

FINAL REPORT

PROJECT TITLE:

INVENTORY OF LEPIDOPTERA OF THE MIDDLE RANGE AND SOUTHERN FACE OF THE MAIN RANGE, KUMAON HIMALAYA, INDIA

DURATION: **December 18, 2009 to December 17, 2011.**

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INTRODUCTION

The main aim of this project was to obtain sufficient comparative data so that the Lepidopteran fauna of the northernmost (main) range and the middle range of the Kumaon Himalaya west of Nepal could be compared with the fauna of the outermost range of the Himalaya. Information for the latter range had been gathered under two previous RSG projects.

Soon after I received the good news that this project had been found suitable in November 2009 and before the funds arrived, I lost my mother and a brother in December 2009. In February 2010, another brother passed away. Thus, most of the winter was spent in organising funerals and seeing to related matters. In addition, my insect collection was put on permanent display at my home and my work formalised under the name “Butterfly Research Centre”. This is now the only museum in Bhimtal and the only place in India where a reference collection of butterflies is accessible to members of the general public. We have had a host of visitors from all over the world during the last one and a half years.

Work on the project was begun by late April, in time for the early brood of butterflies and moths.

A station was established near Kukuchhina in Almora district as the moderate elevation station, which yielded not only some interesting butterfly and moth records, but even the second specimen of a rather rare butterfly not previously reported from the western Himalaya, which has been described as a new subspecies (in press). During the S.W. Monsoons, unprecedented heavy rain during July and September 2010 led to the closure of roads and widespread destruction in the area, which caused some setback to the fieldwork. However, this time was constructively used to catch up on identifications and paper work. Also, an enclosure was constructed at my home to help breeding experiments. There was a brief trip to the Eastern Himalaya in October 2010, mentioned in the interim report.

Insect activity is almost nil during the winter, so again, the time was used to catch up on paper work.

The year 2011 was much better in terms of activity and results. It was possible to visit the main range six times for a week to a fortnight each time and obtain much interesting data. In addition, there were numerous day and two-day visits to the middle range. The data obtained clarifies that

the moths and butterflies are rather different in the main range as compared with the middle or outer range, with a much stronger east Himalayan element in the main range. However, detailed analysis will be better reported in publications, which I am working upon.

A useful development was the return of my moth collection from the 1980s, along with much material gathered by my father between 1949 and 1986, from my late brother's possession. Picking up the threads of taxonomic matters perforce abandoned after 1991 is taking some time, but it is good to have it back!

METHODOLOGY FOLLOWED

In 2010, a field station was established near Kukuchhina in Almora district at an elevation of around 2200m. It was intended that much work would be carried out there during the monsoon months (July to September) for moths. However, the terrible weather during July to September made travel not only difficult but actually hazardous, even after the roads were opened. Consequently, it was not possible to gather as much data from the Kukuchhina site as one would have wished.

In 2011, despite untimely rains and very heavy rainfall during the monsoon months, I visited the main range six times but did not establish any permanent station. The reasons were, firstly, after the experience in 2010 with the washed out roads, it seemed likely that there would be a repeat and it seemed advisable not to pay unnecessary rent as during the last year. Secondly, I visited the Govind Ballabh Pant Institute of Himalayan Environment and Development at Kosi-Katarmal, Almora, which is at low elevation (1120m above mean sea level) and has a campus within which extensive plantation of indigenous trees has been undertaken, so that it is an oasis of greenery in a more or less agricultural landscape. Some of the butterflies of this campus have been photographed and it was possible to add several species to their list during my visits. This therefore served very well as the low elevation station for the middle range mentioned in the proposal.

The fall in the value of the rupee upset calculations for the amount of time one could spend in the field, since in the original budget, I had asked for GBP10 per day, which would have bought around 20 litres of petrol at 2009 rates but only bought 10 litres of petrol at 2011 rates. The price of everything rose accordingly, including food, rentals and portorage.

As a result, it was not possible to spend as much time in the field as was originally intended. Nevertheless, a total of around 280 days were spent in the field, as compared with the 500 days originally intended.

RESULTS

First, a round up of earlier material. During the last two projects, a lot of data had been gathered and literature purchased. A part of the discoveries generated from this was published in fourteen papers during the last two years. These are:

- 1) 2010. A new species of *Ceryx* Wallengren (Lepidoptera: Arctiidae) from the Kumaon Himalaya. *Journal of Threatened Taxa* 2 (5): 894 – 895.
- 2) 2010. The hitherto undescribed male of *Calocalpe abraxidia* Hampson (Lepidoptera: Geometridae: Larentiinae). *Journal of Threatened Taxa*. 2(8):1103-1104.
- 3) 2010. (M. Bhakare and P. Smetacek) Two instances of inter-generic mating by Lycaenidae (Lepidoptera) in Maharashtra, India. *Journal of Research on the Lepidoptera* 43: 23-25.
- 4) 2010. Climate Change and Himalayan Lepidoptera. International Workshop on Mountain Biodiversity and Impacts of Climate Change with special reference to Himalayan Biodiversity Hotspot. G.B. Pant Institute of Himalayan Environment and Development, Kosi-Katarma, Almora. Abstract Book: 130 – 134.
- 5) 2010. *Ypthima kedarnathensis* A.P. Singh (Lepidoptera: Nymphalidae: Satyrinae) from the Kumaon Himalaya. *Journal of Threatened Taxa*. 2(13) 1390-1391.
- 6) 2011. Four new Lycaenid records from the Kumaon Himalaya. *Journal of Threatened Taxa* 3(2): 1555 – 1558.
- 7) 2011. (Ankita Gupta and Peter Smetacek) A new larval host record for *Sphingomorpha chlorea* (Cramer) (Insecta: Lepidoptera: Noctuidae) from Karnataka, India. *Journal of Threatened Taxa* 3(2): 1553 – 1554.
- 8) 2011. Detrimental effects of low atmospheric humidity and forest fire on a community of western Himalayan butterflies. *Journal of Threatened Taxa* 3(4): 1694 – 1701.
- 9) 2011. Notes on the Bombycidae (Insecta: Lepidoptera) of the Kumaon Himalaya, Uttarakhand, India. *Bionotes* 13(2): 72 – 74.
- 10) 2011. On the anomalous altitudinal distribution of the West Himalayan Troidini and Papilionini (Papilionidae). *Journal of the Lepidopterists' Society* 65(2): 126 – 132.
- 11) 2011 (Alok Mahendroo and P. Smetacek) Extension of the known distribution of the Red Pierrot butterfly, *Talicauda nyseus nyseus* Guérin-Ménéville to Kalatope Wildlife Sanctuary, Himachal Pradesh, India. *Bionotes* 13(3): 113.
- 12) 2011. A review of West Himalayan Neptini (Nymphalidae). *Journal of the Lepidopterists' Society* 65(3): 153 – 161.
- 13) 2011. Further additions to the moths (Lepidoptera: Heterocera) of Nainital district, Kumaon Himalaya, India. *Bionotes* 13 (4): 140 – 141.
- 14) 2011. (with Rajni Smetacek) Additions to the known larval hostplants of Indian Lepidoptera. *Journal of Threatened Taxa* 3 (12): 2272 – 2276.

In particular, number 8 (Detrimental effects), which is a pioneering paper on the response of Lepidoptera to forest fire and low atmospheric humidity in India, consists of data mostly gathered under the former two RSG projects. Similarly, the last (Additions to the known larval hostplants....) represents data gathered under the last RSG project, wherein larvae of moths and butterflies were bred. Another paper (number 10, On the anomalous altitudinal distribution....) also contains a lot of data gathered under the previous RSG project on hostplants. Number 15, Further additions to the moths....is a continuation of the two papers published on the basis of data gathered under the former two projects. In all these papers, the support of the Rufford Small Gant Foundation has been gratefully acknowledged.

In addition to the above, there are 9 papers in press, 3 under review and a host in preparation, almost all based on data generated under the three RSG projects.

The results of the current project will take time to process, since many of the moths from the main range are new to me and belong to difficult groups. However, smaller papers dealing with specific findings have been formatted.

Besides the data that was intended to be collected, a most interesting matter came to light. The Western Himalaya is climatically and faunistically somewhat different from the Eastern Himalaya. The Eastern half is characterised by high humidity and temperature, and greater biodiversity, while the western half tends towards a drier Palaearctic climate with affinities to the European fauna. In a low valley on the eastern border of Kumaon, near Nepal, there is a remarkable crucible of Eastern Himalayan flora and fauna, especially orchids and butterflies. The orchids were known, but the butterfly diversity was appreciated when, in response to the discovery of a "lost" butterfly by Mr. Manoj Chandran of the State Forest Department, I rushed to the place and found it teeming with butterflies in November, when butterfly activity over most of Kumaon is reduced in preparation for winter. In addition to the butterflies, the valley contains bromeliads and at some distance, is the only tree fern grove in the Western Himalaya, consisting of three plants.

This valley will now be publicised as the "Valley of Butterflies", much on the lines of Frank Smythe's Valley of Flowers in neighbouring Garhwal and will enable visitors to experience the feel of an east Himalayan forest within a day's drive from Delhi.

HOW THE MONEY WAS USED

From the funds received, the salaries and wages, as well as the postage and internet charges were used as intended. Of the field stations, only one was hired for a year, leaving a sum of GBP 772 extra.

When it became clear in August 2010 that it would not be possible to spend as much time in the field as intended, I got constructed a large enclosure for breeding butterflies at my home. Within this, butterfly and moth larval host plants from higher elevation were introduced to examine whether it was only the absence of the larval host plants that was preventing butterflies restricted

to higher elevation from colonising forests at lower elevation. I used part of the contingency and part of the money from the proposed rental for this purpose. A total of roughly GBP900 was spent on this, including maintenance. The results have been interesting: it has clarified that certain low elevation butterflies do not lay eggs on food plants of the same genus found at higher elevation, suggesting that foodplant availability rather than climatic constraints is responsible for their inability to colonise higher elevation.

Part of the contingency fund was used to pay for membership for me and Rajani Smetacek in the Lepidopterists' Society (US\$50/- + US\$10/-).

The remaining funds were used for field trips, as intended in the original proposal, but the number were reduced as mentioned above due to the great fall in the value of the Indian rupee.

CONCLUSION

The present project generated a large amount of data on the Lepidoptera of the middle and inner range of the Kumaon Himalaya. Processing this data is underway. Comparison with data gathered under the previous two projects (1. Inventory and comparison of moth communities inhabiting different forest ecosystems in the foothills of the Kumaon Himalaya, India, and 2. Hostplants and early stages of Lepidoptera in the Kumaon Himalaya, India) will clarify the distribution and affinities of a large number of moths and butterflies in the Kumaon Himalaya. The data gathered during the course of these projects have resulted in 18 scientific publications in Indian and international journals. So far, one new species (*Ceryx mirabilis*) and the undescribed sexes of two species (*Orthozona quadrilinea*, *Calocalpe abraxidia*), two new butterfly subspecies (*Neptis clinia praedicta* and one in press) have been described from data largely generated under this series of projects.

A large number of moths previously unreported from the Kumaon Himalaya have been added to the known fauna and ecological comparisons made which will have far reaching implications for the conservation of the flora and fauna of the Western Himalaya.

In addition, 9 papers are in press, 3 are under review and material for at least a dozen more is on hand.

IMAGES ATTACHED:

1. Low cost butterfly house constructed at my home.
2. *Neptis clinia praedicta* Smetacek, described in September 2011.

OTHER ATTACHMENT

Additions to the known larval hostplants of Indian Lepidoptera PDF.