The Studfold Community Nature Project

As part of a Heritage Lottery-funded nature project in North Yorkshire, Matthew Adamson has been recording the distribution of bryophytes on Studfold Farm in upper Nidderdale. In this article, Matthew reports some of the interesting observations from his investigation.

The fields of Studfold Farm behind the village of Lofthouse in Upper Nidderdale with the wooded cleft of Blayshaw Beck. Alan Croucher

The Studfold Community Nature Project (SNCP) has a Heritage Lottery Grant to study the history and wildlife of Studfold, a farm in upper Nidderdale, North Yorkshire. It is a 3-year project investigating the interaction over the ages between the plants and wildlife on the site and the land use, which has included iron workings, lead mines and marble quarrying, as well as farming. Its 80 hectares are now mainly meadowland and pasture for sheep and cattle.

The main geological feature is a fault along which flows Blayshaw Beck. To the north of this is a limestone inlier, while to the south is gritstone. Most of the limestone is overlain with boulder clay with Pennine gritstone boulders from which the walls around the fields have been constructed. Limestone is exposed along the gill, in some rocky outcrops in the fields and in two quarries on the site. In altitude the site ranges from 160 m at the confluence of Blayshaw Gill and the River Nidd to 300 m. The site is included in the 10 x 10-km square of SE07, which includes the whole of the headwaters of the Nidd up to Great Whernside (704 m), and it is in the tetrad that includes How Stean Gorge.

Starting in 2007, the first year of the project concentrated on surveying and recording. We wanted to be able to depict the diversity contained within a fairly ordinary site that has no designation beyond being part of the Nidderdale AONB. We decided to record the bryophytes as one strand of the overall project because their fine adaptation to habitat and their susceptibility to environmental change mean that they reflect very closely the environmental history of the site.

We are using 50-m squares to make visible as much of the variety inherent in the site as possible. These squares are aligned to the UK grid, each centred on a grid reference 50 m apart. Recording is done monthly throughout the year with 294 squares having been surveyed to date.

Our only access to other records is through the NBN Gateway which has only 97 bryophyte species recorded for the whole of SE07, the majority of these being those recorded by Tom Blockeel in How Stean Gorge on a visit in 1986. There are just a handful of other records. As far as we know, the rest of the region is unexplored and we have found no information regarding habitat, abundance or change. At the national level, all our species records equate to just one dot each in a 10 x 10-km square with no difference in status between a ubiquitous moss like Kindbergia praelonga which we have so far recorded from 221 squares and any of the bryophytes we have recorded from only one square and in many cases from one solitary colony. However, zoom into 50-m squares and a kaleidoscope of distributional patterns appears, illustrating the variety of ecological niches which can be seen when the records are plotted on a map.

212 species have been recorded so far and plotted on MapMate. The process of surveying has been as interesting as the results themselves. A hundred species were quickly recorded in a couple of visits, but each subsequent visit added a handful of new species with no apparent relationship with how obscure or hidden away they might be. For example, Funaria hygrometrica only appeared as the 200th species recorded, while in September 2008, the latest recorded species, Barbilophozia atlantica, was noticed for the first time – in full view on a boulder in the Vaccinium–Deschampsia heath. It then appeared to be growing on every boulder in sight! Other species were entirely predictable; after a while it even became rather therapeutic on a Sunday afternoon, poking around the bases of the gritstone walls and duly noting Pseudotaxiphyllum elegans and Campylopus flexuosus every 50 m. Being thrown onto our own resources meant heavy use of Smith (2004) and Paton (1999), and involved many hours of trying to persuade Didymodon leaves to sit
have the advantage we have at Studfold of having the landowner's permission to examine every square metre of ground. However, there are a fair number of species in How Stean Gorge and in the upper part of Blayslaw Beck in the same tetrad that we haven't recorded from our site and with these the tetrad total must be quite close to that in Carmarthenshire. If we accept that Studfold is not an exceptional site, this shows how much county-wide surveying significantly under-records species diversity at the tetrad level.

294 fifty-metre squares have been surveyed (Table 1). Eight squares in the centre of the heavily fertilized fields have failed to produce a single bryophyte. A further 35 have only K. praenonga and Brachythecium rutabulum, and in fact 64% of the squares on the site yielded half a dozen or less species, such is the extent of the meadows and cow pastures.

At the other end of the scale, the two richest squares contain 109 species between them. It is interesting, though, that this richness is due to completely different factors. One square (65 species) holds perhaps the only habitat in Studfold which might contain original vegetation as Blayslaw Beck flows off the Vaccinium-Deschampsia heath and cuts through low cliffs into the wooded area, and the variety of species is due to the stability and quality of this habitat. The other square (68 spp.) consists of a number of different man-made microhabitats – walls, a lane, field edges and the footings of a water mill – as well as both the gritstone hanging wall and the limestone footwall of the fault through which the beck flows. As a result, only 24 species are common to both squares. Interestingly enough, only seven species on Studfold are exclusive to these two squares and they include Pogonatum urnigerum and Saxinia uncinata whose requirements are not exacting, yet for some reason have only one colony in the entire 80-hectare survey area.

The total number of 212 species (Table 2) on the site is probably of little significance. It may be that this number is about the average for all intensively surveyed tetrad across the country. It is the species distribution within the site and the picture it gives of the landscape that is so interesting, and browsing through the maps generated by MapMate gives us a precise picture of the varied habitats of Studfold.

Table 2 shows that seven species have been recorded in over 100 squares, and these are detailed in Table 3. The substrate and shelter provided by the bases of the grit dry-stone walls forming all the field boundaries enable the last two species in the table to be so widespread.

On the other hand the poverty of much of the site as a whole is illustrated by the fact that 69% of the species have been recorded from 4% or fewer of the squares, while 45 species, or over 20%, have been recorded from only one square. However, some of the diversity of the site can be gauged from the fact that these species are scattered over 28 different squares. Only one square has a significant number of them and that is explained by its unique habitat: a dump shaded vertical cliff of an overgrown limestone quarry which is the only site for Eucladium verticillatum, Fissidens osmundoides, Gymnostomum aeruginosum, Plagiomnium elatum and Jungermannia atrovirens with Scorpidium eosinii in seepages on the floor below.

Earth recesses on banks in fields contain the single record for species like Fusambromina pastila, Dicranella schreberiana, Fissidens celicus, Pleuridium acuminatum and Pseudephemerum nitidum. With such scattered and minute mosses it is very difficult to assess how completely they have been recorded, but suitable sites are in fact quite scarce with most bare earth among the grass aeward created and kept completely barren by rabbit and sheep activity.

Other species are discussed under four main habitat headings.

**Fields**

The distribution of Pleurozium schreberi picks out the enclosed area of Narbus–Agrostis–Festuco–Vaccinium acid moorland. It is in exact complementary distribution with K. praenonga and Brachythecium rutabulum, which cannot survive in the heathy moorland but which are ubiquitous in the fertilized pastures and meadows.
Pseudoscleropodium purum grows in the interface between Pleurozium schreberi and K. praelonga. It is absent both from the extremely infertile moorland and the heavily fertilized parts of the farm fields, and picks out areas along the beck, the field boundaries and tracksides that have escaped excessive nitrogen enrichment.

Hylocomium splendens is even less tolerant of fertile sites, and its distribution identifies even more perfectly the steep banks and ridges of the fields over which tractors cannot manoeuvre.

Walls
Grimmia trichophylla and Dicranoweisia cirrata pick out the gritstone walls, which are richest in the limestone area of the north and east of the site, those to the south and west being almost completely barren. Grimmia pulvinata and Schistidium crassipilum identify those walls incorporating limestone boulders. As an example of the heterogeneous nature of the walls, we have one colony of Hedwigia stellata in one of its few Yorkshire sites, sitting on top of a gritstone wall completely surrounded by a sea of Hyphnum cupressiforme, while below it on the south side of this wall is our only record for Syntrichia montana (=S. intermediata) growing with Homalothecium sericeum, Bryum capillare, Schistidium crassipilum and Zygodon viridissimus.

Epiphytes
The epiphyte flora is poor and the nature of the lichen flora indicates that air quality has been poor in the past. An unusual occurrence of the lichen Unea ceratina on an old crab apple at the top of the site suggests fairly clean air nowadays, but Zygodon viridissimus and Orthotrichum affine are sparse and occur mainly on trees growing in squares with a rich variety of terrestrial bryophytes. The only record for Ulota bruchii is of a dozen tufts scattered on the upper side of one ash branch at a field edge with 50% cover of the lichen Physcia adscendens, suggesting a high nitrogen content. Dicranum fusceens only grows on oak boles and not on rock faces as it does in profusion on another wooded site near Pateley Bridge, and Leucodon sciuroides only occurs on a massive limestone block used as a gatepost.

Blayshaw Beck
As Blayshaw Beck flows through the moors above Studfold it actually holds some characteristic bryophytes not found on the site. Slumped soil holds big populations of Blasia pusilla and Discelium nudum, and Calliergon cordifolium grows in flushes below mounds of Climacium dendroides.

As Studfold itself has been so thoroughly worked over by man, most of the bryophytes have colonized the area in place of species exterminated by habitat adjustment, and it is only along the beck that some of this original vegetation might remain.

Hygrohypnum ochraceum dominates the submerged gritstone slabs over which Blayshaw Beck flows into the survey area, while on the rock at the stream edge is an association typical of streamsides all over the Nidderdale moors:
H. ochraceum always at water level, then Solenostoma sphaerocarpum (=Jungermannia sphaerocarpus), Scapania undulata and Pellia epiphylla, with patches of Dichodontium pellucidum and D. palustre. In the side gill these plants are replaced by pure mats of Nardia compressa.

As the beck enters the shade of the woods, in the second richest square on the site, Hygrohypnum ochraceum gives way; Scapania undulata and Marsupella emarginata blanket the flat rock surface and Hymcomium armoricum becomes profuse on the vertical gritstone faces plunging into the water. There are some big old oak trees here and the flushed cliff below has tufts of Blindia acuta and cushions of Amphidium mougeotii with Aneura pinguis, Riccardia multifida and Solenostoma hyalinum (=Jungermannia hyalina), the last three at their only site.

This square also contains our only records for western mosses and liverworts on the edge of their distribution range in England: Mylia taylorii, Bazzania trilobata and Polytrichum strictum. Although B. trilobata is dotted about east of the Pennines, for example in a beck below Harlow Carr Gardens in Harrogate, it only turned up here after a diligent search, not in the woodland which has grown up on land heavily disturbed by lead mining, but on the heathy slope below the charcoal bloomeries of medieval ironworks! Nevertheless, the rich variety of Cladonia lichens and the presence of mosses like Leucobryum glaucum (our only record) point to the freedom from artificial inputs here.

The woodland itself is poor; for example it holds only two small colonies of Rhytidiadelphus loreus compared with the luxuriant swathes in Guisecliff above Pateley Bridge, but its association with oak fern on its only site suggests it might be a relic population.

The lead mine on the stream bank destroyed the original vegetation further down, and the flooding beck washed away any spoil. As a result there are none of the spoil heap specialists such as Weissia controversa var. densifolia, Racomitrium lanuginosum and R. ericoides that are such a feature of the spoil heaps along Ashfoldside Beck just to the south of Blayshaw Beck. Instead, vertical limestone under the larch trees holds Studfold’s only colonies of Rhynchostegiella tenella, Oxyrrhynchium pumilum (=Eurhynchium pumilum) and Lejeunea cavifolia.

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References