

guides were enthusiastic and a good time was had by all. That this kind of upmarket nature trail tourism is possible holds out some hope for conservation.

On the last day, as we were chugging up the river in a motorised canoe, the largest, bluest, freshest *Morpho* possible flew past us. By then the *Morpho* had quite a head start, but the river was a kilometre across, and a *Morpho* can be seen from a long distance. I positioned myself in the prow of the narrow, wobbly canoe. It was not much of a platform, and doubtless the piranhas were licking their chops in anticipation. I ordered an intercept course of about 30 degrees from behind the *Morpho*. We were close enough to see it was a perfect specimen. The second intercept was even closer. The third intercept was perfect, the driver having got the hang of it by now. A swipe from behind and below, a good follow through, and the huge butterfly was safely in the net. Had it been new, *Morpho aquatica* might have been an appropriate name.— TORBEN B. LARSEN, 358 Coldharbour Lane, London SW9 8PL.

**Notes on the behaviour of *Luperina nickerlii leechi* (the Sandhill Rustic, Lep.: Noctuidae) at its site in Cornwall**

*Luperina nickerlii leechi* is found at a single site in Cornwall, which the owners have requested is kept secret. The moth apparently rarely flies and does not come to light (Goater, B., 1976. A new subspecies of *Luperina nickerlii* (Freyer) (Lep.: Noctuidae) from Cornwall. *Entomologist's Gazette*, 27: 141-143). The adults may be seen at night in August and September, clinging to the stems of the foodplant *Elymus farctus*, rarely moving, although of course the adults must move to mate and lay eggs, and to hide during the day. I surveyed the site between 1987 and 1989, using light traps and quartz-halogen searchlight, in an attempt to calculate the number of moths on the site.

I found 371 moths between 14.viii.1987 and 24.ix.1989 (Spalding, A. in press. Notes on the population of *Luperina nickerlii leechi* at its site in Cornwall, 1987-1989). Excluding those found at light traps, I found 33 before 10pm, 116 between 10 and 11pm, 81 between 11pm and midnight, and 79 between midnight and 1am. I found 46 after 1am, including one after 5am, but these moths may have emerged much earlier.

Mating seems to take place late in the night. I found nine mating pairs, but none before midnight even though I found over half the moths (230) before this time. I found three pairs between midnight and 1am, four pairs between 2am and 3am, and two pairs between 3am and 4am. It appears that pairing lasts between two and five hours in the wild and the pairs separate sometime between 4am and 5am. One mating pair I saw first at 0.09 had separated by 4.15am. Another mating pair, first seen at 2.05am was still paired at 4am but had separated by 4.40am. A third pair, first seen at 3.02am, had separated by 4.55am. A fourth pair, first seen at 3.06am had separated by 5am.

I also recorded the resting position of each moth and found that most of the moths (320) were resting on the larval foodplant, *Elymus farctus* (sand couch-grass). Most of them were between 5cm and 10cm above the ground, although I found two males resting near the tip of grass stems 20cm above ground level. On this site, *Elymus farctus* is generally between 14cm and 30cm high (Spalding, A., 1991. The distribution of *Elymus farctus* on site L 1986-1989, unpublished report). Two males were found resting on a hybrid *Elymus* grass. Other Sandhill Rustics were resting on *Festuca rubra* (six moths), *Hypochaeris radicata* (4), *Ononis repens* (4), *Plantago lanceolata* (2), *Circius* spp. (1) and *Tripleurospermum maritimum* (1). I found 15 resting on the sand.

Many of the moths found resting on *Elymus farctus* might have just emerged from their pupae in the sand. Where do they go during the day? It may be that Sandhill Rustics spend the day resting on grass stems. In fact, at 9.50pm on 30.viii.1989, I found a male resting on *Elymus farctus* with its wings covered in rain drops. Since the last shower that evening had been at 6pm, the moth must have been resting in the open at that time. However, I made several searches during the day for resting Sandhill Rustics, but found none, even in marked grass clumps where moths had been seen the previous evening.

To find out where the moths spent the day, on 4.ix.1988 I marked the position of some moths seen before midnight and then watched them from 5.15am onwards. Dawn was about 6.20am, when it was light enough to see without torchlight. Some moths seemed reluctant to move. I saw one female resting on *Elymus farctus* at 11.54pm and it remained motionless for over five hours until 5.42am, although it had disappeared by 6.06am. Another female sat on an *Elymus farctus* stem from 11.15pm to 5.45am, after which it dropped to the sand below. It moved about 3cm at 6.40am, then crawled into a small depression, where it remained until at least 7.55am, when I went to get breakfast. Although I had marked this specimen with red felt-tip pen, I could not find it again later. Another female sat on *Elymus farctus* for several hours from 11.45pm, but had moved onto the sand by 5.40am near to a resting male 9cm away. The male was uninterested in the female moth, and flew away. The female then crawled across the sand, moving north-west, then east for a few centimetres, then north again. It stopped at 05.59 for three minutes in a depression (made by me whilst kneeling) before moving north-west, then back into the depression, then north-west again. At 6.05, it moved under a dead leaf of *Eryngium maritimum* (see holly), where it remained at least until 7.55am. During the night it had not moved for at least 5 hours 55 minutes, but at dawn it crawled 103cm in nine minutes. It probably had not flown at all.

Only 14 Sandhill Rustics (12 males and two females) were seen flying during the period of the survey, which indicates that the Sandhill Rustic is a very sedentary moth. Apparently, some beach-dwelling flies are reluctant

to fly, possibly as an adaptation to living in a linear habitat where flying in a strong wind could lead to loss of contact with the habitat. The Sandhill Rustic may have adapted to life in a wind-blown habitat by flying only when the wind is light. In fact, the moths rarely took to the wing when disturbed and those I marked with red felt-tip pen walked in circles in the sand instead of flying away. 6.47% (24) of the moths seen had deformed wings and were unable to fly.

That Sandhill Rustics do fly is shown by the numbers that I caught at light. On 4.ix.1988, at the height of the flight period, I placed a Heath trap in the middle of the site. The wind was slight, possibly about Force 2 and the minimum temperature was 13.5°C at 6.45am. I caught several moth species, including 15 *Luperina testacea*, but the commonest moth was the Sandhill Rustic (20 caught). Of these, one was a previously marked female, three were previously marked males and 16 were males caught for the first time, including two which were darker than usual. Three days later, I ran an m.v. lamp on a white sheet. This time, the wind was strong and I caught no Sandhill Rustics, only *Autographa gamma*, *Tholera decimalis* and *Luperina testacea*. Either the wind was too strong, or Sandhill Rustics are reluctant to come to m.v. lamps.

Males appear to fly and come to light more readily than females. At the Heath trap on 4.ix.1988, the ratio of males to females was 19:1. Females rarely seem to fly and they crawl to their daytime resting places. A tendency to fly may be an evolutionary disadvantage for females, which seem to rest on the foodplant waiting for males to arrive. In the survey period, I found seven females resting on plants other than the foodplant and these females would have to move before they could lay their eggs. For the other females, it would be possible to mate and lay eggs without leaving the foodplant. In fact, *Elymus farctus* is a rhizomic plant, forming large clumps joined underground by a lengthy root system and when the larvae feed on the roots after winter they could travel a great distance on the roots of a single plant clump.— ADRIAN SPALDING, Lerryn Cottage, Lerryn, Lostwithiel, Cornwall PL22 0QB.

### **Distribution Mapping with IBM-compatible Personal Computers**

DMAP is a computer program which is available for producing Distribution Maps and Coincidence Maps on IBM-compatible PCs (e.g. Amstrad PCs). It runs on all true compatibles with all commonly fitted graphics displays (e.g. Hercules, CGA, EGA and VGA). Maps are displayed on the screen (in colour for EGA and VGA) and can be printed on a wide range of printers including ordinary dot-matrix printers, inkjet printers, laser printers, and PostScript laser printers. Maps can also be generated as PC-Paintbrush or Encapsulated PostScript files for importing into Desk-Top Publishing packages.

DMAP reads data files which contain grid references defining the species distributions and study area boundaries. A wide range of grid reference