

**BUTTERFLY MIGRATION ACTIVITY
IN SOUTHWESTERN INDIA
DURING SEPTEMBER AND OCTOBER OF 1986**

by
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Introduction

During my childhood in the Nilgiri Mountains of South India very large butterfly migrations were observed every year from 1954 to 1958 (LARSEN, 1978). Following the observation of a fairly large butterfly migration along the southern flanks of the Nilgiris in April/May 1986 (LARSEN, 1987) and information given by local residents, I am now satisfied that the period of these flights were in September/October, and not in spring as tentatively suggested in the paper referred to. A revisit to the school where the original observations were made indicates that the direction was towards the SW rather than due S as stated in the paper. During the late autumn of 1986 there was significant migration activity in Kotagiri and elsewhere in the Nilgiris which this paper attempts to summarise.

Observations during September/October 1986

After the brief, but massive, migration towards ENE in late April and early May 1986 little migratory activity was seen, except for a bit of flighting by the two *Catopsilia* in early July. However, in the little hamlet of Kotagiri, 1900 m, on the Nilgiri plateau migration began on 13.IX. and lasted till I left the area on 18.X. During most of this time three different migration streams were in evidence, but all three were very thin – so thin, in fact, that they would not have been evident to a casual observer. The fact that several directions were involved made detection of the movement all the more difficult.

Initially the dominant species were the two *Catopsilia*, but many others were involved as well (see table 2). Most of the butterflies were flying due south. Poor weather, frequent absences from Kotagiri, and the fact that the migration was very thin made attempts at systematic observation and quantification difficult. However, the movements continued into October.

On 3.X. I was back in Kotagiri on an excellent day and it became possible to distinguish between three distinct migratory streams. The one directed due S was now the weaker of the three with *Tirumala septentrionis* BUTLER as the domi-

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nant species. A larger stream was travelling nearly SE (125°), dominated by *Catopsilia*, *Papilio demoleus* LINNAEUS, small Hesperidae and the two Nymphalids, *Hypolimnas bolina* LINNAEUS and *Junonia hierta* LINNAEUS. There was also a weak movement towards the SW (225°) with no dominant species, though later *T. septentrionis* was to predominate. The three streams were definitely separate and there was no cross-over from one to another. On 4.X. there was little movement, but on 5.X. I saw many migrants at Avalanche some 40 km from Kotagiri, and GORDON THOMPSON reported a solid migratory movement on the southern plains from Bhavani Sagar to Mettupalayam. On 7.X., the SW stream was dominant with more than 60% of the total being *T. septentrionis*, and this was also the case at Kallar two days later.

On 10.X. the emphasis had shifted to the SE stream which this day was joined by five *Pachliopta hector* LINNAEUS and a single *Hebomoia glaucippe* LINNAEUS, the first time I observed these as migrants, though I remember them from my childhood. From 10 to 18.X. there was constant movement on all three axes in varying intensities and species-mix. On 15.X. a fourth axis opened up directed nearly due N (15°), though nearly only *Catopsilia pyranthe* LINNAEUS was involved. As I was leaving Kotagiri on noon on 18.X. a dragonfly joined the SE migration in very large numbers.

During the afternoon all three migratory streams were very much in evidence at Masinagudi on the southern foothills of the Nilgiris, and the next day further north at Devarashola near Gudalur the migration had firmed up considerably with an emphasis on the SW stream dominated strongly by *T. septentrionis*. The result of one half hour and one quarter hour of observations on 15 m front are given in table 1 below.

Table 1 SW migrants observed at Devarashola in the Nilgiri Wynaad over a 15 m front on 19.X.1986

Species	13.50	14.35
	14.20	14.50 (x)
<i>Tirumala septentrionis</i>	54	38
<i>Euploea</i> spp.	9	12
<i>Junonia hierta</i>	7	0
<i>Papilio demoleus</i>	6	14
<i>Catopsilia pyranthe</i>	6	14
<i>Junonia lemonias</i>	5	4
<i>Phalanta phalantha</i>	4	0
<i>Precis iphita</i>	1	0
<i>Catopsilia pomona</i>	1	6
Total	93	88

Table 2 below summarises the Kotagiri observations in the four streams. When referring to the table it must be remembered that even on one of the better days not more than 100 to 300 butterflies would pass through the 50 metres of observable garden on any of the three axes.

Table 2: Species involved in the four migration streams at Kotagiri [F=few (less than a dozen crossing a 50 m front per day); M=moderate (up to a hundred); L=larger numbers (100 + per day)]

Species	Migration Stream			
	SW	S	SE	N
<i>Pachliopta hector</i>	o	o	F	o
<i>Papilio demoleus</i> (8) *	F	M	M	o
<i>Papilio polytes</i>	o	F	o	o
<i>Hebomoia glaucippe</i>	o	o	F	o
<i>Appias</i> spp.	F	o	o	o
<i>Catopsilia pomona</i> (3)	L	M	L	F
<i>Catopsilia pyranthe</i> (1)	L	M	L	L
<i>Lampides boeticus</i>	M	o	M	o
<i>Danaus genutia</i>	o	F	o	o
<i>Tirumala septentrionis</i> (2)	L	M	M	o
<i>Euploea</i> spp.	F	F	o	o
<i>Phalanta phalantha</i>	F	o	M	o
<i>Hypolimnas bolina</i> (6)	F	L	M	o
<i>Hypolimnas misippus</i>	o	o	F	o
<i>Junonia hierta</i> (5)	M	o	L	F
<i>Junonia lemonias</i> (7)	F	F	M	o
<i>Precis iphita</i>	o	o	F	o
<i>Libythea myrrha</i>	o	o	o	F
<i>Acraea terpsicore</i>	o	F	o	o
<i>Badamia exclamationis</i>	F	F	F	o
<i>Hasora chromus</i>	o	F	o	o
<i>Pelopidas/Borbo</i> ssp. (4)	F	F	L	o

* The numbers from 1 to 8 indicate the most frequent migrants. I also saw one specimen of each of *Yphima huebneri* and *Mycalesis patnia* on the SW stream. They are most unlikely migrants, but they were on the SW stream and are not normally seen at this level (1900 m).

Behaviour

The behaviour of the migrants was more or less the usual one as described in the 1987 paper on the spring migration, but on the whole it did give a more indisciplined impression. Some individuals would wander off course, many stopped to feed on Lantana or to bask, some circumvented rather than surmounted obstacles.

However, one *T. septentrionis* did give a fine display of migratory singlemindedness. It had flown into a brilliantly white wall directly in the direction of flight. For more than five minutes it flew blindly into the wall inside a circle of one metre. Finally it settled on the wall as if to decide what to do, began flying again and gradually reached the corner of the building so that it could resume flight.

Though relatively common on the SE stream the small skipper flew like a bullet and eluded capture. However, *Pelopidas mathias* was common at Masinagudi and this is the most likely candidate. It must have been flying at 50 km/h plus.

As I remembered from my childhood *Pachliopta hector* and *Hebomoia glaucippe* would invariably fly much higher than the other migrants, usually more than six metres above the ground.

Comparison with the spring migration

The species composition of the spring and the autumn migrations were very different. *Junonia lemonias* (no 1 in the spring migration) came very low down the list, while *Catopsilia pyranthe* which dominated in autumn had been only number 7 on the spring list. *Euploea* which had been number 4 in spring was hardly seen. *Cepora nerissa*, *Ixias pyrene* and *Ixias marianne* (nos 5, 6 and 12 in spring) were wholly absent. On the other hand *Badamia exclamationis* the small skipper, *Hypolimnna bolina*, *Pachliopta hector* and *Hebomoia glaucippe* were definitely absent in spring.

The spring migration was quite dense over a narrow front with a core of only four kilometres. The present one was thinly but evenly spread over at least 80 km and possibly much more (see map). All told it lasted for more than a month, while the spring migration lasted less than a week.

The spring migration in the core area had 52 specimens crossing a hundred metre front per minute. At Kotagiri in autumn the figure was not more than about four, less than a tenth. However, at Devarashola the intensity rose to about 20 and it is likely that some intensification would have taken place also in Kotagiri. The migrations of my childhood were much denser and species of *Appias* were co-dominant.

Only in the case of the small S stream was there a movement directly opposed to the N and ENE movements of spring. The SW migration was not a 180° reversal of the main ENE stream of spring (see fig. 1). In all cases the species composition was very different.

Table 3 attempts a quantification of the combined S, SE and SW streams based on the Kotagiri observations.

Table 3: Quantification of the autumn migration

Number of migration days	40
Average daily activity in hours	5
Minimum front in metres	80.000
Number of migrants per metre per hour	2.4
Total Migrants Sept/Oct	38.000.000 \pm 50%
Of which:	
SW Migration	30%
S Migration	15%
SE Migration	50%
N Migration	5%

The estimate of 38 million may be very far off the mark, but it is based on Kotagiri data which are very much lower in intensity than the Devarashola and Mysore ones, and there was every indication that the migration would last for longer. It is quite certain that a very major event was taking place, though it rarely looked impressive in any given place. The spring migration had been only some four million strong.

Observations further north

On 20.X. I left Devarashola to go north to Mysore and the three migration streams were in evidence till Mysore City after which they died out abruptly. Between Mysore and Goa no migration activity was seen at all.

On 23.X. some 150 km N of Goa there was clear migratory activity to the SE, SW and SSW and this continued almost all the way to Bombay. The density was intermediate between that of Kotagiri and that of Devarashola, and as I came closer to Bombay the SSW stream became the most evident. It is not easy to study butterfly migration from a fast moving car, but it was clear that these migrations were dominated by *Euploea* and *Parantica aglea*, a species that I never saw migrating in the Nilgiris. Most of the other species mentioned in marked contrast to the species composition in the Nilgiris.

The following days in Maharashtra and Gujarat no migratory movement was seen, though butterflies were plentiful in the Gir Forest Lion reserve.

On the 27. and 28.X. moderate numbers of southwards migrating *Papilio demoleus*, *Catopsilia pyranthe* and *Catopsilia pomona* were seen in the barren wastes of the Rann of Kutch Wild Ass Sanctuary where no other butterflies were to be seen.

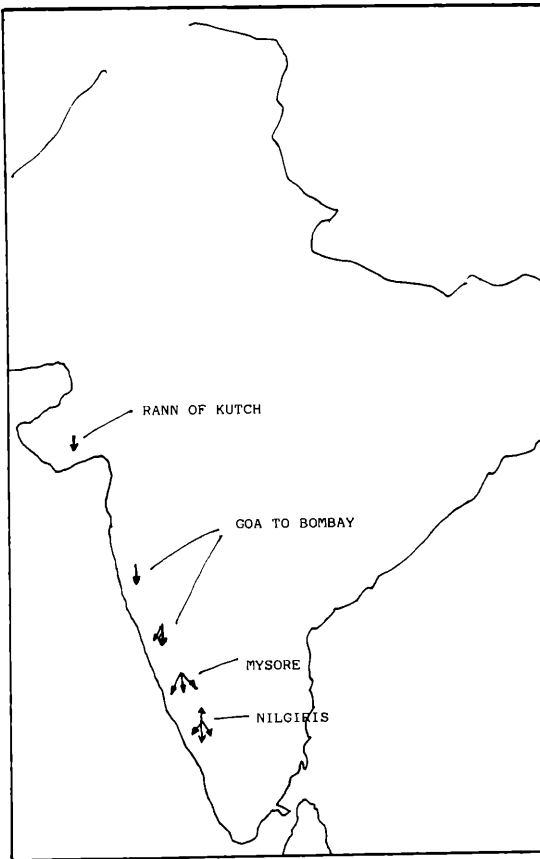
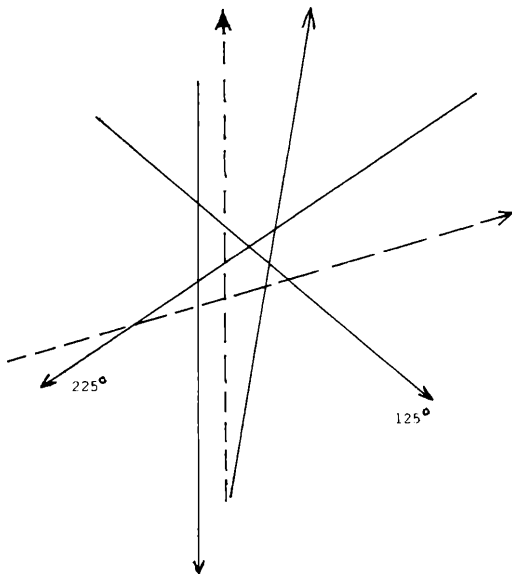


Fig. 2: Butterfly migrations observed during September and October of 1986

Fig. 1: The six migration axes at Kotagiri in 1986

- 75° = main spring migration
- 0° = subsidiary spring migration
- 125° = autumn migration
- 225° = autumn migration
- 180° = weakest autumn migration
- 15° = northwards autumn migration



Discussion

This paper is intended mainly as a description of the migration activity personally witnessed during 1986. I would hope to relate it to the total volume of migration data from S India and Sri Lanka at a later date. However, a number of initial points do emerge.

First, the total level of migratory activity in South India is very considerable. Assuming that the same activity takes place also south of the Nilgiris more than 100 million specimens are involved.

Second, the migratory activity is a regular annual event, though doubtless volume and composition will vary from year and the timing probably as well.

Third, the autumn migrations are not simply a reversal of the spring migrations, since neither directions nor species composition are fully complementary.

Fourth, the timing of the migrations are linked in spring to the onset of the SW monsoon, and in autumn to its retreat as the NE monsoon. This is consistent with other South Indian data.

Fifth, the existence of two to four different migratory streams at the same time is evidence that while the monsoon triggers off the migratory response, different populations may get locked onto different migratory tracks, usually going between N and E in spring and towards the south in autumn.

Finally, I cannot help commenting on the fact that the season of migration and the season of maximum mudpuddling activity coincide. Most, but not all, of the avid mudpuddlers are migrants. Is there a connection? Or do the same environmental cues simply trigger off the two different behaviour patterns.

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