A SURVEY OF THE PLANT COMMUNITIES OF SUBSIDENCE PONDS AT BLAKEMOOR FARM, DRURIDGE BAY, NORTHUMBERLAND

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SUMMARY

Subsidence ponds are a characteristic and numerous feature in southeast Northumberland, forming over coal mine works. Their wildlife remains poorly recorded. This paper presents data on the plant communities from 20 subsidence ponds in fields at Blakemoor Farm at the southern end of Druridge Bay. Plants were surveyed in the summer of 2012 to characterise the communities, using the National Vegetation Classification (NVC). Ponds ranged from the permanent and well vegetated to ephemeral tyre ruts. Thirteen NVC communities were identified, primarily “Open Vegetation” and “Swamp” communities dominated by emergent species or plants of disturbed, occasionally flooded land. The subsidence ponds therefore create habitat for some temporary and shallow-water plant communities which are not represented in permanent, deeper ponds. No non-native species were found in the subsidence ponds, their inaccessibility on farm land perhaps a barrier to infestation. In addition the origin of the ponds represents a form of cultural biodiversity in the landscape linking back to the coal mining economy of the region.

INTRODUCTION

The large numbers of subsidence ponds in southeast Northumberland are a characteristic and distinctive feature of the landscape, attracting specific mention in overviews of the region’s flora and fauna (Swan 1993; Lunn 2004) and in specific regional inventories and descriptions (for example Fiege 2000). Sutcliffe (1972) pointed out that the abundance of shallow, plant-rich lakes throughout the county suggested “an exceedingly rich freshwater fauna”. Sutcliffe’s study focused on larger lakes, but the number of subsidence ponds lends support to his suggestion, given the recent advances in our understanding of ponds as biodiversity hotspots in the landscape (Williams et al. 2004). The subsidence ponds have contributed to a net gain in ponds in the southeast coastal plain since the mid-Victorian era based on comparisons of historic Ordnance Survey maps (Jeffries 2012). Subsidence ponds may also represent a nationally and internationally unusual pond type, a type of cultural biodiversity, the landscape reflecting its economic heritage. Subsidence ponds also occur over old coal mines in Poland (Krodkiewska 2007) and China (Zhenqi et al. 1997) and over salt works in Cheshire (Bell et al. 2000), but have not been documented elsewhere.

Despite their distinctive regional character and sheer abundance there remains a paucity of detailed surveys of our subsidence ponds. Vegetation from 118 subsidence ponds was recorded in the late 1980s. A few subsidence ponds were included in a general survey of ponds throughout lowland Northumberland, which revealed the overall variety of pond types in the county (Jeffries 1998). A more detailed comparison of plants in subsidence ponds with those in old field ponds, ponds created for nature conservation or golf courses (Jeffries 2012), showed the value of subsidence ponds, not least those inaccessible on private land which seemed to have escaped colonisation by non-native invasives, in particular New Zealand Pygmy Weed Crassula helmsii which is widespread especially in ponds on nature reserves. Surveys of fauna are even more limited (Adams and Robbins 1990; Williams 1993), but suggest that these ponds support invertebrates typical of ponds in lowland England.

This paper presents data from a botanical survey of 20 ponds all from one site, Blakemoor Farm, at the southern end of Druridge Bay. The plant communities within each pond were characterised using the National Vegetation Classification (NVC), as well as overall plant lists for each pond. The whole bay is rich in ponds and wetlands of many sizes, types and origins (Jeffries 2012). Ponds along the bay feature in several general surveys (Jeffries 1998; Zealand and Jeffries 2008; Jeffries 2012) and a set of 30 small experimental ponds at Hauxley Nature Reserve, further north on Druridge Bay, has been studied in detail, tracking changes to plants and invertebrates since 1994 (e.g. Jeffries 2002, 2008, 2010). The data presented here represent the first detailed survey focusing on the subsidence ponds within a working farm.

This survey was prompted partly by the conspicuous number of small ponds often in the middle of agricultural fields at Blakemoor, and by the fact that this southern landscape of the bay has not been disturbed by the opencast coal extraction which dominates further north in the bay and presents a distinctly ripped landscape. Waddington (2010) mapped the ponds in the Blakemoor area and compared their distribution to coal seam maps from the nearby Ellington Pit; whilst a few ponds may not be solely the result of subsidence the great majority coincide with the extensive underground works.

METHODS

The 20 ponds chosen all appear to be subsidence ponds, including the wheel rut sites, all of which had formed in shallow hollows which occasionally hold water.

The precise origins of ponds in Northumberland can be ambiguous, for example a pond near Belford included in Jeffries (1991) which was attributed to aircrew from a nearby World War Two base by the landowner but does appear on Victorian OS maps. So the status of the ponds in this survey as subsidence features is defined by a mix of characteristics. Firstly, their recent origins: Jeffries (2011) conducted a map audit of ponds in southeast Northumberland based on 1:10,000 (or 1:10,560) OS maps dating back to the mid-Victorian era. None of the ponds in the current survey appear on maps until the 1950s onwards, although many are large enough to have been recorded if they were older. All lie in hollows or folds and have gently sloping edges grading into the surrounding landscape, rather than abrupt banks. All are recurrent features, appearing in aerial images for at least the last 10 years, even the apparently ephemeral tyre track

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1 Scott, N [1990]. Subsidence pond survey, Northumberland Wildlife Trust. (The precise date of this survey is uncertain and the full results not published. Michael Jeffries has partial data from the survey from 1990.)
The primary purpose of the survey was to characterise the plant communities using the National Vegetation Classification. The NVC relies on sampling distinct, homogeneous stands of vegetation. The current survey used a 1m² quadrat with cross wires at 10cm intervals, recording the plants under each of the cross-wire intersections to give a measure of percentage cover, five such quadrats from each distinct stand of vegetation. For aquatic, swamp and lower herbaceous vegetation the NVC specifies a 2m² quadrat; the smaller size used here was chosen to capture the finer-grained mosaics and zones evident in the ponds.

Plants were identified using Stace (1997, including microscopic examination), with the exception of the Starwort Callitriche species which were checked against Lansdown (2008: however no ripe fruits were found to allow effective identification). Filamentous algae were not identified further, nor a small amount of moss in one pond. No Charophytes (a division of green algae) were found, although these occur widely in dune ponds further north along the bay.

**RESULTS**

Vegetation types found in the 20 Blakemoor ponds comprised aquatic and swamp communities (Rodwell 1995; NVC types A and S), grasslands (Rodwell,1992; NVC types MG) and open habitat vegetation (Rodwell 2000; NVC types OV). Recent suggestions of additional NVC types and variations summarised in JNCC (2011) were also checked. More information on all the NVC types described in this report and the associated methods can be found in these references. The NVC types described in this report are based on keys and descriptions in Rodwell 1992, 1995 and 2000. In total 210 quadrats were recorded.

The mean number of taxa across all 20 ponds was 12.4 (+ 4.1 SD), although the great majority were emergent species (as defined by Pond Action 1998) plus terrestrial plants favouring damp habitats (mean of emergents plus terrestrial taxa = 11.8). The only three aquatic taxa were Starworts, Lesser Duckweed *Lemna minor* and Ivy-leaved Duckweed *L. trisulca*.

Thirteen NVC vegetation types were recorded from the 20 ponds. Table 1 lists all the NVC types and example ponds in which they occurred. Some ponds did not support distinct NVC types, notably the tyre rut ponds 18-20, which had a sparse version of OV18 Polygonum aviculare-Chamomilla suaveolens community (note that the NVC uses an older name Chamomilla suaveolens for Pineapple Mayweed Matricaria discoidea). This same community showed considerable variation in some of the other, larger, arable field ponds, the plant species' mix and density varying with tyre track depth and shape, creating a distinct and attractive surround to these ponds. The four main pond types, defined by surrounding land and permanence, are characterised in Table 2, and the overall plant records for each pond are summarised in Table 3.
Table 1. The NVC Community types identified from the 20 ponds.

<table>
<thead>
<tr>
<th>NVC code</th>
<th>Description</th>
<th>Example ponds</th>
</tr>
</thead>
<tbody>
<tr>
<td>A10</td>
<td>Polygonum amphibian community. Thick sward of Amphibious Bistort, P. amphibium, in deeper water than surrounding grass dominated vegetation.</td>
<td>2, 6</td>
</tr>
<tr>
<td>MG13</td>
<td>Agrostis stolonifera-Alopecurus geniculatus grassland. Creeping Bent and Marsh Foxtail characterise this grass sward of moist, occasionally inundated areas. A distinct ring around several ponds. The finer scale sampling used for this report did pick out areas which were wholly A. stolonifera or A. geniculatus that have been separated out for this list, that is OV28 and OV29.</td>
<td>1, 2, 4, 5, 6</td>
</tr>
<tr>
<td>OV18</td>
<td>Polygonum aviculare-Chamomilla suaveolens community. Knotweed and Pineapple Mayweed. A community of moderately disturbed and trampled areas of agricultural landscapes such as field gateways and paths. This plant community graded into the more wetland types of many ponds around Warkworth Lane, perhaps due to unusually high water levels this year, but was often mixed with types such as OV31 and OV33.</td>
<td>8, 9, 12</td>
</tr>
<tr>
<td>OV28</td>
<td>Agrostis stolonifera-Ranunculus repens community. Areas dominated by Agrostis stolonifera. Conspicuous additional species included Meadow Buttercup Ranunculus repens, or Amphibious Bistort Polygonum amphibium.</td>
<td>3, 4</td>
</tr>
<tr>
<td>OV29</td>
<td>Alopecurus geniculatus-Rorippa palustris community. The grass A. geniculatus in a less thick sward, patches of open water and Yellow Bitter Cress Rorippa palustris, constant in samples.</td>
<td>5</td>
</tr>
<tr>
<td>OV31</td>
<td>Rorippa palustris-Filaginella uliginosa community. Yellow Bitter Cress and Cudweed are characteristic. Distinct patches of vegetation with the grey foliage of the F. uliginosa, reddish Polygonum species and small clumps of bright green Toad Rush Juncus bufonius, but most of the substrate bare.</td>
<td>8, 9</td>
</tr>
<tr>
<td>OV32?</td>
<td>Myosotis scorpioides-Ranunculus seleratus community. Several ponds contain thick stands of Celery-Leaved Buttercup Ranunculus seleratus, a plant which copes with nutrient enrichment, livestock and saline incursion. However the stands do not fit the OV32 type well, lacking other indicator species, for example, Glyceria maxima and Myosotis scorpioides: all Myosotis checked keyed out as M. laxa.</td>
<td>11, 16</td>
</tr>
<tr>
<td>OV33</td>
<td>Polygonum lapathifolium-Poa annua community. Annual Meadow Grass Poa annua is a conspicuous plant on the bare substrate of the Warkworth Lane ponds. In these ponds the Poa tends to be dominant, a thick sward with some Knotweeds, Polygonum spp., and Toad Rush Juncus bufonius, mixed in.</td>
<td>7, 16</td>
</tr>
<tr>
<td>S4</td>
<td>Phragmites australis swamp and reed beds. Pond 3 grades into adjacent reed beds which have developed over subsidence of the ditch running between two fields. Reed bed communities vary considerably but this survey did not attempt to describe reed beds in more detail.</td>
<td>3</td>
</tr>
</tbody>
</table>

Table 2. The four main pond types.

<table>
<thead>
<tr>
<th>Type</th>
<th>Characteristics</th>
<th>Pond numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permanent ponds in pasture fields along Cresswell dune road</td>
<td>Larger ponds, not recorded as drying out over several years of casual visits. 1, 3 and 6 are extensively vegetated throughout but pond 4 largely bare. Pond 4 is fed by a conspicuous spring with elevated conductivity (~1000 µS cm⁻¹).</td>
<td>1, 3, 4, 6</td>
</tr>
<tr>
<td>Temporary ponds in pasture fields along Cresswell dune road</td>
<td>Known to dry out occasionally. Both extensively vegetated. Pond 5 is adjacent to pond 4 but lacks the inflow from a spring which may explain why it dries whilst 4 does not.</td>
<td>2, 5.</td>
</tr>
<tr>
<td>Temporary ponds in arable fields at Warkworth Lane</td>
<td>Wide range of sizes but all drying out most summers. Most ponds are along edges of fields. Either largely bare except for around edges (12, 13), a mix of bare mud and patches of Bistorts, Toad Rush (7, 8, 9) or thick cover of grasses and amphibious species (16, 17).</td>
<td>7-17</td>
</tr>
<tr>
<td>Tyre rut ponds at Warkworth Lane</td>
<td>Water filled tyre ruts, although known to be recurrent at same places within the crops over the years. Sparse but distinct vegetation of Mayweeds, grasses and Bistorts.</td>
<td>18, 19, 20</td>
</tr>
</tbody>
</table>
Table 3. Overall plant data for each of the 20 ponds. Abundance was summarised using the DOMIN scale.

<table>
<thead>
<tr>
<th>Plant taxa</th>
<th>Pond number</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1</td>
</tr>
<tr>
<td>Agrostis stolonifera</td>
<td>5 4 5 3 6 4 7</td>
</tr>
<tr>
<td>Alopecurus geniculatus</td>
<td>1 1 7 10 4 3 3 7 4 2 2 4 7 4 7 5</td>
</tr>
<tr>
<td>Filamentous algae</td>
<td>2 3 3</td>
</tr>
<tr>
<td>Callitriche spp.</td>
<td>1 1 1 5</td>
</tr>
<tr>
<td>Cardamine pratensis</td>
<td>3 2 2</td>
</tr>
<tr>
<td>Chenopodium unidentifed</td>
<td>1 3 2 3 2 1 3 3 3 1 3 3 8 2</td>
</tr>
<tr>
<td>Persicaria aviculare</td>
<td>2 2 2 2 2 2 1 2 1 1 1 3 2 2 2 2 2 2 2</td>
</tr>
<tr>
<td>Plantago major</td>
<td>2 6 4 7 1</td>
</tr>
<tr>
<td>Poa annua</td>
<td>2 4 2 7 7 6 2 3 3 2 4 4 5 10 4</td>
</tr>
<tr>
<td>Poa trivialis</td>
<td>1 3 2 3 2 2</td>
</tr>
<tr>
<td>Polygonum amphibium</td>
<td>2 6 4 7 1</td>
</tr>
<tr>
<td>P. lapathalium</td>
<td>2 2 2 2 2 1</td>
</tr>
<tr>
<td>P. persicaria</td>
<td>2 4 1 1 4 3 1</td>
</tr>
<tr>
<td>Ranunculus lingua</td>
<td>5 2</td>
</tr>
<tr>
<td>R. repens</td>
<td>1 3 1 4 1 3 2 3 2 2 2</td>
</tr>
<tr>
<td>R. sceleratus</td>
<td>2 4 4 2 2 1</td>
</tr>
<tr>
<td>R. palustris</td>
<td>4 1 1 3 1 4 2 3 2</td>
</tr>
<tr>
<td>Rumex crispus</td>
<td>1 1 1 1 3 3 3 1 1</td>
</tr>
<tr>
<td>R. obtusifolia</td>
<td>1 1 1</td>
</tr>
<tr>
<td>Rumex unid.</td>
<td>1</td>
</tr>
<tr>
<td>Senecio vulgaris</td>
<td>1 1 1 1 3 6 1</td>
</tr>
<tr>
<td>Sparganium erectum</td>
<td>1 1 1 3 6 1</td>
</tr>
<tr>
<td>Stellararia media</td>
<td>1</td>
</tr>
<tr>
<td>Tripleurospermum inodorum</td>
<td>2 1 2 1 2 3 1 1 2 2 2 2 2</td>
</tr>
<tr>
<td>Typha latifolia</td>
<td>1 3 3</td>
</tr>
</tbody>
</table>

Ponds 1-6 in the fields to the immediate south of Blakemoor Farm were extensively vegetated, ponds 1-5 in permanent pasture fields and pond 6 along the roadside edge of an arable field. Ponds 2 and 4 have dried up occasionally in recent years but the others are permanently wet. All six ponds support mosaics of wetland NVC communities, in particular dominated by the grass Creeping Bent Agrostis stolonifera, Marsh Foxtail Alopecurus geniculatus and Flote Grass Glyceria fluitans. They also provide habitat for NVC swamp communities dominated by Spike Rush Eleocharis palustris, Erect Bur-reed Sparganium erectum and Common Reed Phragmites australis. Ponds 1-3, 5 and 6 are largely covered by plants. Pond 4 retains an open substrate. It is fed by a conspicuous spring to the west side which has a markedly high electrical conductivity (routinely ~1000 µS cm⁻¹ compared to normal freshwater ponds of the coastal plain of ~100-500 µS cm⁻¹), which may indicate saline intrusion (Waddington 2010).

The ponds around Warkworth Lane are associated with arable fields. They are shallower, prone to drying most years and have either a bare, muddy, submerged substrate or are covered with plants such as Annual Meadow Grass Poa annua. Pineapple Mayweed, and several species of Bistort Polygonum spp. Figure 2 shows examples of the pond types from throughout the farm.
**Figure 2.** Examples of main pond types characterised in Table 2.

(a) Permanent ponds in pasture fields along Cresswell dune road, pond 1.

(b) Temporary ponds in pasture fields along Cresswell dune road, pond 2.

(c) Temporary ponds in arable fields at Warkworth Lane; thick sward of amphibious grasses, pond 17.

(d) Temporary ponds in arable fields at Warkworth Lane; largely bare substrate, pond 13.
No rare plants were found nor any non-native invasives. Several of the latter occur frequently along the bay, in particular New Zealand Pygmy Weed along with more occasional Pondweed *Elodea* species and, at Ellington pond, Fairy Fern *Azolla filiculoides*. Jeffries (2012) notes that the non-native species are found at ponds on nature conservation sites but not in the subsidence ponds on private land and that the actions of conservationists seem to be acting as a Trojan horse for these invasive taxa.

**DISCUSSION**

The 20 subsidence ponds surveyed at Blakemoor Farm supported a variety of NVC types, mostly swamp emergent communities or grass and herbs of damp and inundation habitats. There are no NVC data available from local ponds to allow direct comparison with the subsidence ponds’ plant communities; nonetheless the ponds provide habitat for a range of plant community types not found in other wetlands along the bay or more widely in Northumberland. In particular the ephemeral OV communities are absent from other pond types such as those dug for conservation, which tend to be deeper and permanent, or larger, older subsidence ponds which are often dominated by thick stands of tall dominants such as Reed Canary Grass *Phalaris arundinacea* and Bulrush *Typha latifolia* (Scott 1990; Jeffries 1991, 1998). The mean number of taxa per pond (12.4) is similar to results from a survey of 12 subsidence ponds across southeast Northumberland (mean 11.3. Jeffries 2012); the higher number at Blakemoor is probably due to the wider variety of ponds chosen for the survey, ranging from larger, extensively vegetated ponds to ephemeral tyre ruts.

The ephemeral subsidence ponds are also likely to be valuable for specialist animals. No systematic recording was done of animals for this survey but in the bare substrate arable field ponds microcrustacea were abundant, for example *Daphnia* and *Ostracoda*. More unexpectedly, mature Three-spined Sticklebacks *Gasterosteus aculeatus* (L.) also turned up in one tyre rut pond.

The ponds in the middle of arable fields clearly represent an opportunity cost to the farm, but are recurrent features, probably resistant to draining or infilling. Water sources for the ponds are not reliably known, but several of the ponds in the dune road fields have visible upwellings through their substrate; one has an adjacent spring inflow, and the water from these sources and in several other ponds has elevated conductivity suggesting either mine or saline influenced water tables underground. Waddington (2010) also found unusually high sodium levels in many of the ponds around Blakemoor. Despite the loss of productive agricultural land to the ponds, the farm management have taken a proud interest in these features.

In summary, the subsidence ponds support a varied range of plant communities, many of which have not been recorded from deeper, permanent ponds in the region. Subsidence ponds add to the overall landscape diversity of the county, representing a distinct regional, perhaps national, pondscape, and an ecological echo of the economic and cultural heritage of southeast Northumberland.
ACKNOWLEDGEMENTS

I am very grateful to Jim Beattie, Kevin Skelly and Gillian Agan for allowing access to Blakemoor Farm and for encouraging this work.

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JNCC (2011). A compilation of proposed additions and revisions to vegetation types in the National Vegetation Classification. Peterborough.


2 Copies of all Newcastle Polytechnic and Northumbria University published reports are available from Michael Jeffries.
VEGETATION CHANGE FROM 1979 TO 2008 AT CHILLINGHAM PARK IN RELATION TO CONSERVATION OF THE CHILLINGHAM WILD CATTLE

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SUMMARY

Parks where the botanical interest of the sward has been retained are relatively unusual in the British Isles. Chillingham Park, northeast England, has been managed primarily to conserve its native cattle breed and the sward has been of only secondary importance in conservation terms. A liming programme was in operation from 1980 to 2004 in order to secure the nutrition of the cattle herd. The relatively species-rich vegetation was surveyed in 1979; in 2008 plant species richness of sampled quadrats was found to have declined by 23%. Species characteristic of higher soil pH and fertility, increased light and decreased wetness had been favoured, with a decline in stress-tolerating species. Possible causes of these changes include liming and inputs of fixed atmospheric nitrogen. Few if any plant species have been completely lost, and grassland diversity is now the subject of conservation management.

INTRODUCTION

Wood pasture and parkland are, collectively, a priority habitat in the UK covering 10,000-20,000 ha (JNCC 2004; http://ukbars.defra.gov.uk). Each represents a distinct form of land use. The former was very widespread in many marginal and upland areas (Stiven and Holl 2004), providing wood and pasturage, while parkland was primarily aesthetic and recreational in function. In the British and Irish lowlands, many wood pastures still exist because they were incorporated into landscape parks particularly during the eighteenth and nineteenth centuries (Rackham 2000; Williamson 1995). Much wood pasture is now in decline, and parks where both tree and grassland components are in good condition are rare (“the wood and pasture components seldom both survive” Rackham 2006) while the botanical diversity of grassland in most of the 26 National Trust lowland parks surveyed was “very low” (Cox and Sanderson 2001).

Chillingham Park (Figure 1; 55° 31’ N, 2° 54’ W) was remodelled from a medieval deer park in a process that began in the 1700s (Hall 2010). Quick access to detailed maps and imagery can be obtained using the UK postcode NE66 5NP. Elevation is between 98 and 235 metres above sea level; annual precipitation is 939 mm and accumulated temperatures below 0 °C are 235 (number of days below zero x minimum temperature for each such day, Smith 1984). A Higher Level Stewardship agreement is in place (Natural England 2011). The park, the cattle and the surrounding woodlands are owned by the Chillingham Wild Cattle Association (www.chillinghamwildcattle.com)

Figure 1. Location of Chillingham Park.

This historic landscape has been managed primarily for the cattle herd (Figure 2). Chillingham cattle are a distinct breed, which have inhabited Chillingham Park since at least 1646 (Hall et al. 2005; Visscher et al. 2001). Apart from a reserve herd in northeast Scotland, the breed is found nowhere else.

Figure 2. Members of the Chillingham herd on damp grassland near streamside ash and alder trees.
The cattle graze the 142.61 hectare core of the park, of which the uppermost 10.70 hectares is heathland and 18.84 hectares is mature unfenced woodland. The ground vegetation is mainly infertile grassland with species of mesic conditions such as Common Bent *Agrostis capillaris* and includes moorland grassland mosaics, with extensive areas of Bracken *Pteridium aquilinum*, Tufted Hair Grass *Deschampsia cespitosa* and rushes *Juncus* spp. Apart from tree-covered streamside areas, the ground vegetation of shaded areas is not obviously dependent on whether the shade is derived from trees or bracken. The tree populations are described by Hall and Bunce (2011).

In winter the cattle remain in the park and hay is fed, but otherwise management of the herd is minimal, the animals not being handled or ear-tagged, and there is no castration or culling (Hall et al. 2005). Historically, most dead cattle were buried within the park. Average numbers in the herd have varied considerably. During the last five decades of the twentieth century they were respectively 32.7 (1950s), 51.1 (1960s), 51.9 (1970s), 44.7 (1980s) and 51.0 (1990s) and numbered 103 in November 2013. A commercial sheep flock, of no conservation significance, has been practised as opportunity affords, to increase herbage production. The management has not been systematic, with the grazing of the seven patches varying on the basis of the demand for hay. For the 2008 survey, 50 of the grid squares surveyed in 1979 were selected at random and their centres re-located. The 2008 survey was based on a square quadrat frame of 100 m² and all observations were made from a walking frame.

The ground vegetation was originally surveyed in 1979 (Hall and Bunce 1984) to provide insights into the behaviour of the cattle (Hall 1988). Since then in many European grasslands a general reduction in species richness has been observed from relatively species-rich infertile classes to less diverse classes (Carey et al. 2008; Dupré et al. 2010). This raised the question of whether the pasture plant biodiversity has been resilient at Chillingham, so in July 2008 the 1979 survey was repeated.

**METHODS**

**Herbivore biomass**

Biomasses and metabolic body weights (kg ⁰.⁷⁵ ha⁻¹) of herbivores were calculated from herd records. Sheep and deer numbers were obtained from unpublished records and from personal observation. Body weights (kg) were taken as follows: calf 40, yearling 80, two-year-old bull 140, two-year-old heifer 130, bull or cow three years and older 300; South Country Cheviot ewe 48, mule ewe 73, Fallow Deer 72.

Stocking rates were expressed in terms of the pasture area of the park, that is 113.09 ha, being the enclosed area minus those of heathland and mature unfenced woodland, and comprising a mosaic of mesotrophic and less agriculturally productive grasslands. Stocking rate at its peak in 2002 (86 kg ha⁻¹) for cattle alone; 246 kg ha⁻¹ if ewes are included; 396 kg ha⁻¹ if lambs and deer are added) was within the range of those maintained elsewhere in England, Wales and Northern Ireland on National Trust mesotrophic grasslands (360-800 kg ha⁻¹, calculated from Figure 1 of Hearn 1995).

The removal of sheep means that pasture will be seasonally superabundant for the foreseeable future. Local experience suggests that the carrying capacity of the park with winter hay feeding is likely to be 120 cattle in total (C. Leyland, pers. comm.). By extrapolating from the herd structure in 2008 the biomass of cattle in a herd totalling 120 would be 223 kg ha⁻¹, similar to the rate observed on rather more productive lowland grasslands managed for nature conservation (Kirkham et al. 2005).

**Nitrogen balance**

A mass balance nutrient nitrogen budget was deduced (see Appendix). Losses through leaching could not be calculated; estimated annual deposition of anthropogenic fixed nitrogen (Fowler et al. 2004) is 16.1 kg ha⁻¹ (www.apis.ac.uk). Input from other sources has been trivial, as is generally the case in comparable upland pastures (Ineson 1987).

**Botanical survey**

In 1979 the survey was based on a 25 metre grid drawn on to a 1:2500 map, 101 grid squares being sampled. A square quadrat frame (200 m² in area) was used. The plant species were recorded according to whether they were first encountered in the innermost, nested, rectangular 4, 25, 50, 100 or 200 m² of the quadrat. For the 2008 survey, 50 of the grid squares surveyed in 1979 were selected at random and their centres re-located. The 2008 survey was based on a square quadrat frame of 100 m² and all species were recorded.

Species richnesses were compared by matching the 2008 lists (from 100 m² quadrats) with the 1979 lists from 25 m² quadrats. As a preliminary exploration of whether species that were widespread in 1979 might have been reduced to smaller and more localised stands, the number of species recorded in the innermost 25 m² of the 1979 quadrats was compared by matched-pairs t-test with that recorded in the corresponding 100 m² quadrats used in 2008.

Species lists for the 50 quadrats surveyed in 2008 and the counterpart lists from 1979 were analysed. MAVIS software (Carey et al. 2008) was used to compute Ellenberg values for fertility, light, acidity and moisture, and the competitor/stress toleator/neutral (CSR: Grime et al. 2007) scores for each quadrat, which were compared between 1979 and 2008 by matched-pairs t-tests. To facilitate comparison between surveys, quadrats were assigned by MAVIS to Aggregate Classes, of which eight are defined in the UK (Bunce et al. 1999a) namely crops/weeds, tall grassland/herb, fertile grassland, infertile grassland, lowland wooded, upland woodland, moorland grass/mosaic, heath/bog.
RESULTS

Biomasses for each group of animals are presented in Figure 3.

Figure 3. Temporal change in total biomass (kg) for each herbivore species individually. Lamb biomass is the seasonal peak, those of the other groups are year-round.

Balance of fixed nitrogen per hectare was always positive. The highest calculated annual value was 5.06 kg ha⁻¹ in 2008, the lowest 0.13 kg ha⁻¹ in 1953-57. The overall mean was 1.86 kg ha⁻¹. Deposition of atmospheric anthropogenic fixed nitrogen would add 16.1 kg ha⁻¹ to these values.

In 1979, 109 species were recorded in total in the fifty 100 m² quadrats; in 2008, of these species, only 81 were recorded, a reduction of 25.6%. The species that have shown the most marked reduction in occurrence are shown in Table 1. A list of 27 further species recorded in 2008 and not in 1979 is given in Table 2.

### Table 1. Occurrences of species in the fifty 100 m² quadrats surveyed in both 1979 and 2008. N 79 and N 08: number of quadrats where species was present in 1979 and 2008 respectively. o: species absent, x: species recorded elsewhere in Park. Species with more than 10 records in 1979 and a decline of more than 50% in occurrence are underlined and in bold.

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<th>N 08</th>
<th>Species</th>
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<td>Lolium perenne</td>
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Figure 4. Shifts between Aggregate Classes from 1979 to 2008 (III: Fertile Grasslands; IV: Infertile Grasslands; VI: Lowland Wooded; VII: Upland Grasslands). Numbers within boxes signify numbers of quadrats assigned to each Aggregate Class at each survey. Numbers associated with arrows indicate number of quadrats that shifted from one Aggregate Class to another from 1979 to 2008.

Taking all AC together, for 1979 the mean species richness per 100 m² quadrat was 29.84 (SD 6.77) and for 2008, 22.96 (SD 5.48), implying a reduction from 1979 to 2008 of 23% (t = 6.43, P < 0.001). This is also evident if only the quadrats that were in AC IV in both 1979 and 2008 are considered. These showed a significant decline (also of 23%; t = 5.41, P < 0.001, n = 25) in species richness (1979 mean 30.8, SD 6.56; 2008 mean 23.6, SD 5.06). Mean species richness in the fifty 25 m² quadrats in 1979 was 24.1 (SD 6.41), similar to the mean of 22.96 species in the corresponding 100 m² quadrats in 2008.

Ellenberg scores and CSR scores are compared in Table 3. Increase in Ellenberg scores for pH, fertility and light and decrease for wetness score imply plants being favoured that prefer less acid, more fertile, less shaded and drier conditions. These parallel changes in CSR scores, which show a marked decline in stress-tolerator score.

Table 3. Changes from 1979 to 2008 in Ellenberg and CSR scores (averaged across all 50 quadrats surveyed in both years).

<table>
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<tr>
<th></th>
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<th>2008 mean</th>
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<td>pH</td>
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<td>CSR scores</td>
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<td>Ruderal</td>
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<td>2.54</td>
<td>0.32</td>
<td>-8.31</td>
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</table>
**DISCUSSION**

Nationally, over the period covered by our study, species richness in the open countryside in the UK has declined by 8% (from 17.1 species per 200 m² plot in 1979, to 15.7 in 2007: Carey et al. 2008). This has already been reported in Northumberland (Lunn 2010). The decline we observed, of 23% (from 29.8 species per 100 m² plot in 1979 to 22.3 species in 2008) seems to be characteristic of areas that were more species-rich at the outset. In the UK, many of the more species-rich vegetation classes have shown a greater proportionate decline in richness; from 1979 to 1990, nationally, infertile grassland and upland woodland showed 12% and 21% declines respectively (Bunce et al. 1999b), while from 1990 to 2007 “areas targeted for their botanical interest” (Carey et al. 2008) showed declines averaging 17%. Indeed, floristic changes were already under way at Chillingham by 1992, when Smith and Humble (1994) found that the upland grasslands had shifted either to bracken communities or to more fertile variants of Festuca-Agrostis-Galium (NVC type U4b) grasslands.

Core species present in high frequency in 1979 such as Common Bent Agrostis capillaris, Red Fescue Festuca rubra and Common Sorrel Rumex acetosa have remained almost unchanged. Perennial Ryegrass Lolium perenne, Crested Dog’s-tail Cynosurus cristatus and Cock’s-foot Dactylis glomerata have increased in frequency, as would be expected as a result of liming. The only widespread pasture grass to have declined in frequency is Common Meadow-grass Poa pratensis. Species that have shown major declines include Common Heath Grass Danthonia decumbens, Heath Bedstraw Galium saxatile and Matgrass Nardus stricta, all characteristic of acidic soils and poor competitors (Grime et al. 2007), generally unable to withstand the denser shade caused by increased grass growth. Twenty-seven of the 109 species recorded in 1979 on the sampled quadrats are no longer detectable, while (coincidentally) 27 others were detected for the first time in 2008. These changes are probably sampling and detection effects rather than results of local extinction and colonisation. That the less frequent species continue to exist but in smaller and weaker stands is implied by the observation that on average a given 25 m² quadrat in 1979 contained the same number of species as the corresponding 100 m² quadrat in 2008.

The greater prevalence of species of less shady, more fertile, less acid and drier conditions and the decrease at Chillingham in stress-tolerator score and concomitant increase in competitor and ruderal scores parallel what has been seen in acid/neutral grasslands generally in the UK (Carey et al. 2008). However, light score decreased in these habitats nationally, implying an increased importance of shade as a national ecological factor possibly because of reduced grazing intensity. Perhaps Chillingham runs counter to this national trend because of dominating effects of removal of bracken or as a result of grazing pressure.

Chillingham Park was evidently heavily stocked while the sheep flock was present and deer were numerous, and the changes in plant species richness are presumably due to the interaction of grazing pressure and nutrient enrichment. Other studies have implied that eutrophication of upland grazing is the result of positive feedback, whereby atmospheric deposition of fixed nitrogen “increases the proportion of grasses, making the vegetation more palatable for grazing animals [which] in turn increase the levels of nitrogen in the vegetation through input from dung and urine” (Firbank et al. 2000). Sheep exhibit greater selectivity on pastures of this kind (Hodgson et al. 1991), so such a feedback process will be less evident now the sheep have been removed; but there is a lack of information on the vegetational consequences of the replacement of a sheep flock by a numerically growing cattle herd.

Changes in patterns of survival of the cattle during the 16 years of liming are being investigated (S J G Hall in preparation). There was not a clear increase in cattle biomass over the period, but the nutrition of lactating cows had been secured, which was the desired outcome. In summary, the pasture biodiversity has been damaged but probably not irretrievably.

Management policy, which previously focused on the cattle, now includes conservation of plant biodiversity. A programme of reduction of excess herbage by mowing and removal of cuttings was initiated in 2008. Controlled grazing through temporary fencing would not be consistent with the management policy of this free-ranging herd. The response to these measures will depend partly on local conditions which are not predictable. However, the general conclusion of Smart et al. (2005) that the presence of “more diverse residual species pools” increases the response of farmland to agri-environmental schemes may give reasons for optimism.

Although the cattle will continue to have priority at Chillingham, the vegetation has retained much of its interest and it will be possible to assess in due course whether the more sympathetic pasture management regime will have retrieved the situation further.

**ACKNOWLEDGEMENTS**

The Chillingham Wild Cattle Association authorised the study which was funded by the University of Lincoln and the Bryan Guiness Trust. Mr Chris Leyland, Park Manager, provided background information and Dr Roger Smith provided an unpublished report. Dr Simon Smart, Dr Libby John and Prof. Nick Polunin commented on an earlier version of the manuscript.

**REFERENCES**


APPENDIX

Supplementary Information: nitrogen balance
Herd records document the quantity of hay fed to the cattle each year together with the results of occasional chemical analyses, which included crude protein (mean 8.77%). Protein generally is 16% fixed nitrogen so 1 tonne of hay provided 14.03 kg of fixed nitrogen. During this study dead cattle were almost all buried within the Park so there is no cattle output term for nitrogen. Mean annual input of fixed N in cattle hay from 1953 to 2002 was 289.8 kg.
A MAJOR GLACIAL MELTWATER CHANNEL AND FOSSIL WATERFALL IN THE NORTH PENNINES, NORTHERN ENGLAND
(WITH A NOTE ON THE FLORA OF THE WATERFALL)

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32 Trajan Walk, Heddon-on-the-Wall, Newcastle upon Tyne NE15 0BJ

SUMMARY
A major ice-directed, subglacial meltwater channel crossing the main North Pennine watershed is described. It last operated at and near the Late Devensian Last Glacial Maximum, and led water to a large waterfall, now fossil, over an outcrop of the Carboniferous Great Limestone.

DISCUSSION
At the local Last Glacial Maximum (LGM) of the Late Devensian glaciation (about 31,000-11,700 Before Present (BP)) in the North Pennines, both Cold Fell in the north and Cross Fell in the south nourished their own ice caps, powerful enough to deflect ice dispersing from an ice dome centred over the Lake District to the west. However, the rather lower section of the North Pennine escarpment between these ice caps was overridden by the ice-sheet, with flow being broadly towards the east-northeast (Livingstone et al. 2012; Lunn 1995; Mitchell 2007; Trotter 1929; Vincent 1969: Figures 1 and 2). East of this section of the divide, including in the Gelt Burn and Knar Burn valleys which are the subject of this paper, are numerous erratics derived from the west. They consist of Borrowdale Volcanic Group and New Red Sandstone material, some Scottish granite (there was possibly some influence of southwestern Scottish ice), and some quartz-dolerite erratics (the quartz-dolerite Whin Sill crops out in the New Water valley, immediately to the west of the divide in this area).

Figure 1. Northern England. NP = North Pennines; LD = Lake District; TG = Tyne Gap; VE = Vale of Eden; St = Stainmore; CF = Cross Fell. After Google Earth.

References for appendix:


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The channel was first recorded by Trotter (1929) and interpreted by him as a “direct overflow” into the South Tyne catchment from a lakelet impounded by the retreating Vale of Eden ice sheet in New Water. It was named the Butt Hill channel by Trotter and Hollingworth (1932) in their subsequent account, and is depicted as a “glacial drainage channel” on the Geological Survey one-inch Brampton drift sheet (Geological Survey of England and Wales 1931). Trotter’s interpretation was according to the then accepted paradigm (Kendall 1902) that such channels are normally ice-dammed lake overflow channels. However, the Butt Hill channel is now recognised as a major ice-directed subglacial meltwater channel, carrying debris-charged meltwater from the Lake District and Vale of Eden into the South Tyne valley (Vincent 1969; Lunn 1995). It has a “humped” longitudinal profile, indicating subglacial flow under a hydraulic pressure gradient. Because the orientation of such ice-directed meltwater channels approximately accords with that of the ice surface gradient (which largely determines the sub-glacial hydraulic gradient), the channel must have been operating when ice from the Lake District and Vale of Eden was still able to override this part of the North Pennines. In fact, the channel could well have been eroded incrementally during successive Quaternary glacial stages. An implication is that at the LGM the basal ice in this area was at pressure melting point, and wet-based, in order that meltwater could be present.

Livingstone et al. (2012) have recently identified different flow phases during the existence of a dynamic last British-Irish Ice Sheet, and the channel likely operated mainly during their Stage I and subsequent early down-wasting – that is, during the maximum expansion of the ice sheet at the local LGM, around 25-22,000 BP, and shortly afterwards. Thereafter, since thinning ice in the Vale of Eden was no longer able to surmount the Stainmore col at about 420 m.a.s.l. from the head of the Vale and thus follow an easterly flow pathway there, it is unlikely that east-flowing ice (and therefore ice-directed subglacial meltwater) was by then able to override the higher divide (above 450 m.a.s.l.) in the Butt Hill area. Rather, during deglaciation, ice flow in the Vale of Eden was redirected towards the northwest, more or less parallel to the North Pennine escarpment.

The Butt Hill channel is one of the major meltwater channels in northern England. Its floor (the surface of the peat infill) is located at the lowest point (by some 150 metres) on the main North Pennine watershed between the Tyne Gap and Stainmore, a distance of some 50 km, as also – prior to its incision – were its shoulders, albeit some 40 metres higher. It can therefore be expected, since subglacial water tends to cross divides at topographic lows, to have drained very substantial amounts of meltwater from a large up-glacier catchment to the west and southwest: hence the channel’s impressive dimensions. The col into which the channel is incised may itself have been selectively deepened and broadened by ice sheet erosion (Vincent 1969). After the abandonment of the channel owing to ice-sheet surface down-wasting, continued meltwater flux was responsible for the impressive suite of subglacial and lateral channels trending broadly north-westwards obliquely down the Pennine escarpment into the Vale of Eden (Arthurton and Wadge 1981; Livingstone et al. 2012).

At the eastern end of the channel, at around 290 m.a.s.l. and where it opens out into the northeast-flowing Gelt Burn, is a large, east-facing, fossil waterfall over an outcrop of limestone (NY 639502), known as Gelt Linn (Figure 4). The limestone is the Carboniferous (basal Namurian) Great Limestone, the thickest of the local limestones, located at the top of the Upper Alston Group of the Alston Block (Stone et al. 2010). From its dimensions the waterfall is clearly misfit with respect to the minor Gelt Burn headwater, which now flows over it in a narrow slot.
The floor of the Butt Hill channel above the fossil waterfall, as noted, is occupied by peat (“The Bog”) and is partly blanket and partly soligenous mire. The blanket mire is locally dominated by Common Cottongrass *Eriophorum angustifolium*, with a very high water-table. The steep channel sides are mainly covered by upland Calluna heath, which is partly on sandstone block scree, presumably dating from frost climates in Late-glacial times. There is very extensive *Calluna-Eriophorum vaginatum* blanket bog on gentler slopes to north and south, managed as grouse moor and hill sheep farm.

The flora of the fossil waterfall, with elements of tall-herb and calcareous rock-face communities, is typical of ungrazed, upland limestone outcrops, particularly ones such as this where the humidity is enhanced by spray from the modern waterfall and by the presence of the slot gorge. The vascular plants include:

- *A Lady’s Mantle* *Alchemilla glabra*
- *Maidenhair Spleenwort* *Asplenium trichomanes*
- *Green Spleenwort* *Asplenium viride*
- *Carnation-grass* *Carex flacca*
- *Brittle Bladder-fern* *Cystopteris fragilis*
- *Crowberry* *Empetrum nigrum*
- *New Zealand Willowherb* *Epilobium brunnescens*
- *An Eyebright* *Euphrasia sp.*
- *Wild Strawberry* *Fragaria vesca*
- *Herb Robert* *Geranium robertianum*
- *Wood Cranesbill* *Geranium sylvaticum*
- *Meadow Oat* *Helictotrichon pratense*
- *Hogweed* *Heracleum sphondylium*
- *Hard Shield-fern* *Polystichum aculeatum*
- *Stone Bramble* *Rubus saxatilis*
- *Wild Thyme* *Thymus polytrichus*

and where they can gain a foothold on ledges:

- *Ivy* *Hedera helix*
- *Goat Willow* *Salix caprea*
- *Rowan* *Sorbus aucuparia*

The Brittle Bladder-fern and spleenworts are very abundant. On a visit in 2000 Mountain Everlasting *Antennaria dioica* was present. It was never common in Northumberland and Cumbria, is in general national decline for reasons which are not yet clear, and was not refound at Gelt Linn in 2012. The current electronic *Flora of North East England* (www.botanicalkeys.co.uk/northumbria/) clearly indicates its greatly reducing distribution in the region.

**ACKNOWLEDGEMENTS**

Thanks to Barry McWilliam, Jenny Wigston and Margaret Fletcher for assistance in the field.
A RARE DISCOVERY OF A PERMIAN STINGRAY

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SUMMARY

In August 2013 whilst on a “family-fun” day to Lafarge-Tarmac’s Thrislington Quarry and National Nature Reserve, a rare Permian stingray-like fish fossil was found in the 250 million-year-old Marl Slate, part of the Magnesian Limestone sequence. Whilst the Marl Slate is internationally famous for its fossil fish, particularly of the mackerel type *Palaeoniscus*, the flat fish *Janassa bituminosa* is infrequently found. The fossil was discovered in the Marl Slate pile to which Lafarge-Tarmac kindly allowed us access.

INTRODUCTION

The Magnesian Limestone stretches from Hartlepool on the coast in the southeast to South Shields in the northeast, tapering down to the southwest at Newton Aycliffe, and consists of a series of limestones and evaporites resulting from the English Zechstein Cycles. Below this a mud stone, more commonly termed the Marl Slate, is found, being approximately six metres maximum in depth, though it can be absent on the dune ridges of the Yellow Permian sands. The Marl Slate was created during the first transgression of the Zechstein Sea when the previous desert phase was brought to an end. It is a laminated, commonly bituminous, silty argillaceous dolomite that smells of oil when fractured and consists of alternating grey and black laminae (Lawrence 2009). The coloured layers are thought to have been deposited in bi-annual fluctuations of biological activity with an algal bloom in the summer months and an oxygen-depleted sea in the winter months. The overall effect was to form a thin blanket of dark-coloured organic matter in summer, and when phytoplankton production was not possible a pale layer was deposited, probably in winter (Pettigrew 1980).

The Lafarge-Tarmac quarry is one of the largest quarries in the Magnesian Limestone area and is regionally important for the extraction of a variety of products including sand, aggregate dolomite and industrial limestone, some of which are high purity and utilised in the adjacent furnaces. Many of these products are used in the chemical industrial works of Billingham and Teesside.

Between the Yellow Permian Sands and limestone of the quarry is a thin band of Marl Slate of a maximum thickness of six metres, which has very little economic value. However, it is internationally famous for the widespread occurrence of fossils, the most abundant being free-swimming animals dominated by the *Palaeoniscus*. Other fish and plant debris have also been discovered.
Marl Slate has been a rich source of fossils for over 150 years with geologists such as Sedgwick coming to the area to search in the fledgling quarries such as Middridge near Shildon. The most common fish were the palaeoniscids which were a mackerel/herring type shoal fish up to 20 cm in length. Larger preying fish that hunted palaeoniscids were *Acrolepsis* and *Pygopterus* which would have been over 50 cm long, extremely fast and streamlined and armed with a set of sharp teeth and powerful jaws. They would have been exceptionally good at predating smaller fish such as the *Palaeoniscus*.

However, the stingray-like *Janassa bituminosa* has rarely been found due to its lack of swimming prowess and the likelihood that it would have frequented the shallower waters where it would have been feeding on the slow-moving shellfish using its large array of teeth, which continually grew. *Janassa bituminosa* would have inhabited the shallower areas of the Zechstein Sea and because of this they are comparatively rare in the deeper waters. They only rarely drifted out to the deeper water and sank down to where the Marl Slate was forming. There are specimens of *Janassa* in both Sunderland (Figure 3) and the Great North Museum: Hancock. The first fossils were found in the German *Kupferschiefer* in 1762. Some of these had intact stomach contents showing shellfish and Bryozoan (moss animals) remnants that had been taken from the reef. Estimates of the rarity would suggest that they are probably in the low tens.

Marl Slate has been a rich source of fossils for over 150 years with geologists such as Sedgwick coming to the area to search in the fledgling quarries such as Middridge near Shildon. The most common fish were the palaeoniscids which were a mackerel/herring type shoal fish up to 20 cm in length. Larger preying fish that hunted palaeoniscids were *Acrolepsis* and *Pygopterus* which would have been over 50 cm long, extremely fast and streamlined and armed with a set of sharp teeth and powerful jaws. They would have been exceptionally good at predating smaller fish such as the *Palaeoniscus*.

RESULTS and DISCUSSION

Various parts of fish and plants were found in the Marl Slate but the main discovery was of a rare *Janassa bituminosa*. On finding the fossil, it appeared to be a jumble of what seemed like shellfish until the left lobe of the body of the fish was noted (Figure 2). Previous experience of geological talks and a visit to the Permian room in Sunderland Museum enabled the finder to realise that this was a shellfish-eating *Janassa bituminosa*. What appeared to be shellfish were, in fact, the teeth of this stingray-like fish. The left lobe showed the remarkable “dark” areas where it is possible to make out the dermal denticles or scales of the shark-like skin (Pettigrew, pers. comm.; Figure 2b).
ACKNOWLEDGEMENTS

Enormous thanks go to Steve Carter and Dave Park of Lafarge-Tarmac for allowing us access to the Marl Slate and use of their facilities. The Limestone Landscapes Partnership (www.limestonelandscapes.info), funded by the Heritage Lottery Fund, has funded the project in partnership with Natural England. Thanks to geologists Tim Pettigrew, Brian Young, Eric Johnson and Dave Lawrence for support and confirmation of the Janassa bituminosa. We would also like to acknowledge the late David Green for his sketch of the Janassa specimen currently in the Sunderland Museum.

REFERENCES


THOMAS ROBSON 1812-1884: THE FORGOTTEN BIRD MAN

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SUMMARY

When two naturalists with the same name have lived and recorded birds in the same area, confusion must arise. This paper attempts to separate the ornithological contributions of the unknown Thomas Robson from those of his namesake, author of Birds of the Derwent Valley (1896).

INTRODUCTION

The Two Thomas Robsons

Thomas Robson (1871-1944) of Winlaton is well known in the North East for his Birds of the Derwent Valley. The 137 species recorded were later described by George W Temperley (1951) as being “very well and reliably described”. In 1993, when Birds of Gateshead was published (Bowey et al. 1993), Robson was described as “Undoubtedly the most important ornithologist of the area” his book being “one of the principal reference documents on which this present work draws”. It also mentions Thomas Robson as being “responsible for adding Great Reed Warbler to the British List”.

However, it is in Robson’s account of the Great Reed Warbler Acrocephalus arundinaceus that we learn of a second ornithologist (also called Thomas Robson), where the author writes “A specimen of this bird was shot at Swalwell by the late Mr. Thomas Robson” (Figure 1), and he also provided a short biographical account of his namesake, the Ryton-born Robson.

The author also acknowledged Robson for information given on seven species: Wryneck Jynx torquilla, Great Grey Shrike Lanius excubitor, Siskin Carduelis spinus, Woodlark Lullula arborea, ‘Grey-headed’ Wagtail Motacilla flava ssp, Great Reed Warbler and Quail Coturnix coturnix. Of particular interest are the entries for ‘Grey-headed’ Wagtail and Robson’s most famous find, the Great Reed Warbler (see Appendix).

Thomas Robson of Ryton

Thomas Robson, son of John and Isabella Robson, was born at Ryton, County Durham on 24 March 1812. His father was registered on the baptism certificate as an Anchor Smith and probably would have been employed by the Crowley family.

In turn, Thomas Robson joined Crowley Millington & Co. as a clerk; we can place this prior to 1836 thanks to J W Fawcett’s Notes of the birds of the Derwent Valley (1891). Fawcett had compiled the records of Thomas Grundy, “a gamekeeper for gentleman in the Valley of the River Derwent”. Grundy’s entry for Redwing Turdus iliacus reads “A regular visitor. Two or three eggs of this bird were obtained on the Bradley Hall Estate about 1836, by Mr. Thomas Robson, at that time clerk for Crowley, Millington, and Co., Swalwell. They were lying on the grass, and had probably been dropped by the birds while feeding”.

Thomas Robson married Rebecca Clark at St John’s Church, Newcastle in September 1848 and they made their home at Winlaton Mill in the Derwent Valley. They had two daughters, Ann (born in 1849) and Mary (born in 1851). Rebecca Robson died in 1851, and 10 years later the Census recorded Thomas Robson (widower and head of household), Ann and Mary (both scholars) and live-in housekeeper Mary Jeavens all living in Winlaton Mill.

Robson continued with his contribution to local avifauna. Two articles were published in The Zoologist in 1861. In “Late Stay of Swallows” (Robson 1861a) he refuted earlier comments by a Captain Hadfield who had supposed swallows would not suffer much, were they to stay throughout the winter. Robson wrote “I remember quite well on November 28, 1846 seeing several on the wing here, one of which I shot, and on close examination it was in a most emaciated condition, and I think could not have lived here much longer”.

In his second article “Nest of The Longtailed Titmouse” (Robson 1861b) he debated the point of there being two holes built into the structure of the nest of this bird. He wrote “I have known dozens of their nests, but never found one with two holes”. However later in the article he refers to his friend Thomas Thompson of Winlaton who “took a nest in Gibside Wood near this place which had two distinct holes. This is the only one I have ever seen”. In both articles he gave his address as “Thomas Robson; Swallwell Iron Works, near Gateshead-on-Tyne”.

The following year, 1862, would prove decisive for Thomas Robson. Due to ill health, and following medical advice to seek a place with a warmer climate he emigrated to Turkey. It is not known what happened to his daughters Ann and Mary (by then aged 11 and 13) although in the census for 1871 Mary was recorded as boarding in Winlaton with Mary Jeavens, Robson’s former housekeeper. Before his departure Robson sold off his collection of birds, that he had stuffed himself. The larger birds were purchased by Col. J A Coveney of Blaydon Burn while the rest of the collection was sold to Thomas Thompson, then of Whickham, who in his will of 1904 wrote:

Figure 1. The Great Reed Warbler captured at Swalwell in May 1847 and now in the collections of the Natural History Society of Northumbria (David Noble-Rollin, courtesy NHSN).
I bequeath to the Hancock Museum of Natural History at Newcastle upon Tyne my preserved specimen of the Great Sedge or Reed Warbler (the only one taken in the Kingdom) … and the cases (eighty or thereabouts in number) of small birds purchased by me from the late Thomas Robson of Winiton Mill and now mostly on the east end of my room together with the said Thomas Robson’s manuscript catalogue thereof. And I desire that the small birds in the above bequest to the said museum including the Great Sedge or Reed Warbler shall be kept together in one place and not dispersed or divided up.

The Thompson collection was used as an educational resource for local schools during the 1930s.

From Turkey to the British Museum, and an irate curator

Robson settled in the town of Ortakoi near Constantinople (Istanbul) where he once again began to study and collect the birds of the region. His contribution to Turkish ornithology would become quite significant. This together with his work on British avifauna would see his material used by some of the prominent ornithologists of the day. Henry Eels Dresser, William Yarrell (1784-1856), John Hancock, John Gould, Richard Bowdler Sharpe and Henry Seebohm (1832-1895) amongst others would all include contributions by Thomas Robson in their publications.

Many of the specimens he found were sent to the British Museum, and are now in the Natural History Museum (Tring). His correspondence with Dr Albert Günther (1830-1914) is in the archives of the Natural History Museum. In a letter to Günther dated 27 January 1865 Robson wrote:

I have strong hopes of sending you more undescribed specimens of birds and varieties of species & feel certain that I have set up in my collection at Ortakeuy some 6 more undescribed species some of them very scarce…. I accept the price of 5/- each for common bird skins & trust that you will allow me all prices reasonably possible for the rarer ones, the Country is difficult to travel for want of roads, in the outlying districts, the people are rude & strangers to us & it is only by getting up shooting parties to go into the interior that we will be able to do much service & the prices offered will be a small surplus over expenses but as Englishmen we are anxious to serve our Country and any information on natural history we may glean you shall have it.

Further letters show that Robson had ideas about selling specimens that roused the wrath of Dr Günther. He wrote to Robson on 24 August 1865:

I was very sorry to hear from Mr Gray⁴ that you have disregarded my distinctly and repeatedly expressed advice to send collections which you wish to dispose of to Mr Stevens or any other agent you may choose. I see also from one of your letters that you have understood this, as you express intention of sending such collections to a relation of yours. I advised you to enter into correspondence with Mr G.R. Gray … who could give you the information about various birds which you described in some of your letters but I never said to send a collection to him for the Brit. Mus. This being quite against the rules of the Establishment…. I told you distinctly that such specimens should be sent not to the Museum, but to an agent who would offer them to the Museum.

Agents and auction rooms were used extensively by museums and private collectors to obtain specimens for collections. Samuel Stevens (1817-1899) was one such agent whose premises were in Covent Garden, London. He was well known for the sale of Great Auk skins and for acting as the agent for Alfred Russell Wallace (1823-1913) (for example see Allingham 1924).

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⁴ A C L G Günther of the Zoology Department was successively Assistant (1862-1872), Assistant Keeper (1872-1875) and Keeper (1875-?).
⁵ G R Gray (1808-1872), Ornithologist and Assistant Keeper in the British Museum's Zoology Department.
In the year of Seebohm’s publication, Thomas Robson returned home. He had never fully regained his health and was obviously quite ill, possibly dying, when he arrived back in England in December 1883. His time here would be short; he died on 5 January 1884. An obituary appeared in the *Newcastle Courant* on 11 January, which read:

We have to announce the death of Mr. Thomas Robson who was for many years in the employment of Messrs Crowley, Millington and Co. The deceased was a keen and true observer of natural history, especially in zoology and natural history. He contributed to the ‘Zoologist’ and other papers. Twenty-two years ago he was obliged to leave this country owing to bad health and by the advice of his medical advisor he went to Constantinople where he derived great benefit, following his favourite pursuits with unabated resolution and collecting a large number of eggs and skins, a small portion of which he sent to this country to be disposed of amongst his numerous friends. In private life the deceased was unassuming and was a kind friend and genial companion.

He was interred at Winlaton where a headstone was erected to his memory.

**CONCLUSION**

Thomas Robson’s contribution to ornithology is considerably more than he is credited for. It is hoped now that future avifaunas may recognise this and acknowledge the fact. He not only found Britain’s first Great Reed Warbler and discovered a new sub-species of Long-tailed Tit, but to this day his specimens at the Natural History Museum with their distinctive, heavily creased blue-paper labels are still available to modern researchers.

**ACKNOWLEDGMENTS**

I would like to thank the Northumberland and Durham Family History Society for their assistance in researching the Robson family, June Holmes and Stella Chambers at The Natural History Society of Northumbria (NSHN) for help in accessing library and archives including the will of Thomas Thompson (NEWHM:2006 H2585) and Dan Gordon of Tyne & Wear Archives and Museums for assistance with the Great Reed Warbler specimen (NEWHM:2006 H1261). I am grateful to Dr Robert Prys-Jones, Head, Bird Group, Natural History Museum, Tring for archive material on the Robson specimens and I am particularly indebted to Dr Les Jessop not only for his contributions in presenting the list of Robson specimens from the Natural History Museum and researching the problem of the “Grey-headed/Blue-headed Wagtail” specimens but also for his generosity of time in helping prepare this paper.
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APPENDICES

Appendix 1: Great Reed Warbler

The record of a Great Reed Warbler was published by John Hancock (1847):

A male specimen of this fine warbler was shot, three or four miles west of Newcastle, near the village of Swalwell, by Mr. Thomas Robson of that place, on the 28th of last May. The attention of this gentleman who is perfectly familiar with the song of all our summer-visitors was arrested by a note which he had not before heard; and after some search he succeeded in getting a sight of the bird. It was concealed in the thickest part of garden hedge close to an extensive mill-dam which is bordered with willows, reeds and other aquatic plants. It would scarcely leave its retreat, and when it did so never flew far and always kept close to the hedge. Its habits resembles those of the Reed Fauvette [Sedge Warbler], being continually in motion, occasionally hanging with the body downwards or clinging to the branches and stretching forwards to take its prey. Its song was powerful, and resembled that of the Black Ougel [possibly Black Ousel, the Blackbird] but was occasionally interrupted with the harsh cracking note common to many of the Warblers, and at intervals it uttered a single shrill cry. The specimen was very fat, and when opened the testicles were found to be much enlarged; the stomach contained small beetles and flies. From the nature of the locality, from the time when captured and from the enlarged state of the testicles, there can be little doubt that this bird was breeding in the neighbourhood; and I have some reason for believing that the nidification of this species has occurred in another part of England.

Hancock ended by saying “… and even now it might have escaped detection had not the accurate ear and experienced eye of Mr. Robson been engaged in the pursuit”.

Temperley (1951) summarised the find as “A very rare accidental visitor. This species owes its place on the Durham list to one specimen shot by Thomas Robson near Swalwell on May 28th 1847. This was the first recorded occurrence of this species in Great Britain”.

The specimen came to the Hancock Museum in 1906 with the Thomas Thompson collection.

Appendix 2: Grey-headed Wagtail or Blue-headed Wagtail?

In the 1830s ornithologists recognised two forms of Yellow Wagtail Motacilla flava as occurring in Britain. As well as the common form, there were a few records of a second form, known as the “Grey-headed Wagtail” and given the Latin name Motacilla neglecta. Later in the nineteenth century all of the early records of the rarer form were assigned to the “Blue-headed Wagtail”; and it was only later realised that the Blue-headed M. flava flava and Grey-headed M. flava thunbergii Wagtails were in fact separate subspecies of M. flava and that all three were found in this country.

Thomas Robson recorded a male bird, shot 1 May 1836 on Dunston Haughs (see Hancock 1837), which was published initially as a “Grey-headed Wagtail”; and again as the same thing in Howse’s catalogue of the birds in Hancock’s collection (Howse 1899). Later authors in the region (Tristram 1905; Temperley 1951) followed the national trend in discarding the “Grey-headed Wagtail” in favour of “Blue-headed Wagtail”. However, since we now know that both of the rarer subspecies do occur in the North East (Bowey and Newsome 2012), the true identity of Robson’s bird is open to question.

Appendix 3: Thomas Robson specimens in the Natural History Museum

The British Museum’s manuscript accession registers record the following specimens collected by Thomas Robson. In the list below the modern-day Latin and English names are given to the right of the original listed names:
Aquila maculate  
Nisaetus pennatus  
Scops gius  
Circus cyaneus

11 October 1877 (43 specimens presented by Bowdler Sharpe, collected by Robson)
Turdus pilaris  
Corone cornix  
Coccoleus collaris  
Pica pica
Coracias garrula

10 September 1885 (16 specimens purchased from Stevens, collected by Robson)
Garrulus melanocephalus  
Accipiter nisus  
Sylvia Bowman  
Anthus cervinus

28 January 1875 (11 specimens presented by Sharpe, collected by Robson)
Acreducta tephronota  
Sitta caesia  
Lanius minor

27 April 1875 (28 specimens presented by Sharpe, collected by Robson)
Emberiza cia  
Oriolus galbula  
Epupa epops  
Nisaetus Pennatus

8 May 1875 (14 specimens presented by Sharpe, collected by Robson)
Sylvia nisoria  
Hippolais icterina  
Sylvia nisoria  
Pytilia melba

21 May 1875 (25 specimens presented by Bowdler Sharpe, collected by Robson)
Rallus aquaticus  
Archibuteo lagopus  
Buteo desertorum  
Corvus frugilegus

Circus macrurus  
Cerchneis naumanni  
Milvus korshun  
Accipiter nisus

Aquila clanga (Greater Spotted Eagle)  
Hieraetus pennatus (Booted Eagle)  
Orus scops (Scops Owl)  
Circus cyaneus (Hen Harrier)

Aquila maculate  
Buteo vulgaris  
Pica pica

Appendix 4: Thomas Robson Manuscript Catalogue

Robson’s Manuscript Catalogue not only lists his collection of specimens in their display cases, it also gives a fascinating insight into various aspects of nineteenth-century ornithology. Three examples are of particular interest.

The entry for case 17 gives an interesting comparison to present day numbers of Bunting Lark (Corncrake) in England: “A common bird in the neighbourhood of Swallwell and Winlaton, building in meadow fields and frequently alighting on Hemlock, adjoining which it generally has its nest. In 1876, when their numbers had greatly decreased, I took after grass was all cut, the above young and shot them with the assistance of two Spaniels which pointed and rose and could not rise anything, female after losing her mate a few days frequently cried at night and after a fortnight had elapsad another male even as they usually do, I went out with dog pointing it, but still could not find the female, when mowers came to cut meadow I attended and saw female and young of which they were great number, I took after grass was all cut, the above young and shot the above female and left a few young, and some were killed by mowers. Case 117 had on display Robson’s most famous find, the Great Reed Warbler. He wrote “May 28th 1847 Male Thrush Nightingale, Selby. Shot by Thomas Robson in Mr Nicholson’s Garden Hedge by Damn Side, Bishops Mill”.

5 The use of the misnomer “Thrush Nightingale” is explained by William Harrell (1874) as a footnote in A history of British birds, Vol. 1 page 320: “Failing to detect the blunder of an anonymous writer (Zool. p. 1876) who applied this name to a very different bird, Mr. Morris (FO. Morris, A history of British birds.) has introduced the ‘Thrush Nightingale’ to his readers as a British Species, when the recorded occurrences on which he chiefly relies notoriously refer not to Phylomea toridiae, Blyth but to Sylvia Turdoides, B. Meyer, of which though under a far older name an account will by-ans be given here. There is no sufficient reason for supposing that the large Nightingale of Eastern Europe has ever visited this country.”
Throughout the catalogue, Robson describes specimens often using vernacular names popular of that period. These are listed below:

- Mountain Finch – Brambling Fringilla montifringilla
- Hedge Warbler – Dunnock Prunella modularis
- Bunting Lark – Corn Bunting Emberiza calandra
- Hay Chat – Blackcap Sylvia atricapilla
- French Linnet – Redpoll Carduelis cabaret
- Oxe Eye Titmouse – Great Tit Parus major
- Blue cap Titmouse – Blue Tit Cyanistes caeruleus
- Field Lark – Skylark Alauda arvensis
- Willow Wren – Willow Warbler Phylloscopus trochilus
- Grey Bird – Song Thrush Turdus philomelos
- Chimney Swallow – Barn Swallow Hirundo rustica
- Tree Titlark – Tree Pipit Anthus trivialis
- Reed Sparrow – Reed Bunting Emberiza schoeniclus
- Rock Lark – Rock Pipit Anthus petrosus
- Spotted Rail/Water Crane – Spotted Crane Porzana porzana
- Grey Owl – Tawny Owl Strix aluco
- Water Ouzel – Dipper Cinclus cinclus
- Mountain Linnet – Twite Carduelis flavirostris
- Brown Linnet – Linnet Carduelis cannabina
- Ash coloured Shrike – Great Grey Shrike
- Thrush Nightingale – Great Reed Warbler
- Chatterer – Magpie Pica pica

Filed with the catalogue in the NHSN collection is a letter dated 23 March 1868 from Robson to his friend Thomas Thompson. The warmer climate of Turkey obviously suited his constitution. He wrote “God be praised I am as well as an old chap can crave. I am thankful to be so restored and I oftimes imagine my legs have got a little spice of youth in ‘em”. In the letter he comments on locations in northeast England where specimens have originated. He recalls a Montagu’s Harrier being shot on Hedley Fell and Ring Ouzels coming to Winlaton Mill Scar to breed. He ends the letter offering his regards to Mr J Hancock and adds as a postscript “I never saw a Moor Buzzard in my locality”. Moor Buzzard is an old name for a Marsh Harrier.

References for appendices:


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**THE REVEREND W J WINGATE 1846-1912 AND HIS CURIOUS HOBBY**

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**SUMMARY**

The story behind the writing of “Wingate’s Durham Diptera” is described to mark the centenary of the author’s death.

**DISCUSSION**

The Reverend William John Wingate died in October 1912, a hundred years ago, as something of a local celebrity. In addition to his public duties as a vicar, appearing at Temperance Society and charity meetings and visiting parishioners, he wrote a book, A preliminary list of Durham Diptera, with analytical tables. This was published by the Natural History Society of Northumberland, Durham and Newcastle upon Tyne, in May 1906, when he was 60. Known as “Wingate’s Durham Diptera”, the book had a large sale and carried the name of Wingate (Figure 1) far beyond his local community in northeast England. It describes 2,210 species in 60 families of flies in the order of insects named the Diptera (two-winged flies). At the back of the book are seven plates illustrating the terminology and external structures of flies.

Figure 1. Portrait of the Reverend W J Wingate.
The book was reviewed in the journal of the Yorkshire Naturalists’ Union, *The Naturalist*, where the reviewer (Anon. 1906) wrote:

English dipterists (or dipterologists) have so little literature in their own tongue available … that they cannot but feel grateful in the highest degree to Mr. Wingate for furnishing them with a work so well calculated in its plan to help the young dipterologist to make out his captures. The dichotomic or tabular method adopted here is a very useful one, as drawing attention to the diagnostic points, and likely to assist the beginner in making out, at any rate, the well-marked and more distinctly characterised species.

Wingate’s Durham Diptera was also described in the *Transactions of the Natural History Society of Northumberland, Durham and Newcastle-upon-Tyne* (Anon. 1903), in a paragraph noting his death in 1912 as follows: “... his modestly named ‘Catalogue of Durham Diptera’, published as the second volume of the new series of Transactions, has had a large sale, as being the only real introduction to the study of Diptera in the English language”.

Many young student dipterists must have owned and used a copy during the inter-war period and before the advent of the more advanced Royal Entomological Society keys to identify flies. The “Fly Chart” (Figure 2), used as Plate 1 in the book, also exists in the archives of the Natural History Society of Northumbria as a large chart, about a metre across. It was presumably used by Wingate as a visual aid for lectures to local natural history societies.

### Figure 2. The Fly Chart.

![Fly Chart Image]

Rev. W J Wingate was born in Glasgow on 19 August 1846. His father was William Wingate of Nether Croy, Dumbartonshire, a silk merchant, comfortably off and employing several servants. The village of Wingate, 10 miles southeast of Durham, may well be the family ancestral home. His mother was the daughter of a London solicitor and they were married in St Martin-in-the-Fields Church, London. One of several siblings, William John was educated at Glasgow High School, Merchiston, and St Aidan’s, Birkenhead. He was ordained a deacon in 1879 when he was 33 years old, and then as a priest in 1880. Nothing is known of his life before this. He occupied a curacy at St Paul’s, Hendon, Sunderland, from 1879 to 1882, and was married there, aged 36, to Alice Durnford Iliff, on 1 June 1882. He then moved to a curacy at Gateshead from 1882 to 1883 where his daughter Alice was born on 16 May 1883. From 1884 to 1892 he was vicar of St Jude, South Shields, from a son, William Iliff Wingate, was born in 1889, and a daughter, Ethel Wingate, in 1892. From 1892 to 1897 he was vicar of Marley Hill, and it was around 1896, when he was about 50 years old, that Wingate began to take an interest in the Diptera (two-winged flies). In 1887 he left Marley Hill and was appointed vicar of St Peter’s, Bishop Auckland, where he remained for 23 years, until just before his death. In about 1910 he moved to the large vicarage at South Hetton, eight miles north of Wingate, and he died at the Northwood Nursing Home, Northwood, London, on 19 October 1912, at the age of 66. His probate record states that his effects were £1,927. 19s.9d. In a paragraph in the *Transactions of the Natural History Society of Northumberland, Durham and Newcastle-upon-Tyne* cited above, it says “he was a good botanist, and a good geologist as well, and by his energy as an organiser and lecturer he did great service to the local scientific societies of the county of Durham”.

His portrait (Figure 1), by James Bacon and Sons, copied from an unknown source, is in the archives of the Natural History Society of Northumbria, and taken from Jamieson (1906). It seems to be the only remaining portrait and it would be good to hear of any others in existence. His daughter Alice became a teacher in Canada, and his son, an analytical chemist, seems to have died in Spain. There is, apparently, none of the Wingate family now remaining in the locality.

So how did the Reverend Wingate become interested in two-winged flies? After working for 10 years in the industrial towns of Gateshead and South Shields, in 1892 Wingate, aged 46, moved to the rural parish of Marley Hill. In a piece he wrote in 1903 under the heading “Durham Diptera” in the *Naturalist*, Wingate graphically describes his first stirrings of curiosity and interest in flies, which was stimulated by the countryside around him. He wrote:

About six or seven years ago, when old Natural History tastes had been revived by country residence after years of town work, I thought how stupid it was not to know anything about the common flies which crowded the windows in summer. So I turned my attention to the Diptera, and since then I have been collecting in the County of Durham only.

In the Preface to his book, he writes:

It does seem strange, that what I may call our ‘Domestic Insects’ should receive so little attention, that very few, even among entomologists, can point out with any certainty the common House-fly or distinguish between the Blue-bottles. ... And yet no order of insects has so many interesting and varied life histories, and none so deeply affects the human race, whether as protectors when acting the part of scavengers, or as depredators destroying crops, or as scourges carrying deadly micro-parasite.

So, in about 1897, when he was 50, he set about collecting and trying to put names to all of the local species of Diptera. His chief guides were Schiner’s *Fauna Austriaca*, published in Vienna in 1862 (Schiner 1862), and George Verrall’s (1901) *Checklists of British Diptera*. He also borrowed Zetterstedt’s 12-volume work in Latin, on Scandinavian Diptera (Zetterstedt 1842-1860), from the library of the Dean and Chapter of Durham Cathedral, but had to return it after four years. Other authors he consulted included Becker, Macquart, Loew, and Verrall’s book. In addition, he acknowledges in his book help from some of the leading Dipterists of the day: Mr Austen, Col. Yerbury, Mr Henderson, Mr Wainwright, Herr P Stein, Mr P Grimshaw and Mr Collin.
In 1901 he sent a letter to James E Collin, dated 12 March, asking for information about two species that he had found, and Collin wrote back offering to examine Wingate’s specimens. Because of Wingate’s persistent questions, he may later have regretted this! Without the considerable help given by Collin and others Wingate may well have been defeated by his self-imposed task to put names to all of the flies found locally, but with admirable tenacity he bothered Collin, and to his great credit Collin responded until many of Wingate’s problems were sorted out. This relationship is documented in a series of letters to Collin and to George Verrall between 1901 and 1906, which are fortunately preserved in the Oxford University Museum of Zoology archives. Collin was the nephew, secretary and successor to George Henry Verrall, and these two men played a very important part in the development of the study of flies in the British Isles. From 1879 they lived at Sussex Lodge, Newmarket (Pont 2011).

From 1901 Collin was bombarded by questions from Wingate. He also wrote directly to Verrall on a number of occasions, but, perhaps because Collin was more responsive, he often addressed Verrall through Collin. Thanks to an efficient postal system he regularly exchanged specimens of flies with Collin and often included in the postal box specimens he found difficult to identify, “to fill up the space”. So there was a strong link to the expertise residing in Newmarket, as well as to a wider supportive network. Wingate would freely admit that he was not himself an expert on the Diptera, not having a long experience of the subject, but he did rightly claim to know the problems faced by those beginning their study.

Wingate’s initial project was to publish a list of the Durham Diptera, and this he did in the Naturalist of 1903, but by the time he came to write his book he had formed a broader educational aim. An important source of his motivation for writing his book came from his contact with the young naturalists around him. In a letter to G H Verrall dated 10 August 1905 he wrote: “I have had many enquiries from young fellows wanting to begin the Diptera and have always had to reply. Do you read German, for there is no book in English except Verrall’s Syrphidae and articles in entomological magazines?” and again, in the same letter he writes: “I am too much of a tyro at diptera to be likely to be of any service to specialists. The only thing I am hoping to do is to make it a little easier for young naturalists in our north counties to make a beginning with Diptera. I am only a beginner myself and I know a beginners difficulties. So in a local list that the Newcastle Natural History Society is now publishing I am giving a pretty full explanation of parts and terms and numerous tables.

Perhaps Wingate sometimes taught children at the local Church School. On many occasions he emphasised his role as a teacher rather than a specialist and was aware of the importance of this role to encourage beginners. In a later letter to Verrall dated 19 June 1906, in response to Verrall’s worries about over-confident but inaccurate identifications by beginners, Wingate writes: “I do not see how that can be helped . . . He is far better to go on and make mistakes than never to go on at all”. The Reverend then goes on to coin an appropriate parable:

All I want to be is like some fellow paddling in the shallows who calls out to another on the shore who is frightened to enter the water, “it is not cold, and it is not deep, come on.” Once he is in and enjoys and wants to go deeper I leave it to you and other fellows farther out to teach him to swim. I cannot swim myself.

In his preface, in describing his battles with the literature available to him, Wingate writes:

Many a time I have pounced upon some descriptive list of local species in transactions and magazines, hoping to be able to identify some specimens I had taken, only to find that the learned phraseology, the want of analysis indicating the points of difference, and the unnecessary repetition of points of agreement, made it an almost hopeless task. Life is too short for this weary groping after the undefined, but a short life may be practically lengthened if one is able quickly to begin where a predecessor has left off.

It may fairly be said, in his attempt to introduce the fascination of the Diptera to a wider group of naturalists, Wingate was the forerunner of Charles Colyer and Cyril Hammond, authors of Flies of the British Isles, although unfortunately without the artistic skills of the latter. This popular book, part of the “Wayside and Woodland” series, first published by Warne in 1951, caused a significant surge of interest in the natural history of flies. From his own initial ignorance Wingate understood the problems of other beginners, and indeed of all naturalists, in becoming familiar with a new group. He had the vision, determination, and the opportunity to take a step to remedy this.

In 1902 Wingate founded the Durham County Naturalists’ Union and became its secretary. He brought out a book of rules, and a set of nature notebooks in a case, which must have been the proud possession of many young naturalists in the district. It is said that the Union thrived for the 10 years up to Wingate’s death, and it would be interesting to know if any of these notebooks, or records they contained, are still in existence today.

Most of Wingate’s collecting was carried out in the four years between 1898 and 1902. He listed 17 sites where he collected (Wingate 1903), and wrote: “My collecting has been chiefly in two localities – one inland – round Bishop Auckland and up Weardale, and one near the sea”. Some descriptions and grid references are as follows:

**North Durham**

- Gibside – North Durham. NZ 176589. 100-400 ft. Wooded estate (Snipes Dene Wood) on the River Derwent, about 7 miles southwest of Newcastle.
- Marley Hill, North Durham. NZ 203581. 500-700 ft. On the ridge east of Gibside; rather bare colliery district. (Wingate was vicar in this parish.)
- South Durham

An interrupted strip 4-12 miles broad along the southern (Durham) border. Beginning from the sea:

1. Hesleden – South Durham. NZ 4438. [Perhaps a family home or where Wingate lodged], Sea shore, flowery sea banks, sandhills, wooded dene and farmland, about three miles north of Hartlepool. Collected mostly during the holiday month of August.
2. Bishop Auckland. NZ 2228. 350ft. Practically the small plot of ground round this [sic] vicarage.
5. Evenwood.
10. Shipley Moor, Shipley Glen – 400-700 ft. Wooded glen with bog at the top.
14. Waskerley. NZ 051 4544, 700-1,300 ft. Wooded glen and moorland.
15. Wearhead. NZ 176 534, 1,000-1,500 ft. High dales and moors.
Also, in his book, Wingate includes:
Bedburn. NZ 1032.
Brancepeth. NZ 2338.
Deepdale. NY 9615, in Yorkshire.

It would be very interesting to re-visit these sites and to compare their current fauna with that in Wingate’s time.

Wingate’s collection of local Diptera is housed in a glass-fronted cabinet, in 36 numbered glass-topped store-boxes, stacked on their sides like books on a shelf (Figure 3). To evaluate the collection as a whole would take a number of specialists many weeks of work. There are signs that the collection has been examined previously on many occasions, but the only publication that I am aware of is by Andrew Grayson (2004) who re-examined the seven species of Tabanidae (horseflies).

The author examined Wingate’s collection of Craneflies (Tipuloidea), which is located in five glass-topped store-boxes numbered 5 to 9. The specimens are gummed to card and box numbers 5 and 6 contain the Limnobidae (Limoniidae and Pediciidae) while numbers 7-9 contain some 31 species and 150 specimens of the Tipulidae (Figure 4). It is presently stored in the Great North Museum: Hancock as part of the collections of the Natural History Society of Northumbria. A detailed report (Kramer 2012) is available from the author.

Figure 3. Cabinet of the Wingate Collection, Great North Museum: Hancock.

Figure 4. Store boxes from the cabinet of the Wingate Collection.
So what of Wingate’s legacy? Since his time, the fascination with flies and their lives has increased and more people study flies than ever before. Progress has been made with their ecology, taxonomy and the discovery of new species. Wingate’s educational purpose, perhaps the chief aim of his work, has been taken up by other authors and other books. Other important things that Wingate has left us are his records and his voucher specimens. If we want to know the rate at which our environment is changing, the disappearance of our native species is as good a sign as any. They act as indicators which allow us to identify changes in the environmental components for a given region. For example, decline in some species can signal a decline in ground water to dangerous levels. Sometimes the effect of climate change is positive, as on populations of some disease vectors. It is only by comparing today’s species lists with well-curated collections of plants and animals recorded in the past that we will be able to make informed judgements and perhaps help species survive in the future. Wingate’s carefully made, documented and curated collection is a rare and valuable dataset to help us. The curators of this collection are to be congratulated on conserving an important part of our heritage, and it would be interesting to follow in the footsteps of the Reverend Wingate to discover if the species which he identified and enjoyed are still to be found in their ancestral habitats.

ACKNOWLEDGEMENTS

Thanks are due to June Holmes, Archivist of the Natural History Society of Northumbria, who sent me biographical details and grid references of some of Wingate’s sites that I was unable to locate, and who made many documents available from the Society’s archives. I am grateful to Dan Gordon, Keeper of Biology at the Great North Museum: Hancock, for access to the Wingate Collection. Thanks also to Adrian Pont who alerted me to the presence of the Wingate letters in the Hope Department Library and to Kate Santry for making these letters available.

REFERENCES


William Turner’s efforts to identify Herb Paris *Paris quadrifolia*, which persisted for well over 20 years, were a key component of his subsequent reputation as the first writer in English to identify approximately 300 native plants. This paper analyses the difficulties for him in aligning a plant seen locally with those described in available herbals, both the Greek and Latin texts of the classical world and the contemporary European accounts. Such difficulties were intrinsic to sixteenth-century parameters in natural history and its vocabulary. Utilising Scott Attran’s concept of the “generic-specieme” in folk botany, Turner’s description of *Paris quadrifolia* is shown to be typical of his general descriptive practice. It also demonstrates that this practice was aimed at considering plants for what was believed to be their medical qualities, and the additional difficulties which such contemporary usage generated.

This kind hath leaves like concumbers or souses bred, three or four together, but lesser and something rougher; the stalk is a hand breadth height, the roots resembleth a scorpion’s tale, and shineth like alabaster… the herb hath ever four leaves like plantain, without any roughness and never hath three leaves … (Turner’s first description of *Paris quadrifolia* in *Herball* 1 [1551])

Fuchsius taught us that the herbe that I call one berry, to be *Aconitum pardalianches* and then he thought it had been so, and if he had known a better, he would have shewed us it. But Matthiolus proueth that the herbe which Fuchsius setteth forth for Aconito pardalianches is herba paris of later writers. The herb that I cal One berrye, hath a rounde stalke, which is never above a span long, and out of the middes therof commeth oute foure leaues, not unlike unto some Plantayne, and in the top of the stalke about a rounde black berrye come oute other foure small leaues, and there in is sede in color white. The roote is full of small thinges, like thredes: This herb groweth plentifulous in a wode beside Morpeth, called Cottinge woode, and in manye other woddes. (Turner’s final description in *Herball* 3 [1568])

**SUMMARY**

William Turner’s efforts to identify Herb Paris *Paris quadrifolia*, which persisted for well over 20 years, were a key component of his subsequent reputation as the first writer in English to identify approximately 300 native plants. This paper analyses the difficulties for him in aligning a plant seen locally with those described in available herbals, both the Greek and Latin texts of the classical world and the contemporary European accounts. Such difficulties were intrinsic to sixteenth-century parameters in natural history and its vocabulary. Utilising Scott Attran’s concept of the “generic-specieme” in folk botany, Turner’s description of *Paris quadrifolia* is shown to be typical of his general descriptive practice. It also demonstrates that this practice was aimed at considering plants for what was believed to be their medical qualities, and the additional difficulties which such contemporary usage generated.

**DISCUSSION**

The Morpeth physician William Turner (circa 1508-1568) is distinguished for his identification of English native plants, providing first records for about 300 species, several of them from his native county of Northumberland (Raven 1947). Turner’s work has rightly been subsumed into subsequent developments in plant studies which look back to him as a founding father since, as with any true pioneer, in some essential ways he transcended his time. Nevertheless, it is an unhelpful distortion to divorce him completely from his context, which defined both his objectives and his methodology in ways very different from modern expectations. His aim was repeatedly and openly stated as the desire to provide accurate identification of medical plants. But although modern medical herbalism respects him as a founding father, for some modern commentators there is an unresolved tension between the possibilities inherent in his natural history and his immersion in the defunct world of sixteenth-century medical usage (Arber 1938).

Yet Turner’s clearly focused aims were up-to-date in his own era, reflecting the best academic teaching of the 1540s which formed the core of his training in Italy and which were current in Germany while he was working and travelling there. In Europe he learnt that meticulous translation of and commentary on the classical texts were considered fundamental to the development of academic medicine. For Turner, these texts comprised the first-century Greek army doctor Dioscorides above all, as well as the Roman writers Pliny and Galen, and from much further back the Greek natural philosophers, Aristotle and his pupil Theophrastus. But in Italy and Germany, Turner found also that field studies were encouraged, in order to match up, and increasingly to distinguish, local flora and classical master-text. This enterprise, persisting right through the vagaries of Turner’s adult life (Jones 1988), was both constrained and facilitated by the kind of language Turner had available to describe plants, as well as by the nature of his stated purpose. Nowhere is this clearer than in what is perhaps his most famous identification, that of Herb Paris *Paris quadrifolia* (Figure 1), a Northumbrian native whose location in his home county was crucial to his entire mode of description.

**Figure 1.** Herb Paris *Paris quadrifolia* at Scardale (© John Richards 2011).

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1 Raven (1947) gives details of Turner’s identifications of several Northumbrian plant species, as well as his records of the county’s birds and fishes. There is also a great deal of information to be had from the William Turner Garden in Carlisle Park, Morpeth, and from the staff who run it (contact Northumberland County Council).

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2 W R D Jones offers the only existing full-length biography of Turner. A briefer account can be found in M Addyman (2008), and an extensive study by the same author is forthcoming.
The natural history which emanated from the medical departments of the Northern Italian universities in the early 1540s, when Turner was at Bologna and Ferrara, no longer adhered completely to the dictates of the medieval natural historian Albertus Magnus (died 1280). Albertus had stated categorically that “Philosophy cannot concern itself with the particulars, with individual species of plants, because ‘it is not possible to make syllogisms about such particular natures. [Rather, one must] treat the things common to plants according to the order of nature, beginning with the more universal and descending to particulars.” (Reeds 1991) As a result of this long-held belief, the pioneers of the Renaissance found, as Gaspare Gabrieli, the University of Ferrara’s first professor of simples, complained in 1543, that the “entire medicine of herbs is in the hands of the unlearned, the foolish, and superstitious wise-women” – a complaint which had a long history in the practice of medicine. Gabrieli’s criticism targeted the incompetence of contemporary physicians, though it also entailed very little respect for the populace at large. Yet unlearned folk botany and academic natural history shared the same premises, and it would often be difficult to attribute some features of Turner’s writing to one or the other. Both ultimately unlearned folk botany and academic natural history shared the same premises, and it would often be difficult to attribute some features of Turner’s writing to one or the other. Both ultimately acknowledged that we need something different, yet something related, to be able to understand individual species of plants, because “it is not possible to make syllogisms about such particular natures.”

The on-the-spot note-taking which must have preceded these published entries is now appreciated as essential to subsequent developments in natural history. At first sight these notes might seem very limited. They provide no form of quantification such as we are used to, since they do not provide either the micro-reference of the grid notation for a specific plant or colony of plants, or the macro-reference of a distribution map showing overall patterns. But such on-the-spot note-taking nevertheless plays a part which Deborah Harkness insists should be recognised alongside the experimentation of the early modern period: “reading, writing, and experimenting supported and reinforced one another” (Harkness 2007). Nevertheless, Harkness is aware that the distinctions between what one has read, what one has been told, and what one has done or seen “became blurry” in the personal experience of making a note: all formed part of the writer’s learning experience without necessarily being explicitly distinguished.

In Turner’s case, while he kept as much as possible to the self-imposed rule that “men should not thynke that I write of it that I never sawe” (Britten et al. 1965), inevitably he could not be entirely consistent. When for instance he mentions a plant growing in Rome, a place he is highly unlikely to have visited, it is not surprising – though it is briefly confusing – that he refers to the plant in the same terms as one he clearly had seen near Morpeth or in Cologne. But what is more important is that while Turner’s note-taking was undoubtedly goal-specific and highly selective, he could, if he so chose, use such notes, private or published, as a form of work-in-progress. Hence Part 3 of his Herball rephrases or expands some of his definitions in Part 1, Paris quadrifolias, as we shall see, being one of the most important.

Once something was defined, it could be redefined – though not, at that point, within the taxonomy to which we have grown accustomed. The word “genus”, crucial to modern taxonomy, was in fact available to Turner and his contemporaries in the world of academia. It was there as “genus” in Theophrastus’s writings on plants. Theophrastus, the pupil of Aristotle, took over this originally very abstract term from Aristotelian logic, to convey a sense of a natural hierarchy, at the very bottom of which was the “eidos”, the indivisible and unchangeable being. “Species” would later be used as a translation of Theophrastus’s “eidos”. However, this was not the case in Turner’s writings. Instead, what prevailed in Turner’s and his contemporaries’ time shows just how right Attran was to see folk elements underpinning early modern academic thinking. Rather than indicating some abstract genus and eidos to a few experts and baffling everybody else, the actual plant in its local habitat (Attran’s generic-specieme) alerted the collector or passer-by to other plants with strong family resemblances: the Wood Cranesbill Geranium sylvaticum and the Meadow Cranesbill Geranium pratense, for instance. An amateur naturalist might say today on seeing one of them: “I think that is a kind of cranesbill”, or “a sort of cranesbill”; and the actual plant in its local habitat (Attran’s generic-specieme) alerted the collector or passer-by to other plants with strong family resemblances: the Wood Cranesbill Geranium sylvaticum and the Meadow Cranesbill Geranium pratense, for instance. An amateur naturalist might say today on seeing one of them: “I think that is a kind of cranesbill”, or “a sort of cranesbill”; and the actual plant in its local habitat (Attran’s generic-specieme) alerted the collector or passer-by to other plants with strong family resemblances: the Wood Cranesbill Geranium sylvaticum and the Meadow Cranesbill Geranium pratense, for instance. An amateur naturalist might say today on seeing one of them: “I think that is a kind of cranesbill”, or “a sort of cranesbill”; and the actual plant in its local habitat (Attran’s generic-specieme) alerted the collector or passer-by to other plants with strong family resemblances: the Wood Cranesbill Geranium sylvaticum and the Meadow Cranesbill Geranium pratense, for instance. An amateur naturalist might say today on seeing one of them: “I think that is a kind of cranesbill”, or “a sort of cranesbill”; and the actual plant in its local habitat (Attran’s generic-specieme) alerted the collector or passer-by to other plants with strong family resemblances: the Wood Cranesbill Geranium sylvaticum and the Meadow Cranesbill Geranium pratense, for instance. An amateur naturalist might say today on seeing one of them: “I think that is a kind of cranesbill”, or “a sort of cranesbill”; and the actual plant in its local habitat (Attran’s generic-specieme) alerted the collector or passer-by to other plants with strong family resemblances: the Wood Cranesbill Geranium sylvaticum and the Meadow Cranesbill Geranium pratense, for instance. An amateur naturalist might say today on seeing one of them: “I think that is a kind of cranesbill”, or “a sort of cranesbill”; and the
Overall, local plant knowledge was usually fairly safe. But when access to and comparison with foreign plants entered the equation as they did for a traveller and observer such as Turner, then the anomalies might overload the system. To prevent this, four strategies were available to the herbalist intent on recording useful medical material. These defined the possibilities of identifying “kindes” of plants, and all of them were employed in Turner’s writing:

- The simplest tactic was to say that this plant is X – a Snowdrop, for instance.
- Secondly, a plant which was not completely identical to one seen previously but seemed to have some very similar characteristics could be described as a “kinde”, “sorte”, “forme”, or “mannere” of X: “that is a sort of cranesbill”.
- Thirdly, a plant could be distinguished as different from but in some way “like” X, a habit of analogy which was fundamental and to which we will return.
- Finally, a plant could be emphatically not X, either because an initial misidentification was being corrected, or because the writer, Turner, recorded that he had seen a plant, Water Hemlock Cicuta, in one distinct location – “in east Freisleland by the sea side” – and nowhere else. Not-X, like the other categories, could be revised subject to additional data.

These four interchangeable methods expressed both likeness and difference, but in a non-specific way. They did not clarify whether kinship or variety consisted in sensory resemblance (appearance, taste, smell), habit, or use. Plants exuding an unpleasant sap or having a similar appearance, for example, might tend to be grouped together, while at least some of the problems connected with Paris can be attributed to habitat. Elsewhere, Turner followed the practice of grouping by customary usage when he listed both Chelidonium majus and Ranunculus ficaria as “selendines” (celandines) in his Herball (Chapman et al. 1989). This situation was further complicated because at this period the reproductive mechanisms of the flower were not known, so the dominant criterion of usefulness and usage reduced inflorescence to a mere appendage. It was but a variegated form of foliage with a paucity of colour words to match, far less relevant to the analyst than roots, leaves, seeds, and fruit – the parts used in medicine, food and dyeing. The number of plants with “black” flowers in Turner’s writing reflects this paucity of flower-terms.

Like his peers, Turner used “kinde”, “forme”, “sorte” and “mannere” in ways which blur modern generic definitions. Sometimes the accompanying illustration could help to clarify any resulting confusion, if the different species (“formes”) were illustrated. This was the case with the “selendines”, and to some extent with the other forms of Aconitum (A. lycoctonum and A. napellus) under which Paris quadrifolia was subsumed in Part I. At other times, without suggesting the existence of a different genus, Turner made a clear verbal distinction between individual plants: he correctly identified the local “laus tibi” as a kind of narcissus, rather than as usually suggested a kind of asphodel. In theory, the three elements of his text – written description, visual illustration and name – all contributed to the overall identification. In practice, they sometimes reinforced and sometimes contradicted each other in defining the different “kindes”, “sortes”, “formes” and “manneres” of plants. But in every case, these tactics were underpinned by an absolute reliance on the validity of analogy.

It is difficult for a modern botanist to understand the structural importance of analogy in the natural history of Turner and his contemporaries. It underpinned the rationale of academic scholarship at the same time as it provided that scholarship’s methodology. Analogy was a deep philosophical concept, showing that everything from stars to stones was linked together in the divine plan, and thereby supplying an ongoing narrative of the rational congruence of nature.

Plant description was envisaged within this narrative, as emerges from innumerable minor details. One of these is the fact that sixteenth-century descriptions, like those before and for long after, included the verb: plants “do” things within nature. The verb in plant descriptions was only finally abandoned by Linnaeus in the mid-eighteenth century, an indication that he was not writing a dynamic history of nature, but compiling a static catalogue.

But if analogy in the early modern world was still a deep philosophical concept, it was also a very handy immediate tool for describing plant characteristics. Hence it was standard in the herbals of the period, which had no access to those methods of quantification based on microscopic phenomena that came to dominate later botany. Turner used analogy continuously – his plant descriptions would not exist without it. Sometimes his analogies piled up in effects that became bewilderingly clumsy. His attempt to define simultaneously representatives of what we now know are two entirely different genera under one word “selendine” in Part 2 of the Herball (1562) includes the following description of the Greater Celandine Chelidonium majus:

Selendine ... the leaues are lyke crowfote leaues, but softer and blewish gray in color. The flovrie is lyke the flovrie of wall gelaure, otherwise called hertes eae... The juice that is in it is lyke saffrone, bitinge sharps... It hath a small codde lyke unto honted popye and long, but it is euer smaller ... (Chapman et al. 1995)

No physician, apothecary, or householder would have time or inclination to decipher this when hastily looking for a speedy solution to an immediate problem. But at other times, when Turner looked outside plants to find his comparisons, they were vivid and brilliant. Aristotolecia “bryngeth furth lyke poke blacke peares and sedy lyke mernes hertes”; rowan Sorbus berries are “lyke corall bedes growing in grater clusters”; dodder Cuscuta is “lyke a great red harpe stryenge”; avens Dryas are “in forme lyke a little eye when the flower is gone”; the leaves of madder Rubia circle the stem “lyke unto sterres goyng roundabout”; and sage Salvia leaves resemble the “boremes [hoarims] of a wore cloth”. These short verbal icons, which could be multiplied endlessly throughout the Herball, go well beyond the literal or the utilitarian. In terms of usefulness, it is doubtful whether they would help a person identify a plant he or she did not already know. But they could operate as aide memoire to fix an image of the plant retrospectively.

The difficulties inherent in Turner’s task of achieving accuracy of identification within the available vocabulary help to explain the various descriptions he gave of Paris quadrifolia. The problems start with its name. Leah Knight (2009) has shown that, in the contrasting case of Narcissus, Turner realized the names already attached to the plant were unsuitable but did not offer a new substitute coinage. But with Paris quadrifolia, he preferred his own name “One beryre” (or “one bery”), even though more than one vernacular name for the plant already existed (Grigson 1955). The older name, “Herbe True-loue”, which Gerard in the 1590s would say came from “the Aints” was ignored. Both it and “herba paris” (which Lyte, 10 years after Turner’s death, said was an apothecaries’ term and which would therefore have been of Latin origin) are derived from the distinctive pattern of the leaves, their “parity”. Turner’s name, on the other hand, refers to the fruiting habit and completely ignores the established tradition. This was not necessarily his usual practice; on the contrary, he regularly specified different regional and national variants. It begs the question therefore as to whether or not “One beryre” may have been a local name familiar from his childhood, since the recorded habitat is also from his early days in Morpeth. The question cannot be answered definitively, but it is interesting that the force of Turner’s authority was sufficient for it to be retained by Gerard for his chapter heading more
than 30 years later. Eventually of course “herb paris” did win out in the vernacular, and Paris quadrifolia became the official nomen trivial of Linnaeus.

The term “one bery” first appeared in The names of herbes (1549), Turner’s earliest work on plants in English, in an entry which serves as a reference point for the more complicated entries which appeared in his later work. Aconitum. There are ii kindes of the herbe called Aconitum, the one kynde is called Pardalianches, which we may call in engiish libarde bayne or one bery. It is much in Northumberland in a wodde besyde Morpeth called Cottingwood. It hath foure leaes lynte unto a great plantaine, and in the ouermost top a little blaccke bery lyke a black morbery, but blacker and greater (Britten et al. 1965).

It will be shown in what follows that some details provided here appeared nowhere else in Turner’s work. What was an ongoing factor was the crucial interdependence Turner believed to exist between the terms “Aconitum”, “pardalianches”, “libarde bayne” and “one bery”. His coinage for this plant has therefore to be understood as a significant contribution to an ongoing debate among his fellow-writers concerning the lethal Aconitum and its “kindes”. In fact, it is the puzzling nature of Aconitum which is the root of Turner’s problems; Paris quadrifolia gets caught up in this muddle.

Following the brief reference to the plant in Names, Paris quadrifolia is a rarity among Turner’s identifications in being listed twice during the couple of decades it took to produce the Herball, first in Part 1 (1551) and then among the herbes written up for surgeons in Part 3 (1564). As a result, readers of the final version of the Herball (1568) which contained all three parts would have two separate and significantly differing entries, neither cross-referred to the other, and each set out under a different chapter heading. The entry for Part 1, under “Aconitum”; took as its starting point a close translation of Dioscorides:

This kind hath leaves like concumbers or sowes bred, three or four together, but lesser and something rougher; the stalk is a hand breadth height, the roots resembleth a scorpion’s tale, and shineth like alabaster. (Chapman et al. 1989).

Turner was indeed translating Dioscorides, but his commentary reveals that this was Dioscorides filtered through the contemporary writings of the German herbalist and professor of medicine Leonart Fuchs. According to Turner, Fuchs thought he had identified the ancient “Aconitum, pardalianches” as what would come to be called Paris quadrifolia. A recognisable woodcut of Paris sourced from Fuchs’s own herbal headed Turner’s entry. However, the Englishman was doubtful of the German’s identificiation of the Greek plant, stating that “the herb hath ever four leaves like plantain, without any roughness and never hath three leaves”. This was evidence taken from the plants he has seen growing “plenustiously beside Morpeth in Northumberland in a wod called cottynwood”.

At this point in 1551, the English name Turner rejected for this plant was “lyberdes bayne” [Leopard’s Bane], which he believed to have been indeed Dioscorides’s “Pardalianches”, but which was an entirely different plant from his “One berrie”. This he judged not on its appearance but by its effects on humans – an argument to which he returned in Part 3. Nevertheless, the vernacular name heading the illustration of “Aconitum, Pardalianches” was “One berrie”. The English name would be the chapter title he gave in Part 3, in preference there over both existing vernacular names like the “herb paris” which would eventually become standard, or the “Aconitum, Padalianches”, which he dismissed. The significant difference therefore is that “One berrie” is not classed as an Aconitum in 1568. This later entry carried no illustration, and the written description moved away from general reliance on Dioscorides and developed instead those elements based on describing the actual plant he had seen growing near his home town: The herb that I cal One berrye, hath a rounde stakle, which is neuer aboue a span long, and oute of the middes therof commeth oute foure leaes, not unlike unto some Plantayne, and in the top of the stakle aboute a rounde black berye come oute other foure small leaes, and there in is sede in color white. The roote is full of small thynge, like threde … (Chapman et al. 1995).

The analogy to plantain, now preferred exclusively over cucumber and cyclamen, goes back to Names, though it has turned into a far less helpful analogy 20 years later. Whereas the first use of this comparison had been specifically to “a greate plantaine”, the later one is unhelpful, since it fails to define what “kinde” or “sorte” of English plantain is meant: the Common Ribbed Plantain Plantago lanceolata, for instance, would be positively misleading. What has also been dropped as something Turner must have decided was unhelpful or superfluous in both Part 1 and Part 3 is the comparison of Paris quadrifolia’s distinctive one black berry to the “morbery” cited in Names. The result is that, even allowing for the fact that the 1551 entry was accompanied by a reasonably clear illustration from Fuchs, it is Turner’s final written description contained in those few lines in Part 3 which enabled subsequent botanists to identify the plant which has been known since the eighteenth century as Paris quadrifolia, and to cite this as an accurate first record. To achieve continuity in naming the plant, on the other hand, commentators have had to ignore Turner’s idiosyncratic interpolation of “One berye”.

While for posterity that nugget of useful description may be enough, it was not the whole story where Turner’s own medical brief was concerned. The context out of which those brief descriptive sentences struggled clear locked him in another way into the existing confusion and led him to make a fundamental and drastic medical error. We can understand this if we ask where that puzzling suggestion of the name “leopard’s bane” for English “one berye” and Latin Aconitum came from. The plant Fuchs, Turner and, by the time of part 3, many other great sixteenth-century natural historians were attempting to identify had been listed by Dioscorides as “Aconitum, which some call Pardalianches, some Cammarum, some Thelyphonum, some Mycococtonum, some Theriophon”. The name which had emerged by the sixteenth century from this bewildering melee was Aconitum pardalianches, since what was still being perpetuated was the ancient confusion about what might be understood as an Aconitum. Over the centuries, this had come to designate at least some actual species such as A. napellus and A. lycocoton, which early modern natural historians could identify visually even if they often referred to them under one name (Chapman et al. 1989). But neither Turner nor his contemporaries were able to designate clearly the various European species of Aconitum. On the contrary, the debate generated a non-existent form supposed to be an antidote for the others, over-labelled by Parkinson (1629) as “Aconitum Salutiferum, Nappellus Moysis, Antora and Anthora, quasi Antithora… in English according to the title, eyther wholsome Helmet flower, or counterpoison Monkes hood”. What completed the confusion was that the label Aconitum was used as a general designation for a plant which was lethal in its toxicity: according to the Oxford English Dictionary, as late as the 1620s any poisonous plant might have been labelled Aconitum. This use derived from Pliny, for instance in writing of Erygium as a counter-poison which was effective “contra toxico et aconite” (Jones 1959). His Latin pairing reflected Greek originals referring to the bow and the arrow, the
The newcomer was *Doronicum*, a plant introduced into western medicine by Arab physicians. *Doronicum pardalianches*, what the editor calls “une chimere botanique”, a more or less schematic representation of *Aconitum* Paduan physician Cortusio were suggesting that a third plant, an entirely different one, neither a *Aconitum* entry continued to conflate by name three plants eventually pertaining to three different genera: *Doronicum*, a common plant in Northumberland, *Doronicum* pardalianches, and the “herbe called Paris”. This mix-up indicates that negligence in many and divers other plants, leaving out in many plants which they have described, the special accidents; which hath not a little troubled the study and determination of the best Herbarists of late yeares, not knowing certainly what to determine and set downe in so ambiguous a matter, some taking it one way, and some another, and some esteeming it to be *Aconitum*. Gerhard himself continued to use *Aconitum* to mean a plant that was “malignant and venomous”, poisonous both to man and to “wilde and noysome beasts” (Gerard [1633], 1975).

Turner’s entries on “One berrye” included the *pardinianches* epithet, but made no reference to this other plant. Yet he must surely have seen *Doronicum*, a common plant in Northumberland, and generally he kept abreast with European developments in identification. However, his 1568 entry continued to conflate by name three plants eventually pertaining to three different genera: *Aconitum, (Doronicum) pardinianches*, and the “herbe called Paris”. This mix-up indicates that for him, as for his contemporaries, both mistakes and successes in identifying like groups of plants arose from the nature of those folk-botany methods referred to previously. In particular in this instance, habitat may have been of some importance in Turner’s analysis, since all three species grow in woodlands, especially in the damp areas beside streams and rivers. In one respect however his reference to habitat in this case looks to the future rather than to the past. He did not introduce *Paris quadrifolia’s* habitat by the kind of autobiographical phrase which he and his contemporaries regularly used to indicate reliable evidence (“I found”/”I have seen”). He used instead the neutral third person (“this herbe growth”) to give both a specific location (Cottingwood) and a general habitat (“manye other woddes”). In this way his entry for *Paris quadrifolia* inadvertently provides an early example of what would later become an important empirical principle in natural history: repeatability is more important than individuality.

The chief criterion for Turner and his contemporaries in describing a plant was to explain its function in the world of man. *Aconitum* was conflated with *Doronicum* because both were listed specifically as wolf-killers. As a result, on the principles available to Turner, a given plant could be confused with any species believed to fulfil the same function, though it was (for us) from an entirely different genus. Ultimately, Turner failed in his immediate task of describing what he believed to be a useful medical plant. But the way he failed demonstrates how inseparable a proper botanical identification and a secure medical usage should always be. In this case, this is because *Paris quadrifolia* is toxic. A modern description highlights the existence of “long, creeping, scaly” rhizomes in order to warn that it is there and in the fruit that its poisonous saponins are concentrated (Stary 1983). While “serious cases of poisoning are not common” they typically occur in children who have eaten the berries mistaking them for large bilberries. Two berries are enough to cause poisoning, but fortunately “they have a repulsive taste and so are unlikely to be eaten after the first bite”. It seems odd that Turner did not know at least some of this, since the plant was regularly used with other poisons in the preparation of purgatives. Yet in 1551 he trotted out the familiar contemporary tactic of evoking “credyble persones” to state specifically that children could eat the fruit “without any jeapordy” — citing this as an indication that the plant therefore might not be Dioscorides’s Leopard’s Bane. In 1568 he dropped the mention of children and instead quoted Matthioli’s assertion that “the berrye of the herbe called Paris” was “so far from hurtinge or poysoninge” that people “wasted” by other poisons had “well recovered” by using it. Such a claim continued to link *Paris quadrifolia* to the old mythical idea regurgitated for *Aconitum* in Part 1, that there existed within this group a plant which neutralised other poisons.

The religio-medical tradition concerning hellebore is important *pars melas* had originated as a purge and cure for royal madness, while *Oinos elleborites* could be given as a drastic purge for women. Digging up either of these caused death unless accompanied by the right prayers to the gods Apollo and Asclepius (Osbaldeston and Wood 2000).

The religio-medical tradition concerning hellebore is important à propos of Turner’s struggles with *Paris quadrifolia* because, if botanically its identification was confused by the debate about *Aconitum*, medically its usage was determined by the ideas about purgation which clustered round hellebore. Turner himself, while habitually cautious about blindly basing the secure identification of plants on Dioscorides’s template, nevertheless followed medical tradition in identifying Dioscorides’s Black Hellebore with *Helleborus niger* and his White Hellebore with *Helleborus viridis*.
was, according to Camporesi, “the exorcist’s plant.” If the belief in purgation linked both secular medical and religious practice then hellebore literally identical to those of Camporesi’s exorcist. Therefore was claimed by all contestants. This is not to say that Turner conducted or was present at exorcisms – there is no evidence either way – but he operated within a culture in which the role of the physician and the role of the clergyman were in some respects interdependent. He himself continually demonstrated his own belief in that interdependency, using the metaphor of role of the physician and the role of the clergyman were in some respects interdependent. He himself continually demonstrated his own belief in that interdependency, using the metaphor of purgation to define the necessary cures for the socio-moral diseases dissected in the tract called Spiritual Physik (1555). And the methods he described briefly, quoted above, were, writ large, literally identical to those of Camporesi’s exorcist.

If the belief in purgation linked both secular medical and religious practice then hellebore was, according to Camporesi, “the exorcist’s plant” par excellence. Helleborism was a holy “ritual of liberation by purge” which relied in its execution and in its preparatory stages on a range of medical techniques such as “lotions, baths to induce sweating, moistening of the body, poultices, enemas, fomentations and special diets” (Camporesi 1988). The procedures which Turner described are deceptively bland compared to the warnings that his Italian contemporary Florian Canale offered against exorcisms undertaken using hellebore. He urged that the age and strength of “the patient” [sic] should be taken into account; that another milder purgative should be employed to prepare for this drastic one; that food should be taken in accompaniment to mitigate the effects; and that evacuation through the bowels was less dangerous to the system than violent vomiting. Compared to this, it is clear that Turner’s entry does not tell the whole story involved in prescribing White Hellebore. In this case and in that of <i>Paris quadrifolia</i> constrained Turner’s ongoing struggle to offer what, in the case of <i>Paris quadrifolia</i> and other plants, would become primary reference points in the different discipline of botany. And what also makes the struggle so fascinating to subsequent readers of Turner’s work is that he insisted, obstinately and unremittingly, on the integration of his own experience, originating in his early years in his native county, as an essential part of learned description.

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