

Some notes on the territorial activity of Brown Hairstreak *Thecla betula* (L.) (Lep.: Lycaenidae) in particular, its timing.

Brown Hairstreak butterflies are popularly supposed not to fly much before late morning and then only when air temperature has reached a critical threshold. For example, Green, J. E. (1990. The History, Ecology and Habits of *Thecla betulae* in Worcestershire *Ent. Rec.* **102**: 253 - 266) reported that 'typically, given a good day, it is not worth starting searches until 11 am BST and I consider that a minimum shade temperature of 18°C with sunshine and little or no wind are required before there is any sign of adult activity'. Thomas, J. & Lewington, R. (1991. *The Butterflies of Britain & Ireland*. National Trust & Dorling Kindersley) concurred, stating that 'females that remain in the colony fly only on the warmest of days, and are seldom seen before 10am ... it is unusual for a Brown Hairstreak to fly in air temperatures lower than about 20°C.

We have spent much time over the last decade observing the tree-top activity of Purple Emperor *Apatura iris* and White-letter Hairstreak *Satyrrium w-album* in a number of localities. On a typical trip [for Brown Hairstreak], we would not usually arrive much before 10.00 hrs and at this time only one or two Brown Hairstreaks might be seen, perhaps nectaring or in flight. Typically, we would then have to work quite hard over many hours to see more Brown Hairstreaks, perhaps encountering a female basking or egg-laying or a male might be seen perching still, with closed wings, for many hours on a tree or shrub. It seemed that arrival at 10.00 hrs was invariably followed by a decline in general Brown Hairstreak activity

Meanwhile, around 2004, Butterfly Conservation Upper Thames Branch, in an ongoing study of this species, had begun to identify many ash trees at various locations where males and females could be seen. Watching these tree-tops as the morning wore on, there appeared to be an obvious decline in typical male territorial activity, such as prominent perching, regular patrols of the canopy and clashes with other males, and by late morning the males appeared far less active. This led us to suspect that activity might be taking place before 10.00 hrs and so we began to time our visits earlier, arriving soon after 08.00 hrs and watching through to approximately 11.00 hrs. From arrival, we were rewarded with spectacular displays of male territorial activity and high numbers of individuals seen, for example 20 seen at 4 locations on 28 July 2006, 28 at 3 locations on 31 July 2007 and 28 seen at 3 locations on 15 August 2008.

The weather for the morning of 23 August 2008 was forecast to be sunny and still, so a detailed study was planned for that morning. Our favourite site has been beside a small hump-backed railway bridge, one kilometre north of Piddington, Oxfordshire (O.S. grid reference SP 638186). This is an ideal location where the canopy of a medium sized ash tree can be viewed from the elevated 'hump' of the bridge at perhaps 15-20m distance. The site is fairly self-contained, with a second smaller ash and oak, and adjacent blackthorn, hawthorn and hazel scrub and hedgerows running away along the road and railway sides. Activity here was recorded for continuous 15 minute intervals from 07.15 hrs to 12.15 hrs. Temperatures were also logged at 15 minute intervals using temperature sensors/data loggers. One sensor was placed in the shade at 2m height, and another was placed to receive sunshine on the side of a shrub, also at 2m height. The sensor placed in the sun was black in colour and not dissimilar in size to that of a brown hairstreak, in order to get some idea of the potential temperatures experienced by a basking individual. Time and resources being limited, only one detailed recording session was possible, during which the weather was generally still, with occasional very light breeze from the north-west. Some light cloud obscured the sun mainly from c.07.45 hrs to c.08.30 hrs. The majority of the activity was on the sunny south-east and sheltered side of the crown of the main ash 1, although there was also plenty of activity over the crown of that tree and in its central depression, providing good views from the bridge; a male was also present occasionally on ash 2.

Table 1. Summary of Brown Hairstreak *Thecla betulae* observations at Piddington, Oxfordshire on 23 August 2008

07.15	11°C in shade, 21.5°C in sun 2 females were located on prominent high perches on the south side of ash 1; a 3rd female found likewise on ash 2; wings closed; one just opening and basking. 1 male located high on ash 1, walking; flew to higher perch and began basking.
07.30 07.32 to	11°C in shade, 27°C in sun Basking male embarked on a search of the ash canopy and landed beside a perched female; the male began courtship of female, quivering its body; rejection by female, walking slowly away, and

07.35	below leaves; cloud ended activity.
07.39	Brighter; female moved directly towards male; male moved away; 2nd time female 'buted' male then male flew off.
07.45	11.5°C in shade and <20°C in sun.
07.49	Male basking high on ash, flew off on patrol, landed near 2nd female, then flew off. Cloudy weather followed from 08:00hrs, halting activity.
08.45	Sun emerged and temperatures rose to 12.5°C in shade and 20.5°C in sun, prompting male territorial flights and the first clash of the day.
08.48	Females began basking; short flight by one to a new position. Male flight to perched female; courtship by male; rejection by female; both flew away.
09.00 09.01	13.5°C in shade, 25°C in sun Female flew down from ash and low over the railway bed; eventually landed a few inches from the rail and began basking; on approach of a train, must have flown as no longer visible.
09.45 09.46	15°C in shade, 29°C in sun 2 males in lengthy clash spiralling high into sky and 50m from ash southward, before returning individually to ash crown.
08.45 to 10.45	Minimum 3 males present. Heightened male territorial activity with a minimum of 13 clashes (93% of total) each involving 2 males. A minimum of 84 territorial flights, additional to clashes (76% of total).
10.45 to 12.15	Activity at a much lower level and confined mostly to one or two males making regular flights.

In addition to the observations of female activity described in Table 1 above, females made at least 12 flights in ash 1 between 09.00 hrs and 12.00 hrs; nine flights occurred between 09.00 hrs and 10.15 hrs. Females did not engage in any perching/searching activity that is associated with the males; rather they would fly into the ash, or under leaves, avoiding any male attention. One of two females appeared to remain in ash 1 throughout the period of observation, flying at times and creeping around on twigs.

Figure 1 shows the male territorial activity in terms of 'search flights' and 'clashes' noted during each 15 minutes period. The activity given for each time refers to the total for the following 15 minute period, whereas the temperatures, for shade and sunshine, given for each time were logged at that specific time. Search flights are when a male launches from its perch and flies widely in a jittery hairstreak fashion, quite close to and around much of the canopy; if no other Brown Hairstreak are encountered it will often return to perch at, or near, its original position. Territorial disputes or 'clashes' between males was recorded to the minute and subsequently added up for each 15 minute period as per the 'search flights': all clashes were limited to two males.

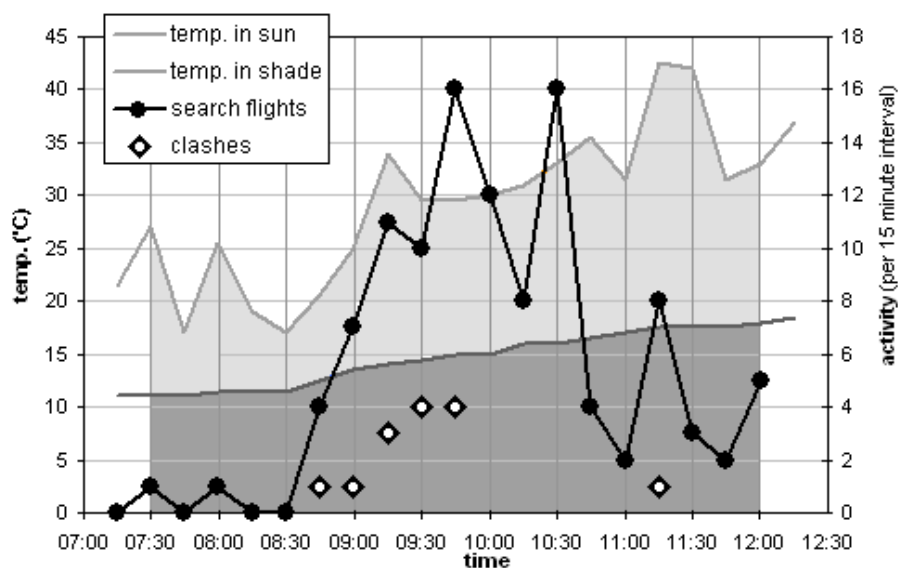


Figure 1. Activity of male Brown Hairstreak *Thecla betulae* at Piddington, Oxfordshire on 23 August 2008

Male activity was so intense and wide ranging between 09.15 hrs and 10.00 hrs, that it became difficult to be certain that all activity had been both observed and logged. This is a typical problem when observing hyper-active territorial males of various butterfly species that use tree canopies in this way. In comparison, once male disputes or clashes had subsided after 10.00 hrs, the remaining males (Table 1, 10.45 hrs to 12.15 hrs) could be more easily tracked in terms of their favoured perch locations and flights.

Our observations suggest that by 11.00 hrs or 12.00 hrs, males tend to perch less prominently, undertake fewer canopy searches and may instead begin visiting ash buds; in other words, territorial activity subsides, perhaps in favour of feeding and other activity. It is known that some other butterfly species hold territory for only a limited number of hours each day (for example, Andre *et al*, (1995) 1997. *Journal of Research on the Lepidoptera* **34**: 14-20 1997) found that 64% of the 14 temperate-zone butterflies for which data were available typically defended territories for only 3 to 6 hours daily adding that ... '*Polygonia comma* Harris is to our knowledge the only temperate butterfly reported to be territorially active for 3 or fewer hours a day').

In summary, heightened territorial activity by male Brown Hairstreaks around tree canopies, mostly of ash but also on other trees and shrub species, in sunny and sheltered areas, was recorded repeatedly prior to 10.00 hrs. Clashes between males were recorded [predominantly] from 08.00 to 10.00 hrs. Extensive observations were not carried out prior to 08.00 hrs, but territorial flights were observed from 07.30 hrs. Males were active at a minimum air temperature of 11°C; female activity was recorded at a minimum air temperature of 13.5°C. Courtship attempts by males were observed three times between 07.30 hrs and 09.00 hrs, the earliest being 07.32 hrs, when air temperatures were 11°C. Temperatures in sun, taken only as a rough simulation of those experienced by a basking dark butterfly, suggested minimum temperatures of *c.*20°C for male flight and 25°C for female flight. It is hoped that this short note will encourage observers to start recording earlier in the morning. This will allow for higher butterfly numbers to be noted, and it may also help to locate new colonies.

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