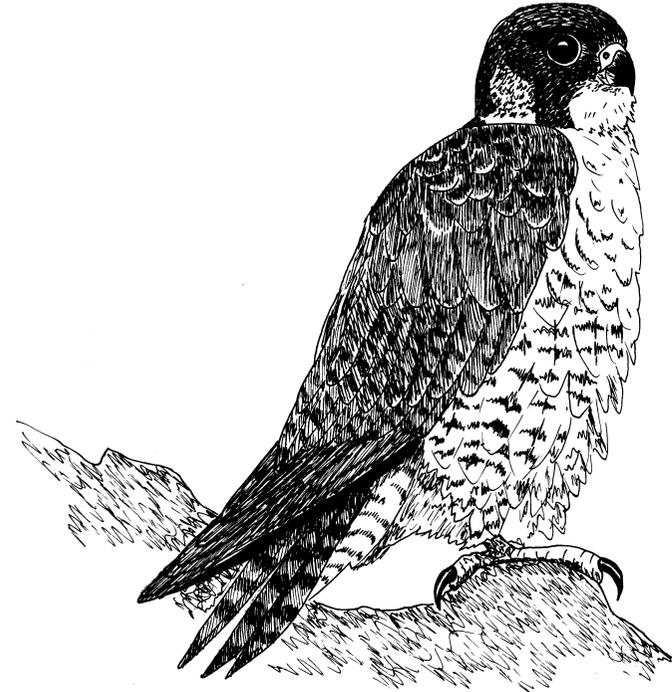

The CARLISLE NATURALIST

Volume 10 Number 1

Spring 2002

Published twice-yearly (Spring/Autumn) by Carlisle Natural History Society



Peregrine (after photograph by Keith Temple)

(Stephen Hewitt)

Contents

Reports on Field Meetings

Loch Ken - John Hamer & Brian Spencer	1
Borrowdale David Clarke	2

Notes and Records

A European spider, <i>Meioneta mossica</i> Schikara, newly recorded from Moorhouse National Nature Reserve in Cumbria – John R. Parker	4
A new species of dance fly (<i>Tachydromia</i> : Hybotidae) discovered on the River Eden – Stephen Hewitt	5
Recent records Geoff Naylor	7

Articles

Are bees and wasps moving north? – Neil A. Robinson	9
A comparison of genetic and morphological variation in Red Squirrels in Cumbria and the north-east of England – Dr Peter Lurz	12

Society Announcements – see end covers

Wanted!

**A substantial edible reward is offered
(on behalf of the Aculeate Conservation Group)
for the capture of
The Black Bog Ant
alias *Formica candida*
(previously used the alias *Formica transcaucasica*)**

The RDB1 Black Bog Ant *Formica candida* shows a preference for humid conditions on valley mires and wet heaths. To date, it is known in Britain only in the New Forest, on Hartland Moor NNR and at two sites in Wales (Rhossili Down and Cors Goch NNR near Carmarthen). It has never been recorded in Cumbria. However, thorough recent searches in the New Forest have found it in places where it was not known to occur, and it extends much further north in Scandinavia (into arctic Sweden). It is possible therefore that this ant could occur in Cumbria, the most likely places being the open coastal mosslands which are a major feature of the county's wildlife resource. It might be found anywhere on a lowland mossland site which does not have a history of being invaded by woodland.

The Black Bog Ant resembles the common black ant *Formica fusca*, also *Formica lemni*, the latter's close relative in more demanding habitats, but it differs in being shining jet black (like *Lasius fuliginosus*). Its most noticeable feature is that it lives exclusively on wet ground. Its nests are typically constructed beneath tussocks of purple moor grass *Molinia caerulea*, heathers *Erica* sp. and cushions of *Sphagnum* moss; they are often surrounded by standing water. Nests are frequently topped by solaria of grass or *Sphagnum* fragments. They tend to be grouped on a site. The solaria are surprisingly inconspicuous and if the ant is present on a site you are most likely to find it by seeing ants running on the vegetation because you have stepped on a nest!

Please keep a look out for this ant whenever you visit open lowland mosslands, especially the coastal mosses, and take some specimens of any black ants you see. The most humane way to kill ants, which are very resistant to ethyl acetate, is to put the tube in your freezer. Let me have the specimens with relevant data: location, grid reference, date and I will let you know what you have found. Even if you have not hit the jackpot with *Formica candida*, records of other species will be appreciated for the Bees, Wasps and Ants Recording Scheme.

Neil A. Robinson, 3 Abbey Drive, Natland, Kendal LA9 7QN

tel: 015395-61078; e-mail: n.a.robinson@tesco.net

Reports on Field Meetings

2nd February, Loch Ken

Leaders: John Hamer & Brian Spencer

The prospects did not look good as 3 cars with 8 people set off – gale force wind and heavy showers. The Eden was in flood as we crossed the motorway bridge – evidence of all the rain during the week.

Our first stop was at Newbie where few birds were in evidence and those were keeping their heads down. Shortly after that we had our first significant find with a female Peregrine. Around Ruthwell there were flocks of finches in the fields with Chaffinches, Yellowhammer, Greenfinch and most notably about 25 Tree Sparrows. By this time we had also seen our first Buzzard and soon gave up counting there were so many. Heading towards Caerlaverock we came across large flocks of Barnacle Geese, including one white one and over 10,000 birds in all.

Next stops were Glencaple and Auchenreoch where we added Tufted Duck, Goosander etc. The usual route was then followed, but omitting Threave, to Loch Ken where we found water levels very high so that there were far fewer ducks than usual. Greylag Geese, with smaller numbers of Pink-footed Geese were seen however. At this point we met a local who told us that the White-fronted Geese had been missing for most of this winter, so it was not surprising that we did not see any. By this time, the weather had become brighter and we were therefore optimistic that more birds of prey might turn up. Sure enough, two 'ring-tail' Hen Harriers were seen shortly after leaving the loch shore, and then over broken ground close to the road, first one, then two and finally three Red Kites were seen, giving excellent views. These were doubtless birds from the release programme in this area and at least one had a wing tag. After that, the rest of the trip was a bit of an anti-climax but there was still time for a look at the Starling roost at Gretna with well over 100,000 birds and just one Buzzard in attendance.

List of species seen:

Cormorant	Mallard	Black-headed Gull
Heron	Shelduck	Common Gull
Pink-footed Goose	Pintail	Lesser Black-backed Gull
Grey lag Goose	Scaup	Lapwing
Barnacle Goose	Tufted Duck	Curlew
Canada Goose	Goldeneye	Oystercatcher
Wigeon	Whooper Swan	Dunlin
Teal	Mute Swan	Buzzard

Sparrow Hawk	Jackdaw	Fieldfare
Hen Harrier	Wood Pigeon	Redwing
Red Kite	Stock Dove	Robin
Kestrel	Collared Dove	Tree Sparrow
Peregrine Falcon	Blue Tit	House Sparrow
Coot	Great Tit	Yellowhammer
Moorhen	Wren	Greenfinch
Pheasant	Treecreeper	Chaffinch
Partridge	Starling	Goldfinch
Rook	Blackbird	

Brian Spencer

20th April, Borrowdale

Leader: Geoff Horne

This was the first really cloudy day for some time, with early drizzle that fortunately soon abated. A brief stop en route along the east side of Bassenthwaite Lake brought views of the single recently returned Osprey standing on the 2001 nest platform. Any scepticism over the identity of the distant ‘white spot’ was dispelled when it took to the wing!

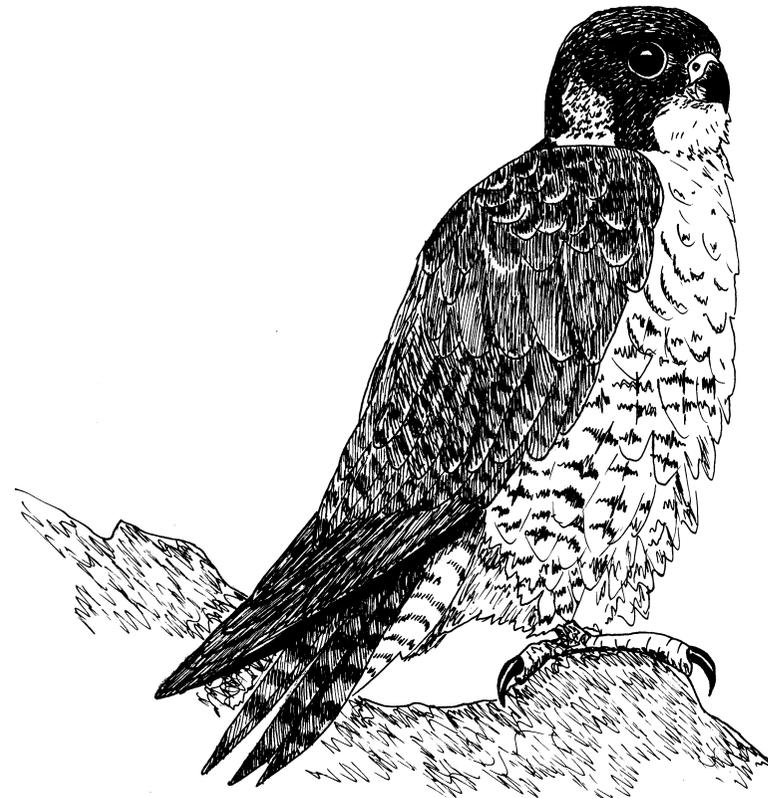
Great Wood, though showing signs of spring, was surprisingly empty of bird-life, and conditions were too cool for much insect activity. Ravens feeding young at the nest on the crag above the car park were a highlight, as were calls, and then views, of a Nuthatch. The only migrants were a Chiffchaff and a Willow Warbler each of which just about managed some song. Walking out through the top of the wood gave a commanding view of Falcon Crag and the well-known Peregrine Falcon eyrie. Geoff’s assurance that one especially thick sward of Bluebells high on the rock-face was the rim of a very large ledge with an incubating female was amply confirmed by the male bird returning with prey. The ensuing exchange of calls and food at the nest was an exciting moment, and there were brief views of the female as she stood to feed. The male obligingly settled on another part of the crag to preen and was well seen by all, courtesy of Brian Spencer’s telescope.

We circuited back via the lakeside, some at least pausing to admire various lichens at this important site including a substantial patch of the ancient-woodland species *Lobaria virens* on a shaded oak trunk. All lichen and moss growth on tree trunks were looking distinctly the worst for lack of significant rain over many weeks.

The afternoon took us on a circuit from Grange towards Seatoller. The fine

spectacle of crags below Low Scawdel duly produced another male Peregrine, this time without food. He circled but did not settle, and Geoff felt sure his female was sitting secure on eggs. Although not a day for soaring raptors, there were good views of flying Raven and Buzzard here too. The walk back through High and Low Hows Woods and along the Derwent revealed a pair of Common Sandpipers and Grey Wagtail, and stunning close-up views of a singing and feeding male Nuthatch, who seemed quite indifferent to our presence.

David Clarke



Peregrine (after photograph by Keith Temple)

(Stephen Hewitt)

Notes and Records

A European spider, *Meioneta mossica* Schikara, newly recorded from Moorhouse National Nature Reserve in Cumbria

In 1964 Dr Michael Nelson of the Nature Conservancy Council was studying the distribution of Diptera on the blanket bog at Moorhouse, on the Cumbrian Pennines. The flies were caught in a range of traps set in a heather habitat and in a *Sphagnum/Juncus* habitat. The flies and other small invertebrates caught included considerable numbers of tiny Linyphiid spiders, including adults of both sexes. Knowing of my interest in spiders Dr Nelson agreed to send me all the spiders caught in the traps, which were emptied every week from the end of February 1964 until the beginning of winter in that year, when snowfall prevented the use of the traps.

These collections enabled me to establish the very small (2.5mm) Linyphiid spider *Cornicularia clavicornis* Emerton (now known as *Walckenaeria clavicornis*) as a new British species at the southern limit of its arctic circumpolar range, which extends beyond latitude 80° north (Parker, 1969). I managed to identify about half of the thousands of specimens sent to me from Moorhouse until an illness and eventual retirement prevented further intensive work. But I kept all the specimens preserved in alcohol and the related data.

Recently two friends, Mr D.R. Nellist and Mr D. Marriott, both of the British Arachnological Society, agreed to take over the collection and complete the identifications. One small not uncommon species had been identified by me as *Meioneta saxatilis*. My identification was based on the description in Locket & Millidge (1953).

In 1993, H-B. Schikora of the University of Bremen in Germany described a new *Meioneta* species: *Meioneta mossica* with a known distribution in Sweden, Germany, Finland and England, the English specimens having been taken from a bog at Kielder Forest in Northumberland. This species is almost identical to *M. saxatilis*, but there are distinct morphological differences in the genitalia of the two sexes in each species which are seen to be constant and reliable criteria for the purpose of identification. There is no doubt that the species which occurs at Moorhouse is *M. mossica*. It is found almost exclusively in acid bog habitats. *M. saxatilis* is a more widespread species in coastal and inland grasslands and arable fields and woodlands.

References

Locket, G.H. & Millidge, A.F. (1953), *British Spiders Vol. II*, Ray Soc. London

Parker, J.R. (1969), On the establishment of *Cornicularia clavicornis* as a British species, *Bull. Brit. Arachnol. Soc.* **I** (1)

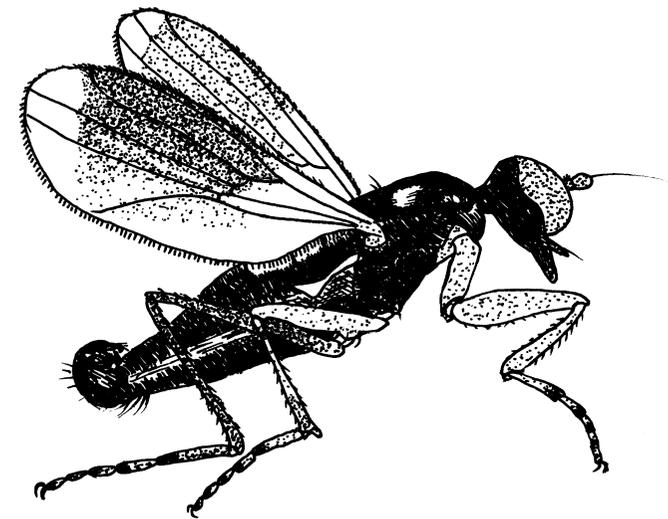
Schikora, H-B. (1993), *Meioneta mossica* sp. n. a new spider close to *M. saxatilis* (Blackwall) from Northern and Central Europe (Araneae: Linyphiidae), *Bull. Brit. Arachnol. Soc.* **9** (5)

John R. Parker

Stoneraise, Greenhead, 42 Lakeland Park, Keswick, Cumbria CA12 4AT

A new species of dance fly (*Tachydromia*: Hybotidae) discovered on the River Eden

On 28th June 2000 I collected a small series of a species of *Tachydromia* (Meigen) from a shingle bank on the River Eden at Temple Sowerby (NY605277). *Tachydromia* are small (2–3mm long) dark flies with varyingly patterned dark markings on the wings, which actively run and skip on shingle and other open substrates. The adults are predators of small invertebrates.



Tachydromia edenensis

(Stephen Hewitt)

On examining the specimens at home that evening I found that they were distinctive in having obvious dark annulations on the tarsi and very distinctive genitalia in the males. They did not appear to match any of the listed British species in this genus, nor did they fit any species detailed in the key to the Scandinavian fauna, which I had to hand.

The Temple Sowerby shingle bank is an area of fine to medium grade shingle forming a point bar on a bend of the river at an altitude of 100m. Towards the top of the shingle bank an area of sand with some pebbles is deposited. The specimens were collected from this area of sand and scattered pebbles and were not noticed elsewhere on the shingle bank. Individuals of this species appeared decidedly quicker and more ready to fly than specimens of other *Tachydromia* species also present.

On 3rd July I returned to the location in the company of John B. Parker and the species was found to be present in some numbers. Again specimens were restricted to the area of sand and scattered shingle. The same day we visited an area of similar sandy shingle some 25 km upstream at Great Musgrave on the Swindale Beck, where it joins the River Eden (NY771133) at an altitude of 150m. Here too we found the mystery species to be plentiful. Again it was restricted to the sandier areas of the shingle bank, usually with some pebbles present but some individuals were also noticed on patches of pure sand. The new species was again seen at Great Musgrave on the 15th July but was not found at either site on subsequent visits during August and September.

Other species of *Tachydromia* collected at both sites were *T. morio* (Zetterstedt), *T. acklandi* Chvála, *T. halidayi* (Collin) and *T. aemula* (Loew). In addition, *Stilpon nubilus* Collin was present in numbers on vegetated sand at Temple Sowerby and *T. costalis* (von Roser) was identified from Great Musgrave.

Subsequent reference to published work on the *Tachydromia* of the Palaearctic region (Chvála, 1970) suggested that the unidentified species was close to the continental species *Tachydromia tuberculata* but was certainly not the same. Interestingly, Chvála had noted in his account that a male specimen (with no decipherable location data) among the material labelled *T. tuberculata* in Berlin Museum was in fact an undescribed species and the diagnostic characters that he noted appeared to correspond to the specimens collected from the Eden.

As a result of these investigations I contacted Milan Chvála at the Charles University in Prague and we have jointly described this new species, giving it the name *Tachydromia edenensis* after the River Eden. This description will be published shortly (Hewitt & Chvála, in press). The type specimens of this species are to be deposited at Tullie House Museum, The Natural History Museum,

London, The Royal Scottish Museum Edinburgh, Liverpool Museum and in Chvála's collection at Charles University, Prague.

The Eden and its tributaries is a Site of Special Scientific Interest being regarded as an outstanding northern river on sandstone and hard limestone. It has one of the most diverse aquatic plant floras of any river in Britain and is recognised to be of significant interest for invertebrates associated with river shingles (English Nature 1997).

References

- Chvála, M. (1970). Revision of Palaearctic species of the genus *Tachydromia* Meig. (=Tachista Loew) (Diptera, Empididae), *Acta Entomologica Musei Nationalis Pragae*. **38**. 415–524.
- English Nature (1997). *Site notification description, River Eden and tributaries Site of Special Scientific Interest, Cumbria*. Unpublished.
- Hewitt, S.M. & Chvala, M. (in press). Description of a new western-European *Tachydromia* species (Diptera: Hybotidae) of the *Tachydromia connexa*-group. *Brit. J. Entomology and Nat. Hist.*

Stephen Hewitt

Recent records

This item is compiled from record cards and verbal records from indoor meetings from January to early March with the addition of subsequent record cards received at Tullie House up to early April. Not all records are fully authenticated.

During January, yet another Hen Harrier was reported at Kirkbampton. The only sizeable flock of Brambling (c. 40) this winter was at Wetheral on 14th January and later became a mixed flock, including significant numbers of Tree Sparrows (RJ).

Unusually large counts included a record 155 Goosander at Talkin Tarn, 650 Lapwings near Brampton and 95 Cormorants at Cardurnock. Talkin Tarn received its first Shelduck for 10 years!

Bird activity was somewhat subdued in February. Crossbills were seen at Hayton Town Head and a Goshawk was displaying near Rockcliffe (JS) on 19th February. Amphibian activity was less subdued. Frogs arrived in George Tinkler's Carlisle garden pond as early as 3rd February and spawn was laid in Margaret and Jeremy Roberts' Wetheral garden only 3 days later.

In late February and early March there were many reports of Pintail, including

1000 at Grune Point, several on the R. Eden in the Aglionby area and unusually high numbers at Talkin Tarn. Pintail has always been a scarce bird at Talkin with a previous maximum of 3, so groups of between 5 and 18 were a major surprise. Blackcaps were still in Carlisle and Wetheral gardens. Ravens had eggs on 1st March (GH).

Reports of summer visitors began to come in from mid-March. These included Chiffchaff on 17th March at Dalston (GRN), Wheatear on 18th March at Mardale Head (SMH), Ring Ouzel on 27th March in Nethermost Cove, Helvellyn (SMH), Sand Martin on 26th March at Talkin Tarn (GRN), an early Swallow at Port Carlisle at the end of March (RA) and Willow Warbler on 5th April at Talkin Tarn (GRN).

Spring flowers included Yellow Star-of-Bethlehem and Yellow Anemone along the R. Eden on 20th March, Purple Saxifrage just coming into flower in Nethermost Cove, Helvellyn on 27th March (SMH) and masses of Toothwort in Bitts Park, Carlisle on 4th April (GRN & SMH).

Butterflies made a promising start with lots of sightings of Peacock and Small Tortoiseshell and a Comma as early as 27th March (DJC). A very early Painted Lady was in Bitts Park on 4th April (SMH) and a Holly Blue was seen in Penrith around the same date.

Finally, an unwelcome record of a Grey Squirrel in Stephen Hewitt's Penrith garden, also on 4th April.

Contributors initialled: RJ = Bob Jones, JS = John Strutt, GH = Geoff Horne, GRN = Geoff Naylor, SMH = Stephen Hewitt, RA = Roy Armstrong, DJC = David Clarke.

Geoff Naylor

Are bees and wasps moving north?

Neil A. Robinson

3 Abbey Drive, Natland, Kendal LA9 7QN

Working on the list of bees, wasps and ants recorded in Cumbria for publication on the Society's *Transactions* has brought to light a number of recent records of species previously known only further south, which make one wonder whether they are extending their ranges northwards. It is well known that a number of butterflies and dragonflies have expanded northwards, made their first appearances in the county and then become established in recent decades, with the implication that this is a consequence of global warming. These popular species are well enough recorded for the case to be convincing, but for aculeates it is difficult to be sure because recording has been so patchy. F.H. Day and G.B. Routledge accumulated valuable records for the north of the county in the first half of the 20th. century, but little was done in the south except by J.D. Ward in the 1920s and A.E. Wright in the 1940s at Grange-over-Sands. Then there was a gap of several decades until the 1990s when Steve Hewitt began in the north, Michael Archer started working Sandscale Haws and I began in South Lakeland. Therefore it is difficult to tell whether newly-found species are new arrivals or simply ones which have evaded detection before. One certainly cannot generalise, and the case for each species needs to be considered separately.

The social species present some interesting cases. The bumblebee *Bombus terrestris* used not to be common in Cumbria, but it has certainly expanded in the county. There are few specimens in Tullie House Museum, and the ITE Bumblebee Atlas of 1980 shows only a scattering of records, mainly around the coast. Now it is very common, at least in the south of the county; often its huge queens are the first bumblebees to be seen in the spring. In its wake, its nest parasite *Psithyrus vestalis* has also arrived in recent years. The so-called Median Wasp (*Dolichovespula media*) has made a more dramatic invasion. After first arriving from the Continent in the south of England in the 1980s it spread rapidly northwards and reached Longtown in 1998, where it announced its arrival by putting an unfortunate gardener in hospital (Hewitt, 1998). This is clearly a vigorous invasive species and its spread once it had arrived, whether of its own accord, or accidentally introduced, may have nothing to do with global warming. I have not heard anything further about it in Cumbria, but it is well established in the Lune valley in Lancashire.

Some solitary species are also believed to be on the move. The distribution of the

handsome black and yellow solitary wasp *Ectemnius sexcinctus* was described in 1980 as “Kent to Cornwall, Somerset, Glamorgan, Norfolk, not common”. It has been known in gardens as far north as the Wirral since the 1990s, but a female which I found in our utility room in Natland on 5th July 2001 was the first to be seen in Cumbria. However, on 18th August, when I was called to see some wasps which were tunnelling into the soft woodwork of a cottage porch in Kendal, I found there was an established colony of this species (Robinson, 2001). It seems to like the urban garden habitat, and to be spreading. Less clear cut is the case of the spider-hunting wasp *Anoplius caviventris* which Steve Hewitt found on 10th August 1999 at Cummersdale, which is about 120 miles (192 km.) north of its previous northernmost record at Denbigh. This is a startling extension of its known range, but whether it is a new arrival, or whether an isolated population has been living on the southern outskirts of Carlisle all along, or for how long, we shall probably never know.

Similar uncertainty surrounds the significance Steve’s finding of the solitary mining bee *Lasioglossum parvulum* at the soft clay cliffs of St. Bees on 23rd May 2001. This is considered to be a southern species, but, being among the ‘little brown jobs’ of tiny solitary bees, it is not easy to identify. Tullie House Museum has a series of specimens taken by F.H. Day labelled *Halictus minutus*, an earlier synonym for this species, but I found that these were mostly *L. nitidiusculum*, which is known to occur in the county. The only genuine *L. parvulum* had been collected by Day in southern England. So Steve’s specimen, which has been confirmed by two national experts, is the first to be found in Cumbria. However, it turns out that it is known in Cheshire and has recently been found at Ainsdale Sand Dunes (Carl Clee, pers. comm.). So perhaps it is not so surprising that it should have been found on the Cumbria coast, though how long it has been there we simply do not know. The coast, with its milder Atlantic climate, is understandably where species with a southern association are most likely to be found. Other southern species which have recently been discovered on the coast are the solitary wasps *Oxybelus argentatus* and *O. mandibularis* at Sandscale (Michael Archer), the cleptoparasitic bee *Sphecodes puncticeps* at Rampside (N.A.R.) (Robinson, *op. cit.*) and the solitary bee *Lasioglossum leucozonium* which was first found at Sandscale but is now known to extend as far north as Drigg (S.M.H.).

One cannot help noticing that three of the species which are known to be expanding: *Bombus terrestris*, *Dolichovespula media* and *Ectemnius sexcinctus*, are ones which have adapted to gardens, suggesting the increasing importance of gardens for insects as our countryside’s capacity to support them declines. If there is a movement northwards of other aculeates, the coast is where it is most likely to

be detected. One hopes that the recording of aculeates will continue, and that, at some time in the future, what is happening will be clearer.

PS: A male of the bumblebee *Bombus hypnorum* was found for the first time in Britain near Southampton in 2001. This bee is common in gardens on the Continent. If it turns out to be established, it could easily become a common species in gardens in this country.

References

- Hewitt, S.M. (1998). A nest of the Median Wasp (*Dolichovespula media* Retzius) at Longtown in 1998. *Carlisle Naturalist* 6(2): 32–33.
- Robinson, N.A. (2001). Observations on Bees, Wasps and Ants in 2001. *Carlisle Naturalist* 9(2): 34–35.

A comparison of genetic and morphological variation in Red Squirrels in Cumbria and the north-east of England

Peter Lurz

Centre for Life Sciences Modelling, Porter Building,
University of Newcastle upon Tyne, NE1 7RU

The Red Squirrel is in decline due to the introduction and spread of the North American Grey Squirrel. The northern counties of Cumbria, Lancashire, Durham and Northumberland hold the largest remaining populations of Red Squirrels in England. As part of a Red Squirrel pilot genetics project the Centre for Life Sciences Modelling at Newcastle University investigated genetic and morphological variation in the remaining Red Squirrel populations across the north of England. We were interested in how individuals might differ across the region in relation to the distribution of woodlands, their primary habitat. Woodland cover has changed in the region and we wanted to compare Cumbrian Red Squirrels to those in the Borders, Northumberland and County Durham. The collections at Tullie House Museum, Carlisle and the Hancock Museum, Newcastle go back to the early 1900s (1918–2000) and therefore present a unique opportunity to look at possible changes over time.

Methods used

For the purpose of this study, we took a 2 mm DNA sample of skin from 101 specimens in the collections at Tullie House and the Hancock Museum (Hale *et al.* 2001) and measurements from 42 available skulls. Samples covered squirrels from the very south of Cumbria to County Durham, Northumberland, Dumfries and the Scottish Borders. We noted tail coat colour patterns, collection date, age and sex of the specimens.

We overlaid the sample locations (Figure 1) with a satellite map of woodland cover (Fuller *et al.* 1994) for the whole area using GRASS, a Geographic Information System (GIS; Westerfeldt *et al.* 1990). Red Squirrels are capable of moving and dispersing between patches of woodland, but will avoid crossing open areas during dispersal movements if and where possible (Wauters *et al.* 1994). The extreme fragmentation of woodland habitat across large parts of the north of England makes it difficult in some cases to determine what constitutes a continuous squirrel population. Our approach allowed us to allocate individuals to populations based on the connectivity of the habitat. Using a custom built

computer program linked to the digitised woodland map, we grouped woodlands that were within a defined 'linking or dispersal distance' and samples of squirrels located within these woodland groups were considered to be of the same population. In other words we used what we know about Red Squirrel dispersal behaviour to determine which woodlands in the landscape of Cumbria, Durham and Northumberland form connected Red Squirrel populations. 1.5 km gave the most significant results, suggesting that the maximum dispersal distance of Red Squirrels over unfavourable ground is approximately 1.5 km (Hale *et al.* 2001).

Main findings and conclusion

Coat colour and skulls

Bleaching of the tail was seasonal, with the majority of squirrels collected in June, July and August showing some yellowing or bleaching of the tail. Red tail colour was found in all months, while the darker tail colours, ranging from slightly darker reds to completely black, were found in all months except June and July. Cumbria had a much higher incidence of tail bleaching than the north-eastern regions. We could not find any seasonal bias and in both the northern and eastern regions, dark tails were much more common than red or bleached tails (Table 1). As expected, there were large differences between adults and juveniles in respect of skull size, with adults predictably larger than juveniles. However males and females did not significantly differ in size (mean condylobasal length for males = 47.2 ± 1.4 mm; females 47.8 ± 1.7). Furthermore, there was no apparent difference in overall skull size between the regions, however, there were some significant differences in skull shape (M. L. Hale, pers. com.).

Table 1. Proportion (%) of squirrels with red, bleached or dark tails for Cumbria and the north-eastern regions (Northumberland and County Durham combined).

Region	Red tails	Bleached tails	Dark tails
Cumbria	52	28	20
Northeast	39	10	51

Genetics

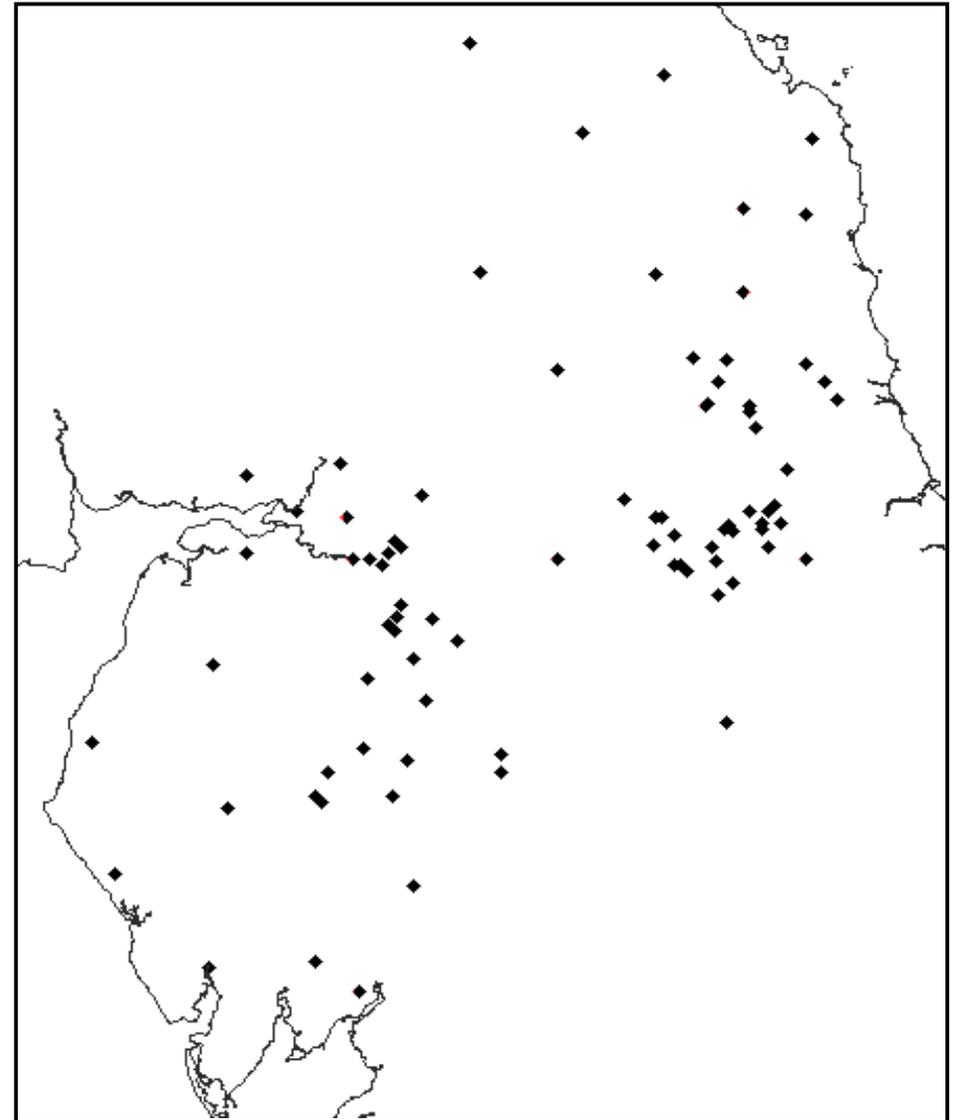
The genetic structure of the squirrel populations in the three main regions (Cumbria, Northumberland, Durham) was very different. There were differences between populations within the three regions, but the largest portion of the genetic subdivision was between Cumbria and the north-east (Hale *et al.*, 2001). However,

samples from Cumbria after 1980 suggested a movement of northern genes through the Cumbrian population. This is most likely the result of the large expansion of Kielder Forest during the 1950s and 1960s which reconnected the fragmented woodlands. The original population of Red Squirrels in the north of England would probably have been one single interconnected (panmictic) population. The integration of the Cumbrian population into the northern group therefore, not only increased genetic diversity and population viability (Kielder Forest constitutes one of the largest remaining populations for Red Squirrels in England), but also returned the remaining population towards its original genetic structure (Hale *et al.*, 2001). This is particularly important given the threat from the introduced Grey Squirrel leading to a risk that the unique genotypes of Cumbrian squirrels will be lost.

The originally described native subspecies of Red Squirrel in Britain (*Sciurus vulgaris leucourus* Kerr 1792) is characterised by a bleaching of the ear tufts and tail, and it is also slightly smaller than other, darker, Red Squirrel subspecies (e.g. *S. v. fuscoater*) that occur on the European continent (Sidorovicz 1971, Lowe and Gardiner 1983). There have been a number of reports of introductions of continental Red Squirrels to Britain, including releases in Lancashire, Northumberland and Scotland (Harvie-Brown 1880–1881; Lowe and Gardiner 1983). Based on a search of the literature for Cumbria (e.g. see Macpherson 1892) there is no record of releases of squirrels from continental Europe. As far as we know, no squirrels were introduced to Cumbria and individuals with bleached tails are still relatively common in some areas (Lurz 1995).

Our initial results based on only 101 samples from a few populations, indicate the existence of significant genetic and morphological differences between some Cumbrian Red Squirrel populations and populations in the north-east of England. The range of the Red Squirrel in Cumbria is shrinking fast due to the spread of the introduced North American Grey Squirrel (Skelcher 1997) and there is an urgent need to carry out a more comprehensive study of Red Squirrel genetic diversity, particularly of north Lakeland and west Cumbrian populations, before it is lost. Whilst it is possible that the Cumbrian populations are close to the original native subspecies, we do not yet know. We have contacted the British Museum (Natural History) and hope to obtain permission to sample type material of *S. v. leucoris* in their collection to answer this question. Even so, based on the results of our study, the west Cumbrian populations are genetically unique and an effort should be attempted to identify remaining populations and include these in the conservation area network proposed for Cumbria and the captive breeding program that exists for Red Squirrels in the UK.

Figure 1. Locations of the Red Squirrel samples across Cumbria and the north-east of England.



Acknowledgements

We would like to thank Tullie House Museum in Carlisle and the Hancock Museum in Newcastle for access to their skin collections. We are grateful to Corrie Bruemmer, Eric Morton and Stephen Hewitt for their personal support and to Jason Reynolds for helpful comments on the manuscript.

References

- Fuller, R.M., Groom, G. B. and Jones, A. R. (1994). The land cover map of Great Britain: an automated classification of Landsat Thematic Mapper data. *Photogrammetric Engineering and Remote Sensing* **60**:553–562.
- Hale, M. L. , Lurz, P. W. W., Shirley, M. D. F., Rushton, S., Fuller, R. M. and Wolff, K. (2001). Impact of landscape management on the genetic structure of red squirrel populations. *Science* **293**:2246–2248.
- Harvie-Brown. J. A. (1880–1881). The history of the squirrel in Great Britain. *Proceedings of the Royal Physical Society of Edinburgh* **5**:343–348; **6**:31–63; **6**:115–183.
- Lowe, V. P. W. and Gardiner, A. S. (1983). Is the British squirrel (*Sciurus leucourus* Kerr) British? *Mammal Review* **13**:57–67.
- Lurz, P.W.W. (1995). Ecology of red squirrels in conifer plantations. Ph.D. Thesis. University of Newcastle upon Tyne, UK.
- Macpherson, Rev. H.A. (1892). A Vertebrate Fauna of Lakeland. pp 76–78. David Douglas, Edinburgh, UK.
- Skelcher, G. (1997). The ecological replacement of red by grey squirrels. Pages 67–78 in J. Gurnell, and P.W.W. Lurz, editors. The conservation of red squirrels, *Sciurus vulgaris* L. People's Trust for Endangered Species, London, UK.
- Sidorowicz. J. (1971). Problems of subspecific taxonomy of squirrel (*Sciurus vulgaris* L.) in Palaearctic. *Zoologischer Anzeiger* **187**:123–142.
- Wauters, L.A., Casale, P. and Dhondt, A. A. (1994). Space use and dispersal of red squirrels in fragmented habitats. *Oikos* **69**:140–146.
- Westervelt, J.M., Shapiro, M., Goran, W. and Gerdes, D. (1990). Geographic Resource Analysis Support System, Version 4.0 User's Reference manual, USACERL ADP report N–87/22.

[Tullie House Museum is keen to acquire more specimens of Cumbrian Red Squirrels to further this and future studies. It welcomes road and other casualties from the county and particularly the central and western areas. Ed.]

The Carlisle Naturalist

Editor: Stephen Hewitt.

Layout & DTP: Jeremy Roberts.

Editorial Panel: Roy Atkins, David Clarke, Stephen Hewitt, Geoff Naylor, Jeremy Roberts.

Word Processing: Stephen Hewitt.

Artwork: Stephen Hewitt

All material for publication should be sent to Stephen Hewitt, Tullie House Museum, Castle St., Carlisle CA3 8TP. **Copy deadline for the next issue is 14th September 2002.**

Information for Authors

The *Carlisle Naturalist* publishes material on all aspects of the natural history of Cumbria. General articles, results of personal research, news items, records and letters of relevance to Cumbrian naturalists are welcomed. Material accepted for publication must not be submitted in a similar form to any other journal.

Material should be clearly legible – ideally type-written double-spaced on one side of white A4 paper, or submitted on DOS-formatted 3.5 inch computer disc in ASCII or RTF format and accompanied by a paper copy. Only species and genera should be underlined. Authority names should be given in full. Illustrations should be in black ink; they must be originals and not photocopies. Whilst every care will be taken of original artwork, the editor can not be held responsible for any loss or damage. References should be given in full at the end of the article or note.

Authors of papers two or more pages in length will be provided with 10 reprints. Papers may be submitted to a referee.

Opinions expressed in the *Carlisle Naturalist* are not necessarily shared by the Council of Carlisle Natural History Society nor the Editorial Panel.

Discounted publications to Society members

The following publications of the Society are available to members at the discounted prices shown:

<i>Cumbrian Wildlife in the 20th Century</i> (1996)	£5.00
<i>Lakeland Ornithology</i> (1954)	£5.00
<i>Lakeland Molluscs</i> (1967)	£3.00

Also:

Lakeland Birdlife 1920 1970, R.H. Brown (1974) £5.00

Carlisle Natural History Society Officers

President: David J. Clarke

Vice-Presidents: Geoffrey Horne, Bob Buchanan.

Council: Jeremy Roberts, Bob Wright, Mike Tulloch, Brian Spencer, John Hamer Ann
Robinson, Anne Abbs, Geoff Norman and Marie Saag.

Secretary: Stephen Hewitt c/o Tullie House Museum, Castle St., Carlisle CA3 8TP

Assistant Secretary: Roy Atkins

Treasurer: Dorothy Iveson, 60 Etterby St., Carlisle.

Recorder: Geoff Naylor, c/o Tullie House Museum.

Subscription Rates: Adult £6.00; Family £8.00; Junior £3.00; Affiliated £5.00

(Affiliated members receive the *Carlisle Naturalist* only)

Membership application forms are available from the Secretary.

Summer Programme 2002

Field meetings start from Carlisle College, Victoria Place, Carlisle. (Leaders may cancel meetings at this rendezvous if they consider circumstances unsuitable.)

Members' own transport; places available for those without.

Bring packed lunches for all meetings beginning before midday.

20th April: Birds in Borrowdale Leader: Geoff Horne.

Depart 9.30 am. Meet Great Wood Car Park (NY272213) at 10.30 am.

1st June (Saturday): Arnside Knott & Leighton Moss Leader: Geoff Naylor

Depart 9.00 am. Meet Arnside Knott car park (SD451778) at 10.30 am.

15th June (Saturday): Roudsea Wood NNR Leader: Rob Petley-Jones (David

Clarke). Depart 9.00 am. Meet SD345836 at 10.30 am.

29th June (Saturday): Watendlath area Leader: Dorothy Iveson.

Depart 9.30 am. Meet at Surprise View (NY268188) 10.30 am.

13th July (Saturday): Smardale Gill Leader: Ron Baines (local leader Brian

Spencer). Depart 9.00 am. Meet NY740083 10.00 am.

27th July (Saturday): Scaleby Moss Leader: David Clarke.

Depart 9.30 am. Meet at the lay-by on the A689 (NY402602) at 10.00 am.

9th August (Friday evening): Moth trapping Wan Fell Leaders: Mike

Clementson/Richard Little. Depart 8.30 pm. Meet Wan Fell NY523374 at 9.00 pm.

28th September (Saturday): Fungus foray Fingland Rigg Leader: Geoff Naylor.

Depart 12.30 pm. Meet Fingland Rigg (NY282572) 1.00 pm.

19th October (Saturday): Red Deer Rut – Martindale Leader: Geoff Horne.

Depart 12.30 pm. Meet Martindale Church (NY434183) 1.30 pm.