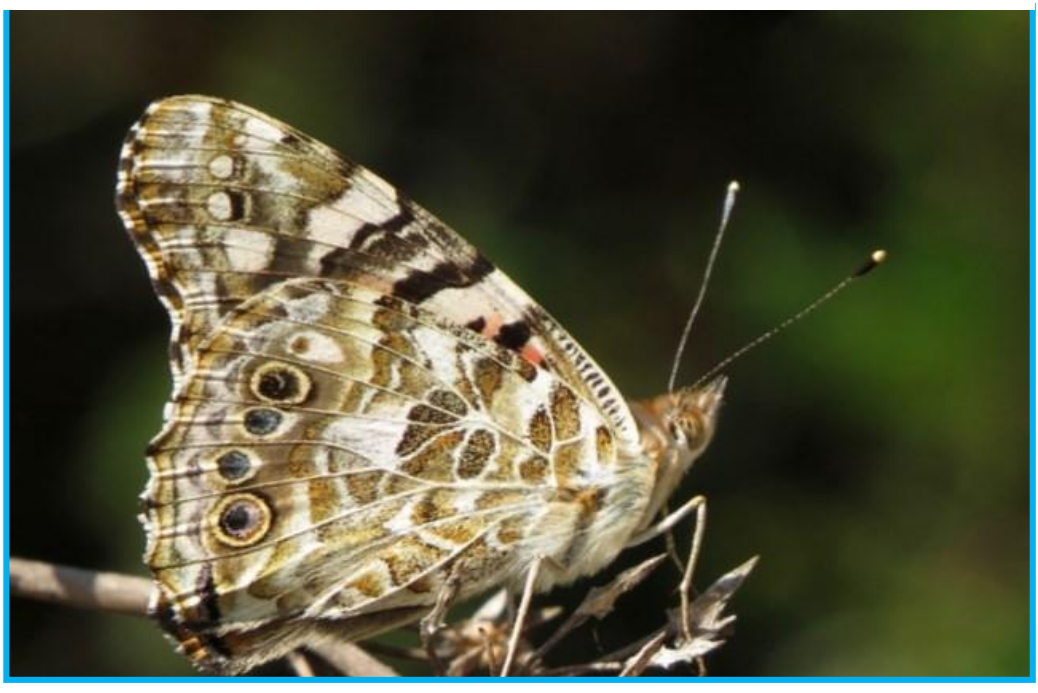

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Cover Photo by Sarab Seth of a Painted Lady Butterfly

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ON THE USE AND LIMITATIONS OF BARCODES IN MODERN TAXONOMY

JEAN HAXAIRE

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(*The author, among the foremost international experts on hawkmoths (Sphingidae), shares his pioneering experience on the importance given to DNA barcoding in taxonomy, based on his own experience.*)

I remember that phone call in early spring 2006, when Dr. Rodolphe Rougerie, postdoctoral fellow in the laboratory of the Canadian Centre for DNA Barcoding at the University of Guelph (Ontario, Canada), told me that they were working on a "perfect" tool to assess the species level of any specimens. He was the first to tell me about the concept of barcoding, even though I was aware that it had been proposed that a short sequence of a mitochondrial gene could give a good indication for identification at species level. Rodolphe was planning to test the validity of barcoding on a whole family of moths. He was facing a major problem. Most of the larger institutions were not willing to permit someone to spend months working on a collection, taking DNA samples of specimens of each species including very rare (if not unique) ones. In summary, he was looking for someone who had a global collection, with more than 90% of the known species, mostly recent specimens (important for DNA) and would be willing to accept his presence for weeks. To my great pleasure, he had thought about me.

He was correct, I immediately accepted, and there followed a very exciting experience. Rodolphe took about 4660 samples (legs of Sphingidae) during his 6 week stay with me. Almost all genera were represented, and more than 95% of the South American fauna was sequenced during his stay. He told me that it would be very useful if I could keep on working with the unsequenced species in the following years, and I did it.

I was very impatient to see the first results, and they were fine. For most of the species, the identification trees were very significant, isolating the taxa with a good percentage of genetic distance. The first and logical question was of course, how many percent distance is required to be sure that we have two different species?. In fact, we have never had any answer to that question, and it is still the most frequently asked one. The good news was that overall, the tool was fine and useful. When we had doubts about a cryptic species, the results of analyzing their DNA were sometimes spectacular, providing clinching evidence to supplement evidence gathered by the traditional approach. For instance, when you think that within a well known, widespread and common species, there are, in fact, two (or

more) hidden species, you may have some evidence based on morphology, anatomy, or just biology (flight-time, host-plant, larval pattern), but you need confirmation. In that special case, the barcodes were more than useful in providing clear and final evidence that you were right (or not).

The situation has not been that idyllic with allopatric populations, isolated on different islands, mountains or valleys. In that situation, it was common to see notable barcode differences (2 or 3 percent) between populations, even though you are certain that they really belong to the same species. No difference in the ecology, biology, morphology, but 3% of difference in CO1 mitochondrial gene. What could we do? Then start the problems, with two different answers. Mine was to do nothing, and to consider that it was just a small, normal, genetic variation due to a significant genetic isolation. But some authors decide to treat the divergent populations as new taxa, and sometimes in large numbers, with a simplistic concept: a different barcode = a new species. First, find a difference in the DNA, and after that, do your best to find a morphologic/anatomic difference. It is axiomatic that when one searches enough for something, you usually find it, in this case, some minor morphological or other difference. In some groups, the number of descriptions has been incredible. When you see the number of new taxa described during the last ten years, you can really estimate the power of the "barcoding effect". The number of Asiatic or South American taxa has more than doubled in some families. It means that there have been more species described during the last ten years than in more than 250 years since 1756! And for most of those "new" taxa, it is impossible to identify them if you do not know the origin of the specimens. Of course, it does not mean that those species are invalid, and it is not unlikely that most of them are correct, but it has definitely changed our species concept. A very normal question now, when someone submits a photo of a specimen in an entomological forum, asking for determination is, "Where does it come from?" It means clearly "no data, no name". This is really a new taxonomical concept. And it has changed a lot of things, including in my own work. I was quite confident with the fact that I was able to put a name to most of the Sphingidae of the world with a good recto/verso picture (with the exception of some very difficult genera like the *Macroglossum* or *Cypa*, for which dissection of the specimen is generally necessary for a reliable determination). Now, I need to have the origin of the moth, and even with that, nothing is simple. The best is to have the DNA sequence of a small part of the CO1 mitochondrial gene (658bp) but this is unaffordable for most of the entomologists, and that's another serious problem of the method. It is an entomology for rich people.

Within some African genera that belong to the Smerinthinae subfamily, with very fragmented populations, the situation is even worse. Almost each population presents a different barcode, and following that logic, should be named as a different species. This is unacceptable.

In my experience, therefore, barcodes have been a very good additional tool to check the validity of a species, but only one tool among many others, and not the perfect one. We have described *Daphnusa zythum* Haxaire & Melichar, even though its barcode is similar to the one of *Daphnusa ocellaris* (Walker, 1856), and we strongly believe in the validity of our new species because we have

morphological evidence. We have seen some South American species like *Nyceryx hyposticta* (Felder, 1874) and *Pachylia ficus* (L., 1758), showing two (or more) very distinct barcodes, but so far, we haven't been able to find any morphological difference justifying the split of *Nyceryx hyposticta* into different species. And last but not least, when the new technique was developed, my hope was that it could help clarify the status of species in some very complex genera, like *Perigonia* or *Neogene*. Unfortunately, this has not been the case; I am sorry to say that it is worse than before.

Now that the novelty has worn off and the confusion has set in, we have to consider the limitations of the barcode approach and recognize it as only one more approach, supplementing traditional approaches to distinguishing taxa within the species concept. It cannot be ignored, it helps a lot with cryptic species, sympatric twin species, but failed to clarify some very difficult genera, and in such cases, it can be misleading if overly relied upon. It has also been used to inflate the number of known species of some families, but that situation will be clarified in due course, with probably a lot of new synonymies being recognized among species described on the basis of over-reliance upon or the misinterpretation of DNA barcode data.

FIRST REPORT OF *SATURNIA CIDOSA* MOORE, 1865 (LEPIDOPTERA: SATURNIIDAE) FROM ARUNACHAL PRADESH AND NAGALAND, INDIA

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Reviewer: Stefan Naumann

The saturniid moth *Saturnia cidosa* is hitherto reported only from "N.E. India" (Type Locality), Nepal (Moore 1865; Naumann & Loffler, 2005) and Bhutan (Irungbam & Irungbam, 2019). Although Hampson (1892) synomised *S. cidosa* with *S. pyretorum* Westwood, [1847], Naumann & Loffler (2005) revised the genus *Saturnia* Schrank,

1802 and recognised *S. cidosa* as a valid species distinguished from *S. pyretorum* by the wing pattern, size and male genitalia. Naumann & Loffler (2005) speculated that Moore's type locality, "N.E. India", might refer to present day Sikkim.

On 4 March, 2013, a moth of this species was photographed by AV sitting on a wall at Mayodia (95°54'36"E; 28°14'01"N) in the Mishmi Hills, Lower Dibang Valley district, Arunachal Pradesh at an elevation of around 2400 m.

On 27 March, 2014, AV photographed a male specimen of *S. cidosa* at Chizami (1000 m elevation)(25°59'18"N; 94°38'25" E), Phek district, Nagaland.

During regular surveys for collection of Lepidoptera across India by AJD, SH, and JMS, 24 specimens of Saturniidae (16 males and 8 females) were collected from the same location at Basar village (27°58'59.99" N and 94°41'59.99" E & 1,625 m elevation), West Siang District of Arunachal Pradesh. Basar is a blessed valley with fertile soil and undulating topography located at the confluence of three rivers and surrounded by tropical evergreen mixed forest that receives rainfall in both South West monsoon and North East monsoon.

The moths were attracted to the moth screen made of white kada cloth with an incandescent lamp of 160 W suspended in front of it. The lamp was switched on at around 8 pm. Subsequently, in another half an hour, moths were attracted to the light. All 24 specimens (16 males and 8 females) that were collected from that location between 22.00 to 23.00 hrs. were identified as *S. cidosa*. The specimens were identified by consulting Moore (1865). The identified specimens were labelled, photographed, registered and deposited at the Parasitoid Taxonomy and Biocontrol Laboratory, Faculty of Agriculture, Annamalai University, Chidambaram. Although Moore (1865) and Naumann & Loffler (2005) reported this species from India (Sikkim) and Nepal, but the distribution of this species in India was not clear until now, since no subsequent reports or collections were made to confirm the distribution in India. Irungbam & Irungbam (2019) reported the species from several localities in Bhutan. The present study confirms the distribution of *Saturnia cidosa* from the extreme east and extreme west of Arunachal Pradesh as well as in Chizami, Nagaland.. Presumably, it is also found in suitable localities in Sikkim and the hill districts of West Bengal, since the distribution extends westwards as far as Pokhara in Nepal.

Male and female of *S. cidosa* Moore, 1865

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ADDITION OF COMMON JAY (*GRAPHIUM DOSON* (C. & R. FELDER, 1864)) TO THE BUTTERFLY FAUNA OF PAKISTAN

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Reviewer: Peter Smetacek

Abstract

The Common Jay butterfly (*Graphium doson*) is reported for the first time from Pakistan.

Introduction

In Pakistan, butterflies have not been well documented. So far, two major works have been published on the butterfly fauna of Pakistan: Roberts (2001), who listed 320 species and Tshikolovets & Pages (2016) who recorded 436 species. In the second publication, several new records of typically Indo-Malayan species were reported which were previously known from as far west as Jammu and Kashmir, Himachal Pradesh or even Kumaon in India. The extension of the known distribution westwards and the substantial increase in the number of species between 2001 and 2016 is probably because most of the area had not been explored. Also, some species are expanding their range westwards.

In the present study, the newly recorded species, Common Jay (*Graphium doson* (C. & R. Felder, 1864)) has expanded its range from India towards the plains of Punjab (Pakistan) in the west.

Methodology

No specimens were collected. Muhammad Babar photographed this species on a Lime tree (*Citrus* sp.) at his home at Doctor's Housing Society, Lahore, Northeastern

Punjab province, Pakistan on 3rd March, 2017 with a Nikon D500 camera.

Results and Discussion

Kumar & Singh (2014) recorded *Graphium doson* from Khanna and Bhatinda in the Punjab plains, India and also observed its life history. Swaraj Raj recorded it from Patiala, Punjab, India; Shakha Sharma and Mamta Sharma recorded it from Jammu, India. (Varshney & Smetacek, 2015). Singh *et al.* (2016) recorded it from Hoshiarpur, Punjab, India. These records show that the species has definitely spread into Punjab plains recently. Sharma *et al.* (2019) clarified that the southern Indian subspecies, *G. d. eleius* (Fruhstorfer, 1907) had recently colonized the plains of Uttar Pradesh and Jammu in India rather than the Himalayan subspecies *G. d. axionides* (Pages & Treadaway, 2014).

Since no specimens were collected, it is not possible to assign subspecific status to the current observation but, since Sharma *et al.* (2019) report *G. d. eleius* from Jammu, it is very likely that the same southern Indian population of this butterfly has colonized Pakistan recently.

Conclusion

The most recent work on butterflies of Pakistan (Tshikolovets & Pages, 2016) listed 436 species for Pakistan. In a recent work on butterflies of Margalla hills, Islamabad by Robert H. Light, at least 3 species were added to the butterfly fauna of Pakistan. After including *Graphium doson*, Pakistan is now known to harbour 440 species. Two species of *Graphium* Scopoli, 1777 were known from Pakistan, *G. sarpedon* (Linnaeus, 1758)(Common Bluebottle) and *G. cloanthus* (Westwood, 1841)(Glassy Bluebottle); the new record of *G. doson* (Common Jay) increased it to 3 species.

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CONFIRMATION OF *EUREMA SIMULATRIX* (STAUDINGER, 1891) (LEPIDOPTERA: COLIADINAE) IN WEST BENGAL, INDIA

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Reviewer: Peter Smetacek

Abstract

Eurema simularix is reported from Jayanti riverbed (26°39´ N; 89°34´ E), Alipurduar district, West Bengal, India.

Introduction

On 16th April, 2018, a single mudpuddling individual of *Eurema simulatrix* was sighted and photographed at Jayanti riverbed, Buxa Tiger Reserve (26°39´ N; 89°34´ E), Alipurduar district, West Bengal, India along with *Appias indra* (Moore), *Appias lalage* (Doubleday), *Ixias pyrene* (Linnaeus), *Eurema hecabe* (Linnaeus), *Appias lyncida* (Cramer) etc. It was observed for a few minutes. The identity was confirmed by Mr. T L Seow, Singapore. A DSLR camera (model no. Nikon D7100). VR 55-200 mm kit lens was used for the photograph.

The species was not observed in that location during the next two days or subsequently, although the author diligently searched for it. Previous records in the literature are from Meghalaya and Sikkim (Varshney & Smetacek, 2015) and from India (Sikkim to Arunachal, NE), Myanmar (Kehimkar, 2016). However, the hill districts of West Bengal were often referred to as Sikkim in older literature, and since this is known to be a low elevation species (Kehimkar, 2016), its appearance in Jayanti, Buxa Tiger Reserve is not unusual. This record confirms the presence of *Eurema simulatrix* in West Bengal.

Acknowledgements

The author is thankful to Mr. T. L. Seow for confirmation of identity of the species; to Mr. Peter Smetacek, Bhimtal, Mr. Shantanu Dey, Delhi and Mr. Amit Kumer Neogi, Dhaka for their suggestions to prepare the manuscript. Thanks to Mr. Kurban Khan for his field guidance and Mr. Arindam Halder for accompanying him in the field.

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CONFIRMATION OF THE PRESENCE OF THE DINGY LINEBLUE BUTTERFLY *PETRELAEA DANA* (DE NICEVILLE, [1884]) (LEPIDOPTERA: LYCAENIDAE) IN BASTAR, CHHATTISGARH

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Reviewer: Peter Smetacek

Keywords: Bastar, Kanger Valley National Park

Introduction

Petrelaea dana (de Niceville, [1884]) is a Lycaenid butterfly which is known from Uttarakhand to North East India; Maharashtra to Kerala; Jharkhand and Andaman Islands in India (Varshney & Smetacek, 2015). Kehimkar (2016) reports it as a forest species of low elevations which flies between March to November. Members of this group are not known to be migratory.

Material and Methods

Opportunistic surveys were undertaken on 24 and 25 July, 2018 in Kurandi Range of Kanger Valley National Park, Bastar, and Chhattisgarh. The paths followed on foot were randomly chosen and the main criterion for choosing suitable paths was the likelihood of encountering butterflies along the way.

Kurandi range is a dense forest which has sal and bamboo as major vegetation along with thick undergrowth. During the survey, in between regular thunderstorms, a group of mud puddling Lycaenids comprising of Common Hedge Blues (*Acytolepis puspa* (Horsfield, [1828])), Lineblues (*Prosotas* Druce, 1891) and Plains Cupids (*Luthrodes pandava* (Horsfield, [1829])) was photographed on a forest track at 2.20 pm. While examining the photographs it appeared that one of the members of the mud puddling congregation was a Dingy Lineblue. This was confirmed by Peter Smetacek.

Discussion

Chandra *et al.* (2014) reported *Petrelaea dana* from GGNP, Koriya district on 17th August 2011 and in Lalpur Range of Kawardha Forest Division on 23rd September 2012. But the only evidence they provided is a misidentified photograph of *Prosotas dubiosa* (Semper, [1879]). It therefore seemed that the species might not occur in Chhattisgarh or along the Eastern Ghats.

A single subspecies of the butterfly occurs in India. The known distribution of this species is disjunct with no known connecting links between the Peninsular Indian and Himalayan populations. The confirmation of the Chhattisgarh population suggests that the peninsular Indian and Himalayan population of the species might be linked via the Eastern Ghats.

Acknowledgement

I am grateful to Ravi Naidu, Jagdalpur for his help with the field work.

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LABORATORY EVALUATION OF EFFICACY OF SOME GREEN PESTICIDES AGAINST *OLIGONYCHUS ORYZAE (*HIRST) (ACARI: TETRANYCHIDAE) INFESTING PADDY

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Reviewer: Peter Smetacek ***Table 1 on page 57***

Keywords: *Oligonychus oryzae*, paddy, West Bengal, green pesticides, bioassay

Abstract

This paper presents the result of a study on bioefficacy of green pesticides *viz Azadirachta indica* (Neem Seed Kernel Extract), *Anona squamosa* (Custard Apple), *Pongamia glabra* (Karanja), *Vitex negundo* (Nishinda) against paddy leaf mite, *Oligonychus oryzae* (Hirst), all at two concentrations *viz* 3% and 5%. The leaf extract of custard apple at both concentrations was found to be most effective while NSKE was the poorest.

Introduction

Oligonychus oryzae is an important pest of paddy in southern and eastern India and often does considerable damage to the paddy crop. Since no study has so far been conducted to control this mite by using green pesticides, this study was undertaken under laboratory conditions to assess bioefficacies of some green pesticides against this mite.

Materials and Methods

The pest mite was collected from South 24 Parganas district of West Bengal state, India around Canning area. The plants which were selected to prepare extracts for assessing their efficacies were *Azadirachta indica* (Neem Seed Kernel Extract), *Anona squamosa* (Custard Apple), *Pongamia glabra* (Karanja) and *Vitex negundo* (Nishinda). In each case, two concentrations, *viz* 3% and 5% were used. The technique for bioefficacy study was as per

Helle & Sabelis (1985), Gupta *et al.* (2007) and Gupta (2012). The standard leaf-dip technique was used for application of extracts. The observations towards mortality were recorded at 24, 48, 72 and 96 hour intervals after application. The percentage mortality was calculated following the formula of Mc.Donald *et al.* (1970). The data were subjected to statistical analysis for interpretation. A control treatment using only water spray was used.

Results and Discussion

The data pertaining to percentage mortality achieved using different treatments of green pesticides on *Oligonychus oryzae* at different intervals after application have been given in Table 1.

24 hours :- A perusal of Table 1 indicates that the highest mortality was recorded in the case of custard apple extract at 5% conc.; 24 hrs. after spraying which was 70.12% and was at par with custard apple extract at 3% conc. where the mortality was 69.89%. Both the extracts were superior to the other treatments. The mortality in different treatments in descending order can be indicated as below – Custard apple 5% (70.12%) = Custard apple 3% (69.89%) > Nishinda 5% (61.25%) > Karanja 5% (59.99%) > NSKE 5% (59.13%) > Karanja 3% (55.21%) > Nishinda 3% (53.02%). There was no mortality in control treatment.

48 hours:- At this interval, the highest mortality was recorded in case of custard apple 5% which was at par with the same plant extract at 3% and both were superior to NSKE 5%, Nishinda 3%, Karanja 5%, Karanja 3% all being at par and was significantly superior to NSKE 3% which was the poorest (59.10%) among all through the treatments. There was no mortality in control treatment.

72 hours :- At this interval, as was recorded earlier, custard apple 5% maintained its superior efficacy registering mortality of 96.29% and was at par with the same plant extract of 3% as well as with Nishinda 3% conc. recording mortality of 96.29%, 95.00% and 92.89% respectively. All these three were significantly more effective than the other treatments. Karanja 5% and Nishinda 5% both were at par registering mortality of 79.81% and 82.51% respectively. NSKE 3% was poorest among all giving mortality of 61.40% after Nishinda 3% which was 73.03% and that superior to the former. There was no mortality in control treatment.

96 hours :- At this interval, Custard apple both at 5% and 3% as well as Karanja 5% and Nishinda 5% all were at par and were superior to NSKE 5%, Karanja 3% and the latter two were at par and superior to NSKE 3%. At this interval, there was no mortality in case of control.

Conclusion

All the plant extracts showed acaricidal properties, with custard apple at both 3% and 5% concentrations proving the most effective among all the treatments, followed by Nishinda and Karanja while NSKE was the least effective of all.

Acknowledgements

The authors are thankful to Dr. Kinkar Saha, Entomologist, Rice Research Institution, Chuchura, West Bengal for valuable suggestions in conducting the study and theSecretary, Ramakrishna Mission Ashrama, Narendrapur, for providing laboratory facilities.

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ADDITIONS TO THE KNOWN BUTTERFLY FAUNA OF KEDARNATH MUSK DEER RESERVE, UTTARAKHAND, INDIA

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Keywords: Kedarnath Musk Deer Reserve; Garhwal Himalaya; butterflies.

Abstract

Nine species of butterflies, i.e. *Papilio bootes janaka*; *Darpa hanria*; *Notocrypta curvifascia*; *Ochlodes brahma*; *Symbrenthia niphanda hysudra; Parantica aglea melanoides; Lethe nicetas* and *Euaspa milionia* are added to the known fauna of Kedarnath Musk Deer Reserve in the Garhwal Himalaya of Uttarakhand.

Introduction

A.P. Singh (2009) surveyed the butterflies of Kedarnath Musk Deer Reserve between 13 May, 2006 and 6 September, 2008. He recorded a total of 3617 specimens of butterflies belonging to 147 species during 11 sampling surveys.

We surveyed the Reserve from 22 May, 2014 to 23 May, 2014. The motor road between Mandal (1528 m) and Kanchulakharak (2660 m) were opportunistically surveyed during the period. In addition to some of the species reported by Singh (2009) the following 9 species were also recorded.

1. Tailed Redbreast *Papilo bootes janaka* Moore, 1857: several individuals of this species were observed on flowering horse

chestnut trees in company of Troidini. We were unable to obtain either a photo or specimen but observed the distinctive character i.e. the red basal marking on the under forewing and hind wing clearly. Unlike the Troidini, they were not found within the forest. Mackinnon and de Nicéville (1899) reported the species from Tehri Garhwal but the exact locality was unknown.

2. Hairy Angle *Darpa hanria* Moore, [1866] (Hesperiidae): two individuals were observed, of which one settled at water for long enough to be photographed. This rare butterfly was earlier known from the Western Himalaya on the basis of two specimens reported by Mackinnon and de Nicéville from Mussoorie in May, 1899 (Peile, 1937). (Figure 1). It remained unreported for more than a century after that from this area.

3. Restricted Demon *Notocrypta curvifascia* (Felder & Felder, 1862), (Hesperiidae): a single individual was recorded near a stream five kilometers below Kanchulikharak. Singh (2009) recorded *Notocrypta feisthamelii alysos* (Moore, [1866]) as Fairly Common in that area.

4. Himalayan Darter *Ochlodes brahma* (Moore 1878) (Hesperiidae): a single male was photographed on a bird dropping between Kanchulakharak and Mandal. (Figure 2)

5. Pioneer *Belenois aurota* (Fabricius, 1793) (Pieridae): several females of this species were seen in open sunny parts. They were probably flighting, since the species is not known to breed at that elevation. (Figure 3)

6. Bluetail Jester *Symbrenthia niphanda hysudra* Moore, 1874 (Nymphalidae): several individuals of this species were observed along the motor road, of which two males were attracted to water. Males often take up a beat in a shady ravine. (Figure 4)

7. Glassy Tiger *Parantica aglea melanoides* Moore, 1883 (Nymphalidae): this species was occasionally observed within this forest. The type locality of the subspecies is Mussoorie.

8. Yellow Woodbrown *Lethe nicetas* Hewitson, 1863 (Nymphalidae: Satyrinae): five individuals of this species were observed. All were in good condition suggesting that the brood had recently emerged. One individual was attracted to an overripe mango. The species was reported as very rare in Mussoorie by Peile (1937), who took two specimens there in 1909. Mackinnon and de Nicéville (1899) did not record the species from Garhwal. (Figure 5)

9. Water Hairstreak *Euaspa milionia* Hewitson, 1869 (Lycaenidae): this rather local species was common in shady ravines. They descend occasionally to water but spend much of their time perched on leaves of bushes and trees. (Figure 6)

Discussion

Singh (2009) noted that the sampling intensity of his study was low as the total sampling period was only 43 days within the study period. It is noteworthy that he reported the Bright-eye Bushbrown *Mycalesis nicotia* Westwood from the reserve on the basis of one female specimen. One of the present authors (Peter Smetacek) examined the specimen and designated it as the female lectotype of the new taxon *Mycalesis suaveolens ranotei* (Smetacek, 2012). Therefore *M. nicotia* should be deleted from the list and *M. suaveolens* inserted in its place. The subspecies was named after Arun Pratap Singh Ranote.

The second half of May is peak flying time for many species and 22nd May was sunny. May 23rd was partly overcast and not as many species of butterflies were observed as on the previous day. Other noteworthy species observed during the period were *Trioides aeacus* Felder and Felder, *Byasa latreillei* Donovan, *Lethe baladeva aisa* Fruhstorfer, *Polyura dolon* Westwood, *Argynnis childreni* Gray, *Spindasis nipalicus* Moore, *Rapala selir*a Moore and *Heliophorus tamu* Kollar.

Conclusion

The present records increase the number of butterfly species known from this Reserve from 147 to 155. Doubtless many species are yet to be reported from this Reserve.

Acknowledgement

The authors are grateful to Mr Akash Kumar Verma, D.F.O. Kedarnath Wildlife Division and his staff at Kanchulakharak for necessary assistance and guidance in the field.

Fig 1. *Darpa hanria*

Fig 2. *Ochlodes brahma*

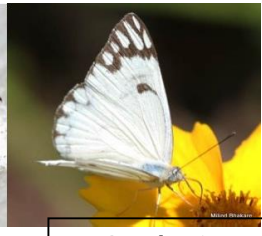

Fig 3. *Belenois aurota*

Fig 4. *Symbrenthia niphanda*

Fig 5. *Lethe nicetas*

Fig 6. *Euaspa miliona*

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A NOTE ON *ISCHNURA NURSEI* (MORTON, 1907): THE FIRST RECORD FROM NEPAL (ZYGOPTERA: COENAGRIONIDAE)

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Reviewer: Parag Rangnekar

Introduction

Morton (1907) described a damselfly species from Deera, India; since he was not certain about the generic placement, he published it as *Ischnura? nursei*. Laidlaw (1919), assigned this unusual species to genus *Rhodischnura* Laidlaw, 1919 because it differs in appearance from all known members of genus *Ischnura* Charpentier, 1840. Dumont (2013) demonstrated in a worldwide DNA analysis of 24 Odonata species that *I. nursei* belongs to the '*pumilio* clade s.l.' and is a real *Ischnura*. Due to its bright red, yellow and black colours on the abdomen, and turquoise on the thorax, *I. nursei* is an enigmatic damselfly. Until 2011, the known distribution of *I. nursei* was limited to India and Pakistan (Nair 2011; Zia *et al.* 2011); Dumont *et al.* (2011) published the first record from Iran; Feulner & Judas (2013) published the first record for the United Arab Emirates; Bashar *et al.* (2014) published the first record for Bangladesh and Kunz (2015b) reported it from Oman. The record of *I. nursei* documented here is the first record for Nepal.

Observations

The Odonata survey was carried out in Jagadishpur lake and Baanganga river of Kapilvastu, Nepal, between January, 2019 and April, 2019.The Odonates were observed and photographed between 09:00 hr and 15:00 hr. during low wind, warm and sunny weather. *Ischnura nursei* was photographed on 24 February, 2019 at 14:04 hr and on same day at 14:37 hr along the shoreline of Jagadishpur Lake (27°37'19.41"N &83° 5'41.54"E). Two male individuals of *I. nursei* were photographed. The first individual was observed basking on a blade of grass (Fig. 1) and the other was observed on the stem of a shrub (Fig 2). The species is an extremely small, low-flying damselfly, which rests frequently. The species was identified by consulting available literature, viz., keys (Fraser, 1933) and field guides and books (Nair, 2011; Subramanian, 2009) and also from the online resources (http://indianodonata.org) and then confirmed by experts.

In the field, the male of this extremely small species was identified at once by the characteristic zonation of the abdomen, which

is tri-coloured in a typical "Belgian" or "German" flag pattern, *viz*. red, yellow, and black on the dorsum and sides (Fig. 1 &2). The pterostigma on the fore wing is larger than on the hind wing and reddish in colour (Morton, 1907; Fraser, 1920; Laidlaw, 1916, 1919) (Fig. 1 & 2). The male appendages are comparatively simple, rather uniformly light brownish in colour.

Figs. 1&2: Two different males of *Ischnura nursei*

Result and discussion

Since its description in 1907, *I. nursei* was known from Pakistan and from all arid areas of Northwestern, Central, and Eastern India (Nair, 2011; Zia *et al*., 2011). It is absent on the less arid Indian Peninsula (Subramanian, 2005; Subramanian *et al*., 2011). The Pakistani records were updated only recently (Zia, 2010; Zia *et al*., 2011). In addition to the westward extension of the known range to Iran, UAE and Oman, *I. nursei* was recorded eastwards too: Nair (2011) reported it twice from Odisha (India), and Bashar *et al.* (2014) published the first two records from Bangladesh. Kumar *et al.* (2015) found it fairly common throughout the year in Northeast India. The record of *I. nursei* from Nepal fills the distribution gap between known eastward distribution to Bangladesh and known westward distribution to Oman. Since artificial habitats like water reservoirs and smaller dams are used by *I. nursei* (Nair, 2011; Feulner & Judas, 2013); the record of *I. nursei* is not surprising as it was recorded from Jagadishpur Lake (Nepal) which is an artificial lake and located adjacent to Northwestern India. This record is an addition to known Nepalese fauna and extends the known distribution of this species to Nepal.

Acknowledgement

The author is highly grateful to Department of Forest, Nepal for the permission to carry out this survey and to Mrs. Karen Coniff for her precious help during confirmation of the species and to Mr. Kritagya Gyawali, Mr. Manoj Sharma, Ms. Shristee Panthee and Ms. Smarika Bhattarai for support.

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A NEW ELEVATION RECORD FOR THE INDIAN TORTOISESHELL BUTTERFLY *AGLAIS CASCHMIRENSIS* (KOLLAR [1844]) (LEPIDOPTERA: NYMPHALIDAE) FROM ARUNACHAL PRADESH, INDIA

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The Himalaya and associated mountain ranges rise from nearly sea level in the plains of Assam, India to 8848 m elevation in Nepal. The proximity to the tropics and the variety of vegetation types clothing these mountains has enabled their colonisation by a vast variety of creatures. The distribution of many of these is restricted to certain altitudinal belts. In the case of Troidine butterflies, the presence of their foodplants have been shown to be a major factor governing their altitudinal distribution (Smetacek, 2011).

The Indian Tortoiseshell *Aglais caschmirensis* (Kollar, [1844]) is a species of nymphalid butterfly found in the northern regions of the Indian subcontinent, primarily in the Himalaya from Kashmir to Arunachal Pradesh (Kehimkar, 2016). Irungbam *et al.* (2017) reported the species from Manipur. It has among the widest altitudinal distributions of any butterfly, being found from 400 – 5,360 m elevation (Kehimkar, 2016). The larval hostplants are species of *Urtica* L.

A specimen of the species was photographed at Miao (230 m), Changlang District, Arunachal Pradesh, on 30 May, 2019 around noon, when it was settling on cowdung outside a cowshed. Although the species is known to visit flowers, it usually does not settle on dung (Peter Smetacek *pers. comm.*)

The present record is around 170 m lower than its previous known lower limit mentioned by Kehimkar (2016). It is possible that the specimen photographed belongs to a resident population, since the larval hostplant, species of *Urtica*, grows abundantly in the area.

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CONFIRMATION OF THE COMMON PALMFLY *ELYMNIAS HYPERMNESTRA UNDULARIS* (DRURY, 1773) (LEPIDOPTERA: NYMPHALIDAE) IN ANDHRA PRADESH, INDIA

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The Common Palmfly *Elymnias hypermnestra* (Linnaeus, 1763) is a butterfly with a wide distribution from Punjab, along the Himalaya to NE India, Maharashtra and Gujarat (Varshney & Smetacek, 2015) and on to SE Asia. The north Indian population is placed in the subspecies *undularis* (Drury, 1773) with a distribution from Punjab to NE India and Gujarat to northern Maharashtra. Although Varshney & Smetacek (2015) treat the taxon *caudata* Butler, 1871 as a subspecies of *E. hypermnestra* with a distribution from Maharashtra to Kerala, Wei *et al.* (2017) recognise *E. caudata* as a good species with a distribution south of a line from Chennai (Tamil Nadu), Bangalore (Karnataka) and Kasargode (Kerala). It is not clear where they obtained their data for the east coast, but the distribution on the west coast is certainly incomplete, since the taxon *caudata* had been recorded from Goa and Maharashtra in addition to Kerala, Karnataka and Tamil Nadu (Varshney & Smetacek, 2015; Bhakare & Ogale, 2018).

While the distribution of these two taxa, *undularis* and *caudata*, is clear on the west coast, little is known of the distribution on the east coast. There are some unreliable reports of *E. hypermnestra* in Andhra Pradesh, but since no evidence was published and this was reported along with such improbable records as *Erites falcipennis* Wood Mason & de Niceville, 1883 and *Euthalia telchinia* (Menetries, 1857), the records are best treated as unreliable (Peter Smetacek, *pers. comm.*).

In Andhra Pradesh, *Elymnias hypermnestra undularis* is a common butterfly and has been recorded from the Papikonda National Park (2 March, 2018), Coringa Wildlife Sanctuary (5 October, 2018) and at the residence of the Divisional Forest Officer, Kakinada (March, 2018), all in East Godavari district. It occurs in the vicinity of palm trees, its larval host

plant and both sexes of adults are attracted to ripe fruit of the palms. The butterfly has been recorded in March and October, suggesting that there are at least two annual generations.

As in other parts of its distribution, the taxon *caudata* has not been recorded in the same localities as *E. hypermnestra*.

Fig 1. *Elymnias hypermnestra* (male)

Fig 2. *Elymnias hypermnestra (Female)*

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RANGE EXTENSION OF *ZESIUS CHRYSOMALLUS* (LYCAENIDAE: THECLINAE: ZESIINI) TO ANAND DISTRICT, GUJARAT

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Reviewer: Peter Smetacek

Keywords: Redspot, Lepidoptera, Anand, Central Gujarat

Abstract:

This note reports the recent sightings of *Zesius chrysomallus* Hubner, [1819] from central Gujarat, extending its known distribution westwards to central Gujarat. The male was observed taking nectar from flowers which provides additional information about its feeding behaviour.

Introduction

The Redspot *Zesius chrysomallus* Hubner, [1819] occurs in forested regions at low elevations with fairly heavy rainfall (Kehimkar, 2016).Within India, it has been reported from S. India, Orissa, (Evans, 1927); Maharashtra to Kerala, Uttarakhand, Uttar Pradesh to North-East India (Varshney & Smetacek, 2015); Southern India up to Gujarat, Odisha, Uttar Pradesh, Bihar, Uttarakhand (Kehimkar 2017). Within Gujarat, this species has only been reported from Ahwa in Dang district (Shull, 1963). Other than this reference, there are no published records of its presence in Gujarat. Recently, it was recorded at Vallabh Vidyanagar, Anand district of central Gujarat which is more than 250 km north of Ahwa, the site of the previous record. Anand district is an agricultural landscape and does not have any forest. However, it has a high density of trees, and is considered the green bowl of Gujarat (Singh, 2013).The climate of the region is semi-arid, tropical monsoon type. The widespread agroforestry in Anand district allows a high density of hedges and roadside plantations, which harbours rich butterfly diversity (Rohit, 2001; Vasava *et al*.; 2007; Variya, 2018). *Z. chrysomallus* was recorded for the first time on 31October, 2017 at 3:30 pm from Vallabh Vidyanagar, sitting on atree about 10 – 12 m above the ground. The second one was sighted on 6 November, 2017, again at 3:30 pm and the third on 16 November, 2017, at 1:28 pm. The butterflies were observed throughout the day during October and November, 2017. Every time, the butterfly was found on *Mimusops elengi* (Figure 1). Females of *Z. chrysomallus* lay eggs on Loranthaceae species (Wynter-Blyth, 1957), *Terminalia catappa*, *Cassia fistula* (Ravikantachari *et al*., 2018) and *Averrhoa carambola* (Valappil *et al*., 2018) which are commonly found in the same area where the present records were discovered. Possibly these host plants and the favourable surroundings may support a colony of these butterflies.

Although a few studies (Bhalodia *et al*., 2002; Gandhi & Kumar, 2016) were conducted to assess the butterfly diversity in certain parts of Dang region, but these studies did not discover this butterfly species again in the same region where Shull (1963) collected the specimen. Earlier studies conducted in Anand Region (Aldrich, 1946; Rohit, 2002; Vasava *et al*., 2008,) did not mention *Z. chrysomallus*. The present records confirm its presence in central Gujarat, and possibly it still occurs in southern Gujarat, which demands intensive surveys.

Feeding observations:

It was believed that the males are pugnacious and are found on damp sand and never visit flowers (Kehimkar, 2008) but the reported male was found on *Mimusops elengi* flowers (Figure 2) with proboscis extended (Figure 3). Individuals were observed throughout day and they spent most of the time on flowers. This

observation adds new information to its feeding behaviour.

Conclusion

Z. chrysomallus was reported earlier in 1963 from south Gujarat and after that there are no published records. The species has been recently sighted in central Gujarat, which is more than 250 kilometres north of its previously known distribution. Hence its distribution range is extended from southern Gujarat to central Gujarat. In addition, males of Redspot were found to be nectaring on *Mimusops elengi* flowers.

FigS 1, 2 & 3. *Zesius chrysomallus*

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EXTENSION OF THE KNOWN DISTRIBUTION OF THE DARK WANDERER (*PARERONIA CEYLANICA*) AND ORANGE-TAILED AWLET (*BIBASIS SENA*) BUTTERFLIES TO THE COROMANDEL COAST, INDIA

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Introduction

The Dark Wanderer (*Pareronia ceylanica ceylanica* C. & R. Felder, 1865)) (Pieridae) and the Orange-tailed Awlet (*Bibasis sena sena* (Moore, [1866])) (Hesperiidae) are inhabitants of dense evergreen forests, the latter ascending to 1500m in the Himalaya. *P. ceylanica ceylanica* is known from southern India, from Goa to Kerala along the western face of the Western Ghats, and Sri Lanka (Wynter-Blyth, 1957). An isolated population, placed under *P. ceylanica naraka* (Moore, 1877), inhabits the Andaman Is. (Evans, 1932; Varshney & Smetacek, 2015).

Within India, the Orange-tailed Awlet is known from Maharashtra to Madhya Pradesh and south to Kerala, Himachal Pradesh to N.E. India; Andaman & Nicobar Is. (Varshney & Smetacek, 2015).

Observations

During an opportunistic survey of the butterflies of Auroville (79° 81'29" E & 12° 00'53" N), which lies in Villupuram district, Tamil Nadu and Puducherry, near the eastern coast of southern India, the Dark Wanderer was recorded several times. It was observed at three locations in the current study, namely Revelation Forest (5 March, 2018),

Pitchandikulam Forest (23 December 2018) (both in Tamil Nadu) and Lantana plantations on the road from Puducherry towards Auroville (multiple sightings from October 2018 to February, 2019, Puducherry). The Orange-tailed Awlet, *B. sena* was also observed at Auroville in April 2018.

Discussion

According the Evans (1932), *P. ceylanica* has two subspecies, of which *P.c. ceylanica* is known from Goa to Kerala (Varshney & Smetacek, 2015). The current records extend the known distribution of the species to the eastern coast of India and suggest that this narrow endemic might actually have a larger distribution than previously known. The forest type at the locations where it was observed is Tropical Dry Evergreen Forest. In this regard, Wynter-Blyth (1957) noted that "in S. India the Dark Wanderer is only found in thick jungle in regions where the rainfall is heavy, usually at the foot of the ghats and never above 3,000 feet. Here it is common all the year round. In Ceylon (Sri Lanka), however, it is common in the drier low country and is found to all heights during the flights." Bhakare & Ogale (2018) note that it inhabits moist, dense forest at lower elevation. Therefore, Tropical Dry Evergreen Forest is a new habitat for the species in India. The fact that it was observed on many occasions at three different locations implies that the species is a resident in the area around Auroville and has a healthy population there.

The Orange Awlet is a widespread species, presumably capable of travelling long distances. The species was observed only once in the course of a year-long survey, on 12 April, 2018 at Pitchandikulam Forest, Auroville, which is a nursery for Tropical Dry Evergreen Forest trees and plants. The possibility that the specimen observed was a migrant cannot be ruled out.

Fig 1. *Pareronia ceylanica*

Fig 2. *Bibasis sena*

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Wynter-Blyth, M.A. 1957. *Butterflies of the Indian Region*. Bombay Natural History Society, Bombay. xx + 523 pp., 72 pl.

RE-APPEARANCE OF THE RED BREAST JEZABEL *DELIAS ACALIS* (GODART, 1819) (LEPIDOPTERA: PIERIDAE) IN THE KUMAON HIMALAYA

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Reviewer: Peter Smetacek

The Himalayan distribution of the Red Breast Jezabel *Delias acalis* (Godart, 1819) was clarified when Smetacek (2001) reported the species from Nainital district in the Kumaon Himalaya, Uttarakhand for the first time since regular records began there in 1947. Prior to this, Evans (1932) gave a distribution of Shimla (Himachal Pradesh) to Burma (Myanmar) for the species, although Wynter-Blyth (1957) questioned the Shimla record and gave a distribution of Nepal eastwards for the species.

Smetacek (2001), on the basis of specimens collected or observed between 1997 and 1999 in Nainital district, speculated that the species contracted and expanded its distribution along the base of the western Himalaya and had probably reached Shimla during the course of one such expansion. Smetacek (*pers. comm.*) did not record the species since its last report in 1999.

On 11 March, 2019, a male Red Breast Jezabel was observed on a flowering buddleia bush outside the Butterfly Research Centre (1500 m), Bhimtal in Nainital district, one of the sites where it had previously been observed during the 1990s. On 22 March, two males visited the site and on 3 April 2019, a female visited the site. These were distinguishable because they had different parts of their wing missing, so it was clearly not a single specimen repeatedly visiting the site.

The present records were after a gap of 20 years. Although the first quarter of 2019 was notable for being unusually wet and cold, with snowfall on the surrounding hills as late as 28 February, it did not affect the quantity of butterflies in the spring brood, which, though emergence was late, were prolific.

Smetacek (2001) reported this species from Nainital district in the months of March, April, November and December. This suggests that there are at least two annual broods in the area during periods when this butterfly has colonised the area. In other parts of its range, there are three generations, the third being a monsoon brood observed by Bailey (1951) in Nepal.

It is interesting that Smetacek (2001) noted that this species has not been recorded in the western

Himalaya for over 50 years prior to 1997, yet its next appearance was only 20 years after the last sighting in 1999.

Acknowledgement

I am grateful to Peter Smetacek for hosting my research during spring, 2019 at the Butterfly Research Centre, Bhimtal and to the authorities of the Institute of Forestry, Pokhara, Nepal for permitting me to conduct my research in India.

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BIOEFFICACY OF SOME GREEN PESTICIDES TOWARDS THEIR OVICIDAL ACTION AGAINST EGGS OF *TETRANYCHUS AFRINDICUS* NASSAR & GHAI (ACARI: TETRANYCHIDAE) INFESTING *ADHATODA VASICA* UNDER LABORATORY CONDITION

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Abstract

The mite species *Tetranychus afrindicus* Nassar & Ghai, 1981 was founed to be a new pest of Vasak (*Adhatoda vasica L*) in the Medicinal Plant Garden of R.K Mission, Narendrapur, Kolkata, West Bengal and a laboratory experiment was conducted to assess the ovicidal action of some of the botanical pesticides (leaf extracts of *Santalum album* L, *Datura metel* L, *Calotropis gigantea* (L), *Saraca asoca* (Roxb.). The results indicate that leaf extract of *Santalum album* was found to be the best registering mean ovicidal action of 36.13% at 3% concentration and 22.47% at 5% concentration while the corresponding values of Saraca *asoca* was61.85% at 3% and 53.24 at 5% concentrations. Leaf extract of *Datura metel* was found to be the second best at both the concentrations.

Introduction

Tetranychus afrindicus has been recorded as a new pest of Vasok (*Adhatoda vasica*) attacking undersurface of leaves during February 2019 causing chlorosis of leaves. This mite was not earlier known from West Bengal. Since, no study was undertaken earlier on efficacy of botanical pesticides against this mite species, it was thought desirable to undertake a laboratory experiment to evaluate the efficacies of some medicinal plant extracts viz., *Santalum album, Datura metel, Calotropis gigantea* and *Saraca asoca* towards causing mortality, repellency and ovicidal action. The present communication pertains to the result of ovicidal action of the aforesaid leaf extracts while the results of the other aspects of this study will be published elsewhere.

Materials & Methods

For studying ovicidal action of *Tetranychus afrindicus* occurring on *Adhatoda vasica*, the technique of Yanar *et al.* (2011) was followed. In this, the test mite was allowed to lay eggs on excised leaves kept on wet cotton pads in a petridish overnight and the next morning, after the eggs had been laid, the adult females were removed. The eggs laid on excised leaves were counted and encircled with a marker. Thereafter, the extracts of 4 plants, *Santalum album, Datura metel, Calotropis gigantea* and *Saraca asoca* were sprayed on the freshly laid eggs in two concentrations, *viz.* 3% and 5%. Another petridish containing one more excised leaf with freshly laid counted number of eggs was kept unsprayed to act as control treatment. Observations towards hatching of eggs were recorded after every 24 hrs till all the eggs hatched in the unsprayed excised leaf kept as control. The percentage of hatching was calculated using the formula:-

[PR= (NC-NT)/(NC+NT) × 100]

(McDonald *et al.* 1970)

NC= Number of mites in control disc

NT= Number of mites in treated disc

The data thus collected were subjected to statistical analysis by using ANOVA

The percentage mortality was determined and transform to Arc-sine square root values for analysis of variance (ANOVA).

Results and Discussion

The data pertaining to ovicidal action of different plant extracts have been presented in Table-1.

Table1: Relative efficacy of plant extracts towards ovicidal action of different concentrations of plant extracts at different intervals

Treatments	% of eggs hatched at different intervals			
	72 hrs	96 hrs	120 hrs	Mean
Datura metel 5%	30.66 (33.93)	40.04 (39.55)	50.29 (45.45)	40.79 (39.98)
Datura metel 3%	48.23 (44.27)	52.17 (46.53)	62.28 (52.40)	55.56 (48.48)
Saraca asoca 5%	42.65 (41.06)	51.37 (46.07)	65.71 (54.46)	52.91 (46.96)

Saraca asoca 3%	52.55 (46.75)	58.50 (50.18)	74.50 (60.00)	57.18 (49.42)
Santulum album 5%	18.87 (26.11)	22.55 (28.69)	26.00 (30.98)	22.47 (28.64)
Santulum album 3%	32.50 (35.06)	35.70 (36.99)	40.00 (39.52)	36.13 (37.25)
Calotropis gigantia 5%	38.20 (38.47)	41.44 (40.36)	55.00 (48.16)	42.70 (41.09)
Calotropis gigantia 3%	50.50 (45.57)	55.00 (48.16)	64.00 (53.43)	54.83 (48.06)
Control	55.56 (48.48)	70.50 (57.42)	80.00 (63.79)	68.68 (56.28)
SEM $^{+}_{-}$	0.63	0.79	0.99	0.80
CD 0.05	1.90	2.30	3.00	2.40

Figures in parentheses are angular transformed values

At 24 hrs interval with 3% concentration
No eggs hatched at this interval either in treatments or in control.

At 48 hrs interval with 3% concentration
No eggs hatched at this interval either in treatments or in control.

At 72 hrs interval with 5% concentration
The lowest % of hatching was 10.87 in case of *Santalum album* which was significantly superior to all other treatments. A mong the treatments, *Saraca asoca* registered the highest percentage of hatching and can be arranged in the decreasing order as below:-
5% *Santalum album* (18.87)<*Datura metel* (30.66) <*Calotropis gigantea* (38.20) < *Saraca asoca (42.65)*
All the treatments were significantly superior to the next one, arranged in increasing order. The % of hatching in case of control was 55.56%.

At 72 hrs interval with 3% concentration
The efficacy was in the same order as was seen in case of 5% concentration. The lowest % of hatching was in case of *Santulum album* which was 32.5 and maximum in case of *Saraca asoca* 52.55%. The % of hatching of different treatments can be arranged for more efficacious to less efficacious as below:-
3% *Santalum album(*32.5) <*Datura metel* (48.23) < *Calotropis gigantea (50.55)* < *Saraca asoca (52.55).*
It may be mentioned, that *Santalum album* was superior to all other treatments, while *Datura metel* was superior to *Calotropis gigantea* and the latter was superior to *Saraca asoca*. In case of control the percentage of hatching was 55.56%.

At 96 hrs of interval with 5% concentration
At 5% concentration the lowest % of hatching was 22.55 in case of *Santalum album* and the highest % of hatching was in *Saraca asoca* where it was 51.37%. The treatments can be arranged from more efficacious to less efficacious as below :-
Santulum album (22.55) < *Datura metel* (40.04) <*Calotropis gigantea* (41.44) <*Saraca asoca* (51.37)
It may be mentioned that the efficacy of both *Datura metel* and *Calotropis gigantea* were statistically at par having no significant difference between themselves. Though, of

course, *Calotropis gigantea* was superior to *Saraca asoca*.

At 3% concentration, the result of efficacy towards ovicidal action was in the order as mentioned earlier and can be arranged from more efficacious to less efficacious as below:- *Santalum album* (35.70) <*Datura metel* (52.17) < *Calotropis gigantea* (55.00) <*Saraca asoca* (58.55) In case of control % of hatching was 70.50

At 120 hrs of interval with 5% concentration

The trend was same as was observed in earlier cases and the treatments can be arranged from most efficacious to less efficacious as below:- *Santalum album* (26.00) <*Datura metel* (50.29) <*Calotropis gigantea* (55.00) <*Saraca asoca* (65.71)

Santalum album was superior to all other treatments, *Datura metel* was superior to *Calotropis gigantea* and *Calotropis gigantea* was superior to *Saraca asoca*. The % of hatching in control was 80.00.

At 3% concentration, the treatments can be arranged from more efficacious to less efficacious toward causing % of hatching as below:-

Santalum album (40.00) < Datura metel (62.28) < Calotropis gigantea (64.00) < Saraca asoca (74.50)

Between *Datura metel* and *Calotropis gigantea*, there was no significant difference but *Calotropis gigantea* was significantly superior to *Saraca asoca*.

Mean % of ovicidal action at 5% concentration , the mean % of hatching can be arranged from more efficacious to lowest efficacious as below:-

Santalum album (22.47) <*Datura metel* (40.33) <*Calotropis gigantea* (44.88) <*Saraca asoca* (53.24)

In this case also, *Santalum album* was superior to *Datura metel, Datura metel* was superior to *Calotropis gigantea* and the latter was superior to *Saraca asoca*.

Mean % of hatched eggs at 3% concentration, the trend was similar as observed in the previous cases. The relative efficacy can be arranged in decreasing order as below:- *Santalum album* (36.13) <*Datura metel* (54.22) <*Calotropis gigantea* (56.50) <*Saraca asoca* (61.85)

In this case also, *Santalum album* was superior to all the others.

Discussion

Little work has been done regarding efficacy of botanical pesticides towards ovicidal action on mites infesting medicinal plants. However, some of the studies which have been made earlier are of Isman *et al.* (2007), Yanar *et al.* (2011), Kumar *et al.* (2009), Tunc 2000. Yang *et al.* (2007), etc., who assessed botanical pesticides for ovicidal action against mite species. None of the authors studied the bio-efficacy of the botanical pesticides taken up in the present study and therefore the present result cannot be compared with any of the earlier studies.

Conclusions

The experiment reveals that all the plant extracts in both the concentrations which were tested have proved their efficacy towards ovicidal action, but the degrees of efficacy varied.

Among the treatments, *Santalum album* was found to have the maximum ovicidal action as evident from the fact that only 36.13% and 22.47% eggs hatched at 3% and 5% respectively while, in case of control the mean percentage of hatching was 68.68%.

Datura metel was the second best where the mean percentage of hatching was 54.22% and 40.33% at 3% and 5%, respectively and 53.24% at 3% and 5%, respectively.

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ON THE ORIGIN OF THE NAME PAINTED LADY FOR *VANESSA CARDUI* (LINNAEUS, 1758) (LEPIDOPTERA: NYMPHALIDAE)

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Reviewer : Peter Smetacek

The Painted Lady is among the most widely distributed butterflies known, being found on every continent except Antarctica (Shields, 1992). The butterfly is common in Europe and was among those named by the creator of the binomial system of classification, Carolus Linnaeus in 1758. The English name for the butterfly, Painted Lady is believed by some to be a euphemism for a lady of easy virtue, referring to the fact that the butterfly is found almost all over the world, as are ladies who practice the oldest profession.

The name Painted Lady was believed to have been coined by James Petiver (1665-1718), an apothecary who coined English names for several butterflies, including Admirals, Tortoiseshells and Brimstone. However, Salmon *et al.* (2001) state that although Petiver published this name, it was an already current folk name for the butterfly.

Since the global distribution of butterflies was unknown in 1699, when the name was published in Petiver's *Musei Petiverani Centuria Prima Rariora Naturae Continens* series, it is unlikely that the

worldwide ubiquity of the Painted Lady has anything to do with the pre-existing folk name. An alternate hypothesis is that some Painted Lady butterflies have, on the underside of the hindwing, markings that bear a remarkable resemblance to a seated lady, in a bonnet and a flowing skirt such as were generally worn in the 17th century and earlier. It is likely that this caught someone's eye and the name was coined. Since it was appropriate, it stuck.

There is considerable variation in the hindwing pattern of *Vanessa cardui*. A female figure does not appear on a large percentage of Painted Ladies. Where a female figure does seem to appear, it doesn't always look like an artist's model. Still, under the circumstances, who is to say that the name didn't originate with a specimen that showed a seated female figure that resembles an artist's model? There is certainly no other plausible alternative explanation for the common name.

Fig: Hindwing of*Vanessa cardui* showing the painted lady.

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REVIEW AND STATUS OF *YPTHIMA NEWARA* MOORE (LEPIDOPTERA: NYMPHALIDAE) IN THE WESTERN HIMALAYA

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Reviewer:Motoki Saito

The Nymphalid genus *Ypthima* Hubner [1819] contains more than 100 species, out of which 35 species are recorded from India (Varshney and Smetacek, 2015). Uttarakhand contains 11 species listed under this genus (Varshney & Smetacek, 2015; Sondhi & Kunte, 2018). Newar Three Ring *Ypthima newara* Moore, [1875] is a moderate sized species with a single subspecies listed in India i.e. *Y. n. newara* Moore, [1875]. Evans (1932) treated this taxon as a subspecies of *Ypthima nareda*, Large Threering. According to Varshney and Smetacek (2015), this species is distributed from Sikkim to northeast India. Smith (1994) also recorded this species from Nepal. There is a single record of this species from the western Himalaya. An individual was collected from Dehradun, Uttarakhand by Ollenbach in 1923 and subsequently reported by Evans (1932), Roonwal *et al.* (1963) &van Gasse (2013). This specimen was deposited at the Forest Research Institute, Dehradun (Roonwal *et al.*, 1963).

A single individual was photographed near Garampani of Nainital district, Uttarakhand at 11:30 hrs (IST) on 10th June 2016. During the two years from May, 2016 to June, 2018, a number of specimens of Newar Three-ring were recorded from Nainital, Chamoli, Almora and Bageshwar districts of Uttarakhand, India. This species was rediscovered from Uttarakhand after a long gap of about 90 years. The species was always present but was overlooked in various surveys due to its similar physical appearance to *Ypthima nareda* Kollar, [1844], Large Three-ring, which is one of the commonest species in Uttarakhand. It can be distinguish from *nareda* by its larger size and underside forewing sub-marginal band of uniform width to tornus.

The rediscovery of *Ypthima newara* also needs to be understood in the context of the lack of past surveys in the region. The genus *Ypthima* is therefore represented by 12 species in Uttarakhand.

Fig: *Ypthima newara*

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FIRST RECORD OF THE TAILLESS LINEBLUE BUTTERFLY (*PROSOTAS DUBIOSA*) FROM SINDH PROVINCE, PAKISTAN

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Reviewer:Motoki Saito

Abstract

The Tailless Lineblue (*Prosotas duboisa* (Semper, [1879])) (Lepidoptera: Lycaenidae) is reported for the first time from Karachi. It is also an addition to the butterfly fauna of the Sindh province of Pakistan.

Introduction

Sindh is the second smallest province of Pakistan and lies to the southeast of the country. It is bordered by Balochistan province to the west (Kirthar range), and Punjab province to the north, Gujarat and Rajasthan states (India) to the east and the Arabian Sea to the south.

The butterfly fauna of this province has been little studied. Mal *et al.* (2014) published a list of butterflies of Sindh, based on previous literature. The actual total number of butterfly species of Sindh is so far unknown. The Tailless Lineblue (*Prosotas duboisa*) has recently been observed in Karachi, the capital of Sindh. This is undoubtedly the first report of this species for the province.

Methodology

AHT found it in a plant nursery in Godhra area of New Karachi town, Karachi, on 30 May, 2019 and again on 1 June, 2019. It was photographed on both occasions with an Oppo A37 cellphone camera.

Results and Discussion

Mal *et al.* (2014) reported 67 species from the whole province. Muhammad Akram has compiled a list of 72 species of butterflies only for Karachi based on literature and records. The Tailless Lineblue is a rather uncommon species in Pakistan. It has been reported from the Murree foothills (Roberts, 2001), Nathia gali (Tshikolovets and Pages, 2016), and Margalla hills, Islamabad (Light, 2018). Pratiksha Patel (*pers. comm.*) recorded it from Gandhinagar, Gujarat, which is the closest known locality to Karachi for the species. Karachi is the westernmost limit of the distribution of the species.

Conclusion

This new record has extended the known range of this species 1144 km southwards and 605 km westwards. The list of butterflies of Karachi has also reached 73 species with this record. The Sindh list needs to be updated.

Figs: *Prosotas dubiosa* in Karachi

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ADDITIONS TO THE HAWKMOTHS OF THE KUMAON HIMALAYA, UTTARAKHAND, INDIA

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Reviewer: Jatishwor Irungbam

Sphingidae of the western Himalaya were documented by Bell & Scott (1937) and Smetacek (1994). A total of 106 species were recorded in the 1994 study, comprising 77 species physically recorded and the remainder included based on distribution records in the literature, which greatly increased the 62 species recorded from the area by Bell & Scott (1937). Two species included by Smetacek (1994) were subsequently dropped. These are *Eupanacra radians*(Gehlen, 1930), which was included based on two specimens in Coll. Hauenstein. Jean-Marie Cadiou (*pers. comm.*) examined these specimens and concluded that they were *E. sinuate* (Rothschild & Jordan, 1903). The second species is *Rhagastis hayesi* Diehl, 1980, which was included on the possibility that it had been overlooked among other members of the genus. However, it has not been recorded in the 25 years since the publication of that paper. Smetacek (1994) proposed that the influx of typically eastern Himalayan species into the area was recent, following climatic change, notably humidity regimes in the western Himalaya.

In the current paper, we report the presence of two more species, taking the total to 108 species reported from the Kumaon Himalaya.

1.*Sataspes infernalis* (Westwood, 1847)

Material examined: 3 exs. Males. Forewing length 30 mm. Madkote (30 08' 21" N; 80 24' 21" E)(258 m), Pithoragarh district, Uttarakhand. 16. v. 2012. *Leg. et coll.* Peter Smetacek, Bhimtal.

This species was previously known from eastern Nepal eastwards (Haruta, 1994) to Sikkim, Bhutan, Bangladesh, Myanmar, eastern China, Hong Kong, Thailand, Vietnam and Borneo (D'Abrera, 1986; Kitching & Spitzer, 1995; Kendrick, 2002; Irungbam & Irungbam, 2019).

2.*Psilogramma vates* (Butler, 1875)

Material examined: I male. Forewing length: 40 mm; Chorgalia (29 21'67"N; 79 51'66"E)(443 m) Nainital district,

Uttarakhand. 25. ix. 2012. *Leg. et coll.* Peter Smetacek, Bhimtal.

The species was previously known from northern Pakistan (Abbottabad and the area along the Afghan border) and India (Jharkhand, Maharashtra, Kerala, Karnataka and Tamil Nadu)(I.J. Kitching, *pers, comm*.) and Sri Lanka (Rafi *et al*., 2014).

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CONFIRMATION OF THE COLONISATION OF PUNJAB, INDIA BY *GRAPHIUM DOSON ELEIUS* (LEPIDOPTERA: PAPILIONIDAE)

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Reviewer: Peter Smetacek

The Common Jay butterfly *Graphium doson* (C. & R. Felder, 1864) is a widespread Indian butterfly. In India, it is represented by two subspecies, *G. d. axionides* (Pages & Treadaway, 2014) which occurs along the Himalaya from Kumaon eastwards at low elevation and *G. d. eleius*, that was reported from Southern India to West Bengal (Varshney & Smetacek, 2015). Sharma *et al.* (2019) reported this from Uttar Pradesh and Jammu on the basis of specimens.

Singh *et al.* (2016) reported the species from Punjab and Kumar *et al.* (2014) bred it in Punjab, but failed to distinguish the subspecies to which the material belonged. Sharma *et al.* (2019) noted that the subspecies *eleius*, which is the southern Indian one, has now colonised Kanpur and Jammu.

Since the subspecific identity of this species in Punjab was uncertain and is only possible to distinguish by an examination of specimens, the species was bred in Patiala in summer 2019. A single larva was found on a false ashoka tree (*Polyalthia longifolia*) in the author's garden on 20 April, 2019. It pupated on 3 May and emerged on 27 May, 2019. The male that emerged was deposited in the collection of the Butterfly Research Centre, Bhimtal, Uttarakhand. It was confirmed to belong to the southern subspecies, *G. d. eleius vide* Peter Smetacek.

Therefore, the subspecies *axionides* has not extended its distribution and the current

extension of the range of the species in northern India is solely by the southern subspecies, *eleius*.

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LABORATORY EVALUATION OF EFFICACY OF SOME GREEN PESTICIDES AGAINST *OLIGONYCHUS ORYZAE (*HIRST) (ACARI: TETRANYCHIDAE) INFESTING PADDY

by Sugandha Mukhopadhyay & Salil Kumar Gupta

Table -1 :- % mortality of *Oligonychus oryzae* achieved due to application of green pesticides at different intervals

Treatment	Concentration	Initial population	% mortality	at different	intervals	after	spraying
			24 hrs.	48 hrs.	72 hrs.	96 hrs.	Mean
T1Karanja	3%	10	55.21	68.35	73.03	86.05	70.66
T2Karanja	5%	10	59.99	69.21	79.81	89.99	74.75
T3Custard apple	3%	10	69.89	78.19	95.00	97.19	85.07
T4Custard apple	5%	10	70.12	79.80	96.29	98.77	86.25
T5 NSKE	3%	10	51.16	59.10	61.40	69.16	60.21
T6 NSKE	5%	10	59.13	68.35	72.35	79.53	69.84
T7 Nishinda	3%	10	53.02	63.91	92.89	94.21	76.01
T8 Nishinda	5%	10	61.25	79.23	82.51	98.33	80.33
Control		10	0	0	0	0	
CD at 5% level			7.32	7.91	8.10	8.78	