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YNU Notice: YNU Annual General Meeting p81

Correction: p117

An asterisk* indicates a peer-reviewed paper

Front cover: Adult Dark Green Fritillary *Argynnis aglaja*. See p112 and Plate III, centre pages.

Photo: *J.Bowers*

Back cover: Ann Hanson of the Yorkshire Mammal Group demonstrates how to safely handle Longworth traps during a small mammals survey. See pp 82-101. Photo *J.Simmons*



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YNU Notice

YNU Annual General Meeting

Notice is hereby given that the 152nd Annual General Meeting of the Yorkshire Naturalists' Union will take place at Malham Tarn Field Centre on November 15 2014. The meeting will be preceded by a meeting of the Natural Sciences Forum and followed by an address from the outgoing YNU President Dr Terry Whitaker with the title 'From Yorkshire to China via Borneo'.

The full programme for the day is as follows:

- 10.30 Arrival. Tea and coffee
- 11.00 Short guided walk
- 11.30 - 12.45 Natural Sciences Forum
- 12.45 - 13.45 Buffet lunch
- 2.00 Formal welcome by the Craven Conservation Group followed by the AGM
- 3.00 - 4.00 Presidential address
- 4.30 Departure

The charge for the day will be £12.00, which includes lunch.

Members may book on-line at www.ynu.org.uk or with a cheque to the Events Organiser, Kerry Netherway, 28 Westmorland Rise, Appleby, Cumbria CA16 6SJ (kerrynetherway@hotmail.co.uk).

A minibus service will be provided from Settle Station price £10.00 return. Seats can be booked via the events organiser. Accommodation for 1 or 2 nights is available at the Field Centre. Please contact them directly: FSC Malham Tarn Field Centre, Settle, N Yorks BD24 9PU; Tel: 01729 830658.

Historical records of some mammals of the Whitby district and adjacent areas of Cleveland and the North York Moors

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The following notes, collations of historical information and bibliography are presented as a background to monitoring historical trends in the mammal fauna of Whitby and adjacent areas of Cleveland and the North York Moors.

The first attempt to plot the distribution of this region's terrestrial mammals at a 10km scale was undertaken between 1965 and 1970 and published by Corbet (1971), followed by Arnold (1978) and updated in 1984 and 1993. The first project to collate local records at a 1km scale was undertaken by the Yorkshire Naturalists' Union, its members and affiliated societies through the 1970s and early 1980s, the results appearing in Howes (1983). This was updated and had the interpretative advantage of plastic overlays including river systems and altitude in Delany (1985). The project was updated by the Yorkshire Mammal Group (YMG) after a 20 year gap and with the benefit of digital mapping technology in Oxford *et al.* (2007).

INSECTIVORA

Hedgehog *Erinaceus europaeus*

A pioneer in the study of Hedgehog road casualties across the region was Ian Massey (1939-2008), late curator of Woodend Natural History Museum in Scarborough, who undertook a public participation survey gathering the dates and locations of Hedgehog road kills in the Scarborough district from 1966 to 1971. These included many records from across the North York Moors. His graphs illustrated the seasonality of Hedgehog winter hibernation versus summer activity periods and his locality records showed a strong urban correlation. Even in rural areas casualties were associated with villages and isolated farms (Massey, 1972).

From 1990 to 1993 the YNU organised a survey designed to compare Hedgehog population levels in the different geographical regions of Yorkshire using the mean number of road casualties per 100 miles on 20+ mile transects on A, B or C roads during sample survey months of July, August and September. 16 transects covering 522 miles across the North York Moors region encountered 28 Hedgehog casualties, giving a relatively low mean frequency index of 5.36 per 100 miles. Adjacent geographical regions recorded higher indices of 10.11 in the Vale of Pickering, 10.80 in the Vale of York/Mowbray and 12.58 on the Wolds. The most frequent associated habitat/land-use types were urban and grassland, each registering 34%, arable and woodland, each registering 12% and the lowest being open moorland registering 8% (Howes, 2002c).

Water Shrew *Neomys fodiens*

Live trapping by YMG caught two specimens of this seldom-encountered mammal in Cropton Forest in 1986 and three more at Rievaulx Terraces in 1987 (see Table 1). Capes (2002, 2013), also using Longworth live mammal traps, found it at Nunthorpe in 2002 and at Great Ayton in 2002 and 2003. Capes (2005, 2007, 2013) made significant strides in the study of the Water

Shrew in and around the North York Moors using the bait tube and scat analysis technique devised by Churchfield *et al.* (2000) in association with the Mammal Society National Water Shrew Survey, confirming its presence at Ingleby Greenhow, on the River Leven at Kildale and Stoup Beck at Fylingthorpe in 2004 and Mill Beck at Liverton, Easington Beck at Staithes, West Beck at Goathland and Danby Dale in 2005, where positive signs had been identified in the latter at the head of the dale during 1986.

Mole *Talpa europaea*

Preliminary studies suggest that Moles appear to favour deeper fertile soils of permanent pasture in the region. An investigation into the effect of soil type/land management on Mole occurrence in the Whitby and North York Moors region (Scalby Mills to Staithes and Thornton le Dale to Sleights) was carried out in April 1977. 245 permanent pastures were sampled and 62% were occupied by Moles but only 8% of 140 arable fields were occupied. Interestingly, only 30% of grassland and 5% of arable fields that had been improved from moorland soils were colonised (Howes, unpublished). The use of calcareous hardcore in road construction has affected the soil chemistry of moorland road verges, enabling enhanced soil faunas including Moles to colonise grassy roadside verges across the otherwise acid podzolised soils of peatland, heather moors and coniferous forestry, which would otherwise have been unsuitable for them (pers. obs.).

One notable feature of the population, as revealed by local mole catchers, is the frequency of abnormally coloured specimens. These are usually some shade of yellow, ranging from almost white through cream and yellow to bright apricot; other variants are cinnamon, slate and smoke grey. It has been suggested (Massey, 1973) that Moles exhibiting recessive pelage colouration are less rigorously 'weeded out' than in surface-living mammals because of their relative freedom from avian predators. The majority of documented Yorkshire records are centred on the upper Esk Valley. Fifteen sandy/apricot-coloured specimens were trapped from January to April 1972 in Danby Dale and Westerdale. Similarly coloured specimens had been caught in Westerdale and Commondale during the 1920s and two cream-coloured animals were caught there and seven near Lealholme in 1936 (Massey, 1973; Howes, 1986).

CHIROPTERA

The Lesser Horseshoe Bat *Rhinolophus hipposideros* was thought to occur in the Newtondale area in the 19th century and was proved to occur around Helmsley Castle, Duncombe Park and the potholes known as the Windypits from 1921 to 1944. The discovery of droppings thought to be from this animal in the Windypits in 1983 possibly indicated its continued survival in the region (Howes, 1985a). Historically the Barbastelle Bat *Barbastella barbastellus* occurred in the Helmsley Castle/Duncombe Park area with confirmed records from 1919 to 1955 (Howes, 1985b). Currently nine species of bat are known to occur in the study area. Detailed studies of roosts and records of Common Pipistrelle *Pipistrellus pipistrellus*, Noctule *Nyctalus noctula* and Brown Long-eared Bat *Plecotus auritus* are provided for Cleveland south of the Tees (Wardhaugh, 1992, 1993 & 1994) but, with further fieldwork since the early 1990s, an improved knowledge of the UK bat fauna and the availability of more advanced ultrasonic bat detectors, Whiskered Bat *Myotis mystacinus*, Brandt's Bat *M. brandtii*, Daubenton's Bat *M. daubentonii*, Natterer's Bat *M. nattereri*, Soprano Pipistrelle *P. pygmaeus* and Nathusius' Pipistrelle *P. nathusii* have been added to the local list, their Cleveland distribution shown in the tetrad distribution maps in Bond (2012).

LAGOMORPHA

Rabbit *Oryctolagus cuniculus*

Henderson (1997, 2003) shows that successive Ice Ages of the Pleistocene eradicated the Rabbit from Europe east of the Pyrenees, leaving the residual population confined to the Iberian peninsula. The Romans, recognising its value for meat, fur and sporting potential, re-introduced it to Italy where the practice of rabbit warrening was developed. By the Middle Ages rabbit warrening was being practiced in Spain, France and Germany and was exploited by the Normans, who brought the practice to Britain shortly after the Conquest.

It was established in the Yorkshire region by the early 1300s and, within a century, rabbit warrening in a range of forms was established across the county. Detailed studies and distribution maps of those on the North York Moors area are in Harris & Spratt (1991) and Henderson (2003). Medieval examples at Rievaulx, Medieval/post-Medieval examples at Broughton, Spaunton Moor, Levisham Moor and Nunnington and post-Medieval examples at Guisborough, Kildale, Ingleby Greenhow, Faceby, Scugdale, Bilsdale, Hutton-le-Hole, Lockton Warren, Staindale, Dalby, Dalby High Rigg, Ellerburn, Nabgate, Flainsey, Whitecliffe Rigg, Scambridge, Cockmoor Dykes, Hutton Buscel, Baker's Warren/Mt Misery and High Langdale End. All refer to tightly managed and guarded enclosed populations, though court proceedings record disputes from time to time between farmers and land-owners (warreners) over Common land being lost to warrening and crops being depleted by escaping Rabbits. The Black Death and the English Civil War would inevitably have enabled Rabbits to escape captivity, though it is likely that escapees would have been trapped out by the beleaguered human population. Curiously, there is no evidence of the long term establishment of feral populations until the 19th century, when warrening became marginal to the rural economy and game laws favoured the feral Rabbit, which soon assumed pest proportions (Henderson, 2003). The Rabbit became a major grazing competitor of the Brown Hare and the Water Vole, which had substantial terrestrial populations until that time. Rabbits were so abundant and ubiquitous that they became the preferred prey for predators, notably Red Fox and Stoat. However, the flea-borne disease *Myxomatosis* reached local Rabbit populations even in remote moorland valleys by 1954, exterminating the majority of the population. For a period grazing pressure was reduced, enabling hay meadows and grassy verges to bloom more spectacularly than in living memory. Stoats almost died out, Weasel numbers increased through reduced competition from the larger Stoat, and Red Fox diets diversified (Tapper, 1992).

Brown Hare *Lepus europaeus*

During the 1876-77 hunting season the Harriers at Whitby killed 23 Brown Hares in 34 days, giving a mean kill rate of 67 per 100 days hunting ('B.A.', 1877). The 6,000-acre shooting estate of Wilton was remarkable in Yorkshire for the numbers of Brown Hares it produced. Shooting bags of 150 were normal but five guns accounted for 247 Brown Hares on October 4 1905 and 255 on the following day (Bonnett, 1912). A Mr Wilson of Mayfield Place, Whitby, had two leverets "that were suckled by a cat and which used to follow him about and run in and out of the house like dogs" (Grabham, 1907). After *Myxomatosis* decimated Rabbit numbers in the 1950s, estate game registers showed that Brown Hare numbers temporarily rallied (Tapper, 1992).

RODENTIA

The invention of the Longworth live trap and the development of field methods and techniques associated with its use revolutionised small mammal studies, enabling specimens to be examined, marked, released back into the population and re-trapped. This opened the way to investigations of territoriality, home range, seasonal movement, dispersal, weight variation and a range of breeding cycle and demographic studies.

16 trapping sessions at 11 sites around the North York Moors region were undertaken from 1977 to 2007 by members of the YMG. This work collectively resulted in the trapping of 540 small mammals of seven species. An outline of the results is presented in Table 1 involving the following small mammals, their numbers and relative frequencies: Wood Mouse *Apodemus sylvaticus* 229 (42%), Bank Vole *Myodes glareolus* 168 (31%), Field Vole *Microtus agrestis* 14 (3%), Common Shrew *Sorex araneus* 120 (22%), Pygmy Shrew *Sorex minutus* 1 (0.2%) and Water Shrew 7 (1%), with other incidental catches including Weasel 1 (0.2%).

Table 1: Small Mammal Trapping by the Yorkshire Mammal Group in the North York Moors and adjacent areas.

Site/ OS Grid ref.	Date	No. of Traps	Wood Mouse	Bank Vole	Field Vole	Common Shrew	Pygmy Shrew	Water Shrew	Weasel	Source
Ashberry Pastures SE5685	Sep 1992	50	8							Oxford (1993)
Ashberry Pastures SE5685	Sep 1993		3			2				Hanson (1994)
Ashberry Pastures SE5685	Sep 1997	25	6	7						Hanson (1998a)
Chafer Wood SE8993	Sep 1994		8	9		11				Hanson (1995)
Cropton Forest SE79	Oct 1986	100	11	14	8	41		2		Thompson (1987)
Dalby Forest SE8587	Aug 2007	50	20	7	1	5				Hanson (2007)
Ellerburn Bank SE8494	Oct 1977	96	75				1			Wooding (1977)
Garbutt Wood SE5083	Sep 1991	73	5	2	1	1			1	Oxford (1992)
Great Ayton NZ5711	Jun 2002	12	3	12	3	1		2		Capes (2002)
Great Ayton NZ5711	Aug 2002	12	6	18		2				Capes (2003)
Ingleby Greenhow NZ5704	Jul 2002	12	2	13		4				Capes (2003)

Site/ OS Grid ref.	Date	No. of Traps	Wood Mouse	Bank Vole	Field Vole	Common Shrew	Pigmy Shrew	Water Shrew	Weasel	Source
Mount Grace Priory SE4498	Jul 2005	50		6		1				Hanson (2005)
Mount Grace Priory SE4498	Jul 2003	50	40	20		25				Hanson (2003)
Rievaulx Terraces SE5784	Sep 1997	100	23	30		9				Hanson (1998b)
Rievaulx Terraces SE5784	Jul 1987	72	19	29		18		3		Thompson (1988)
Troutsdale SE9187; SE9288	Jun 2004	20		1	1					Mortimer (2004)

Red Squirrel *Sciurus vulgaris*

The Red Squirrel was once widespread across the region but in steep decline during the 19th century. Although squirrel pox and mange were implicated, mass starvation through widespread deforestation, particularly the removal of mature fruiting Scots Pines *Pinus sylvestris*, was probably a more realistic cause. A sudden immigration of Red Squirrels in the isolated plantations of the Fylingdales Moor area was thought to have resulted from heavy removal of timber from the Newton House woodlands and to the destruction of “some hundreds of acres of Scots Pine in the Sneaton Plantations in consequence of a ... tornado” (Barry, 1907).

Records published by the YNU from the 19th century and up to the First World War include Arncliffe Wood 1881, Langdale Rigg 1887, Kildale 1890, Kirkbymoorside 1893, Ingleby Greenhow 1899, Eskdale and Mulgrave Woods 1900, Wykeham 1901, Harwood Dale 1904, Loftus 1905 and Great Ayton 1913. One shot in the Whitby area in 1886 was sent to the taxidermist J.H. Wilson and a domestic cat suckled a nest of young (Red) squirrels at Bridge Farm, Staintondale, in 1898 (*Yorkshire Evening Post* 27 Apr. 1898).

After the establishment of the Forestry Commission in 1919 records were from Mulgrave Woods and the Helmsley area in 1923 but they had been seldom seen at Egton Bridge since 1914. Numbers temporarily rallied during the 1930s, possibly due to the development of the new Forestry Commission plantations. They were again being noticed at Egton Bridge in 1930 and had been seen at Osmotherley in 1931. Flintoff (1931) noted that “It is the general opinion... that the Red Squirrel is more numerous than it was a few years ago” in the Goathland area and Bramley (1933) noted a “welcome increase ... from the Whitby area” though cautioning that several had been found dead with disease. It is now known that the introduced Grey Squirrel, newly arrived in the Whitby region, is the vector of the squirrel pox virus for which the Red Squirrel has little resistance. One was killed on the road at Cloughton Plantation in 1939 and one was seen on Silpho Moor in 1940. The last records in the Whitby region seem to have been a small population noticed in Harwood Dale from 1942 to 1945 (Hazelwood, 1946) and one was seen at Kirkbymoorside during the YNU excursion in 1959. During the national squirrel survey of

1944-45 it was only reported to occur in 26 (18%) of surveyed parishes in the North Riding, none in the Whitby area (Shorten, 1946).

Grey Squirrel *Sciurus carolinensis*

36 animals from Woburn Abbey were released at Scampston Park in June 1906 (St Quintin, 1907) and a further 30 in October 1914 (Sheppard, 1915). Other releases which may have helped to form the basis of the current feral population across the North York Moors and the Cleveland Hills were at Bedale in 1913 and Darlington in 1914-15 (Middleton, 1931). By 1923 it was already "fairly common" around Helmsley (Booth, 1923) and established and "common" at Kingthorpe and Thornton Dale in 1930 (Flintoff, 1931). Early feral records close to Whitby were first noted by Mr A.S. Frank in Arncliffe Woods in 1925, where one was shot by the keeper a month or two later, and others were shot in 1930. Three were caught in a stoat trap in Egton Grange Woods in 1927. It was first seen in the woods in Glaisdale in 1930 and was already "common" at Golden Grove. James Patterson reported it from Wheeldale Lodge in 1930 and specimens were being shot in the woods around Newton House, to which the opinionated Flintoff (*l.c.*) noted that "it is spreading rapidly over this district in spite of efforts by game preservers to prevent it" and "that this 'wretched rat' should extend its activities in our direction is most regrettable."

Hazel Dormouse *Muscardinus avellana*

The following records from Howes (1984, 1985c & 2010) document the last known allusions to the Dormouse in the Whitby region from the 19th and 20th centuries before its evident local extinction in the 1970s. It was listed for the Cleveland area by J. Graves as early as 1808, though no specific dates or localities are given. At Pinchinthorpe one was found by R. Lofthouse in the spring of 1881. Thomas Nelson regarded it as "not numerous" in the Redcar area and G. Page described it as being "rather scarce" near Guisborough. A specimen captured some years before 1884 at Loftus was examined by J. Carter. G. Abbey watched one emerging from its nest at Grinkle Park, his only sighting of one during a lifetime in this locality. In 1877 the naturalist 'B.A.' saw a locally caught specimen in the workshop of a Whitby taxidermist [possibly John H. Wilson of Baxtergate (Marshall, 2007)]. T. Stephenson did not consider the Dormouse to be a common animal in the Whitby area during the 1880s, though W. Lister and J. Braim reported that "a few are found at Glaisdale". Specimens in Whitby Museum, mentioned in the literature in 1884 and 1907, were said to be from nearby Mulgrave Woods.

On July 9 1909 the gamekeeper James Patterson took Mr Oxley Grabham, then Curator of the Yorkshire Museum in York, to a small wood surrounded by grouse moorland near Goathland where he knew that three or four pairs of Hazel Dormice bred annually. Though the site's name was never revealed it is likely to have been one of the woods along the West Beck, possibly the isolated Hazel Head Wood on the south-facing escarpment near the shooting box upstream of Nelly Ayre Foss. A nest containing six half-grown young was located, on which Grabham (1909) based his celebrated series of photographic studies. In 1910 the colony was said to be steadily increasing, a claim presumably based on a visit to the site, when Patterson showed Grabham and E.W. Taylor (Chairman of the YNU Vertebrates Section) a nest containing three half-grown young. Grabham and Taylor again found an occupied nest in the same part of the plantation in 1911, though at a later date (pre-1956) Taylor, accompanied by Mr Adam Gordon (gamekeeper at Duncombe Park), failed to re-find a specimen. Brown (1980), ecologist with the North York

Moors National Park Authority, identified tracks in the Esk Valley in 1978 and in 1979 in the same area he claimed at least one sighting and the finding of a mandible of a Hazel Dormouse in a Barn Owl *Tyto alba* pellet.

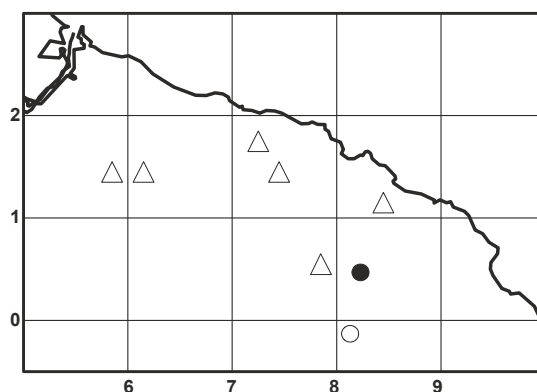


Figure 1: Historical records of Hazel Dormouse showing the locations of occurrences from the 19th century to 1979 across the study region. Symbols: Triangle = 19th century, Open circle = 1900 to 1910, Solid dot 1978 and 1979 (based on Howes, 2010).

Whilst searching for field evidence of Hazel Dormice in the form of characteristically chewed hazel nut shells, in 1993, the author and members of the YMG visited six woodland sites within the study area, each with a good Hazel *Corylus avellana* understorey. After 4½ hours of searching 887 fallen Hazel nut shells were found. 776 had been opened by vertebrates, 762 (98%) by Squirrels and 14 (2%) by Bank Voles but none by Hazel Dormice (Howes, 2010).

Water Vole *Arvicola amphibius*

Pioneering work on the ecology, predation and status monitoring of the Water Vole was undertaken in the North York Moors region during the 1980s (Woodroffe, 1988; Woodroffe *et al.* 1990a, 1990b). This influential work directed early attention to the collapse of the animal's status and highlighted the role played by excessive predation of riparian populations by the feral American Mink. The survey methodology of quantifying Water Vole burrows, lawns and latrines formed the basis of a veritable industry in the production of parochial, river catchment and national Water Vole surveys.

An examination of the mitochondrial DNA of Water Vole tissue samples in museums from round the UK showed that the post-glacial re-colonisation of the United Kingdom had been undertaken by pioneers from two distinct phylogenetic groups or clades. These have formed two geographical distributions, a Scottish clade which seems to have originated in the Iberian peninsula and an English/Welsh clade which seems to have originated in eastern Europe (Pieltney *et al.*, 2005). To refine the geographical boundary between the two groups, the Environment Agency examined Water Vole droppings collected in a wide range of sites in 2008, including some from the North York Moors and Cleveland region. These proved to belong to the Scottish clade (Bond, 2012) whereas material in the 2005 study from Scarborough belonged to the English/Welsh clade indicating that the Whitby district is on the boundary between the two main UK phylogenetic populations.

CARNIVORA

Early documentary records of bounties paid for certain mammals, mainly Carnivora, have been obtained for seven local townships and parishes, mainly in the form of churchwardens' accounts held at the North Yorkshire County Record Office (NYCRO) in Northallerton. These include records of Polecat *Mustela putorius* from 1724, Stoat from 1748, Weasel from 1776, Badger from 1797, Otter from 1745 and Red Fox from 1672. Details of numbers, locations and sources are presented in Table 2. Parishes elsewhere contain records of Hedgehog and Mole. Further archival searches may reveal such records for the Whitby district.

Table 2: Carnivore bounty records from Parishes in the North York Moors and adjacent areas (from Lovegrove, 2007, Howes, 2009). Figures in square brackets indicate relative frequency on a scale of 1 (very infrequent) to 5 (very numerous) (Lovegrove, 2007).

Parish/ Township	Sources & NYCRO archive codes	Archive Date Range	Polecat	Stoat	Weasel	Badger	Otter	Fox	Total
Brompton-by-Sawdon	PR/BRO Mic. 1084	1748-1851	149	6		2	1	2	159
Fylingdales	PR/FY Mic. 1338-41 (Lovegrove, 2007)	1762-1833				[1]		[1]	
Great Ayton	PR/AYG Mic. 1202	1734-1815	224		2		4	45	275
Helmsley	PR/HEL Mic. 995	1671-1785	1					619	620
Hilton	PR/HIL Mic. 1205; 09	1761-1858	18					5	23
Lastingham	PR/LAS Mic. 1976; 85. (Lovegrove, 2007)	1693-1894				[1]		[1]	
Lythe	PR/LY Mic. 1396. (Lovegrove, 2007)	1704-1840			[1]			[3]	
Scarborough	Clarke (1892)	1774-1776	37		1				38
Stainton-in-Cleveland	PR/STC Mic. 1205; 07-08	1769-1848	306					5	311
Totals			735	6	3	2	5	676	1,427
%			51.6	0.4	0.2	0.1	0.3	47.4	100

Red Fox *Vulpes vulpes*

The earliest evidence of the Red Fox in the region, earlier even than from churchwardens' accounts, is from the histories of the local fox hunts. For the Staintondale Hunt there is a tradition that George Villiers, the second Duke of Buckingham, hunted both Red Fox and Red Deer here in the 13th century by royal warrant. Tradition tells of the Buckingham Stone near 'Chop Yat' on the North York Moors marking where the Duke's horse collapsed and died after a severe three hour pursuit of a Fox. It is also claimed that Red Foxes have been hunted on the Sinnington Hunt territory since the 13th century and that organised fox hunting has operated here since 1680. Allusions to 10 packs of foxhounds have been traced in the Whitby, Cleveland

and North York Moors area, each operating within its own defined territory. A brief account of their histories and descriptions of their hunting territories is in Howes (2009).

It was to the prowess of hunt masters and the reputation of the hunts to provide exhilarating riding country and the prospect of finding good numbers of healthy Red Foxes capable of producing good 'runs'. The extensive hunting literature provides transcriptions from hunt diaries of former masters describing celebrated runs. Fox 'find' sites recorded by masters of the Cleveland Hunt from 1838 to 1871 (Pease, 1887) have been traced on 19th century Ordnance Survey sheets to generate Figure 2, which provides an impression of local Red Fox distribution in the mid to late 19th century.

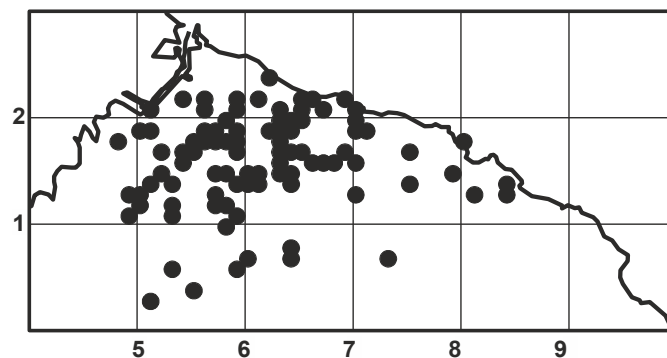


Figure 2: Locations of Red Fox 'find' sites recorded by the Cleveland Hunt from 1838 to 1871 (data from Pease, 1887).

Since the annual numbers of Red Foxes killed by hunts are likely, to some extent, to be a function of hunting effort (numbers of days in the field), data provided by Pease (*l.c.*) have been used to show the mean number of Red Foxes killed per standard 100 days from 1838 to 1871 (see Figure 3).

This set of calculations shows considerable annual fluctuation but indicates a general decline from a peak of 96 kills per 100 days hunting in 1841 to a nadir of 22 in 1864, followed by recovery to 75 in 1868. Within this pattern are several steep declines as in 1844, 1851 and 1856. Similar sudden declines in other Yorkshire hunts have coincided with reports of debilitating outbreaks of mange. This may indeed have been the case in the Cleveland region, since Blakeborough & Pease (1914) refer back to "the great mange scourge" and that "Badgers, thought to be immune or un-susceptible to mange, were introduced into fox hunting territories to clean mangy earths".

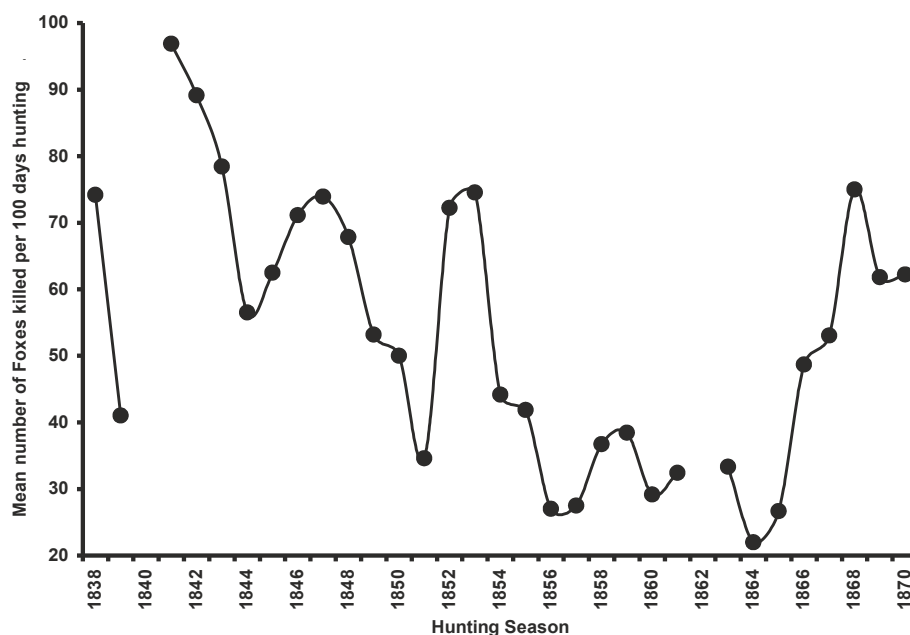


Figure 3: Fluctuations in the annual numbers of Red Foxes killed per 100 days hunting by the Cleveland Hunt during hunting seasons 1838/39 to 1870/71 (figures calculated from hunt diary entries in Pease, 1887).

Badger *Meles meles*

There is an extensive historical literature on the Badgers of the Whitby region commencing with a field sports perspective in Blakeborough & Pease (*l.c.*). During the 19th and early 20th centuries Badger persecution was rife in north-east Yorkshire and the Cleveland area (Howes, 1988). Blakeborough & Pease (*l.c.*) provide an eye witness account of a successful badger dig in the Pickering area, the final extraction of the Badgers into sacks for later baiting being achieved by the use of metal pincer-like 'badger tongs' known locally as 'clams'. Badger tongs are rare or unrecognised in museum social history collections, though a set collected in the winter of 1985/86 from Thornton Dale is in the Ryedale Folk Museum, Hutton-le-Hole. Blakeborough & Pease (*l.c.*) note that Kirkbymoorside was a "locality in which badgers abound and in which baiting was popular". The hunting literature shows that Badgers were hunted with fox hounds in woodland around Kirkbymoorside, Duncombe Park, Boltby, Bilsdale and Farndale in the 1860s. However, opinions varied amongst the fox hunting fraternity as to the merits and de-merits of Badgers. Some regarded them as a potential threat to Red Fox cubs and a nuisance for opening up stopped earths in advance of a hunt. Others recognised their value in creating and cleaning out earths. Although Badgers had been exterminated from many estates during the 19th century, Blakeborough & Pease (*l.c.*) recognised their benign and beneficial nature in fox hunting territory and championed their preservation and re-introduction, contrary to the prevailing attitudes. Badgers were regularly killed in the interests of game rearing and stock protection by laying poisoned baits or by gassing setts, particularly since the 1950s. M. Johnson of the Forestry Commission found 7 setts in the Wykeham Forest area inactive due to gassing in 1962.

Knight, Middleton & Paget (1972) reported on the 125 setts which John Knight and others had located in the northeastern (Cleveland, Whitby and coastal) part of the North Riding as part of the Mammal Society National Badger Survey . Findings are reviewed in Table 3.

Table 3: Associated habitats, soil types, site incline and activity level at Badger setts (Knight, Middleton & Paget, 1972).

Habitat	No. of setts	%
Deciduous Woodland	27	21.6
Coniferous Woodland	58	46.4
Mixed Woodland	24	19.2
Copse	7	5.6
Hedgerow	3	2.4
Open Field	4	3.2
Quarry	1	0.8
Others	1	0.8

Soil Type (Only recorded in 96 setts)	No. of setts	%
Sand	66	69.0
Clay	15	15.5
Limestone	7	7.2
Shale	8	8.3

Incline	No. of setts	%
Slope	124	99.2
Level	1	0.8

Activity (Only certain in 107 setts)	No. of setts	%
Active	86	80.4
Non-active (including extinct)	21	19.6

Sixty years after the beleaguered status of local Badgers was described by Blakeborough & Pease (*l.c.*) the topography and habitats of the comparatively numerous Badger setts in the North York Moors region were beautifully described by Paget & Middleton (1974). Currently the North Riding Badger Group undertakes the role of monitoring these setts and recording local Badger road casualties.

European Otter *Lutra lutra*

Historical records in *The Naturalist* from the River Esk catchment show that an Otter trapped a few days previously was turned down and killed after a short hunt at Lealholme Bridge in 1894 and a young female was killed at White Hall shipyard also in 1894, the preserved specimen being exhibited at Whitby Museum. A female was killed at Glaisdale in 1896 (*Whitby Gazette* 24th Jan. 1896) while a male was killed at Egton Bridge and a male and a female were killed at Grosmont in 1897. One was seen near Sleights Bridge and three were seen at Ruswarp Weir in 1898. One was shot at Ruswarp Weir in 1900 and Otters were regarded as “abundant” in the Esk at Castleton in 1911. They were “not uncommon” at Egton Bridge in 1925 and 1930, while tracks were seen in the snow on the frozen Esk in 1941. *The Northern Echo* of 20 Dec. 1940 gave a lurid

account of a fight between a large, allegedly male, Otter and a seal in the Esk above the dam at Ruswarp. Footprints were seen at Lockwood Reservoir in 1952 and Otters, previously recorded at Lownorth Beck and Jugger Howe Beck on the upper Derwent catchment in 1904, were at Littlebeck in 1972, Ramsdale Beck at Fylingdales in 1976 and Beck Hole on the Murk Esk in 1978.

Woodroffe's (1994) meticulous examination of the records of the Northern Counties Otter Hounds, which regularly worked the Esk and its tributaries, showed that 16 days of hunting from 1933 to 1939 accounted for 15 Otters (0.93 per day) and that 11 days of hunting from 1950 to 1959 produced 12 Otters (1.09 per day). These figures are significant since they provide an index of the Otter population on the Esk immediately prior to the organochlorine pesticide-induced Otter crash of the 1960s.

The series of national otter surveys, which each sampled a standard 25 stretches of the Esk catchment, encountered positive signs at just one site in 1986-88, three in 1991-94, 20 in 2000-02 and 21 in 2009-2010. The Vincent Wildlife Trust introduced four Otters into the area between 1990 and 1993 (Jefferies *et al*, 2000) and the large increase in positive sightings noted in the 2000-02 survey is probably due to these releases (Crawford, 2005).

The annual mammal reports of the Whitby Naturalists' Club noted that Otters were back on the Derwent/Esk catchment in 1994 and there have been many reports since (see Fig. 4).

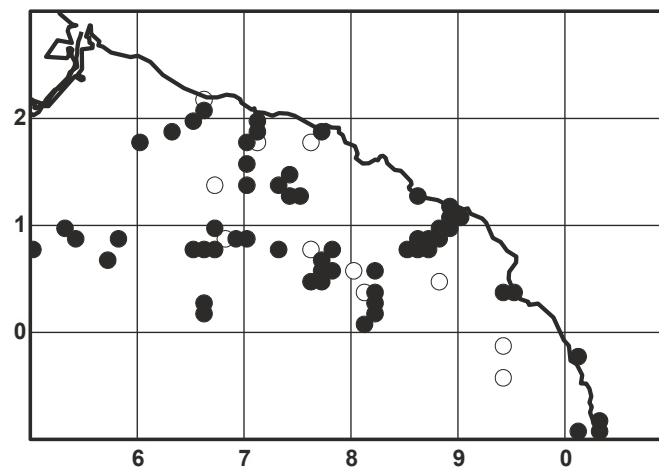


Figure 4: Approximate locations of Otter records from the River Esk catchment and minor becks opening onto the shore and adjacent coastal habitats from Saltburn to Scalby Mills. Open circles = 1790-1979. Solid dots = post 1980.

Historical records from the Cleveland coast show that Otters were present in the beck at Saltburn in 1790, in Roxby Beck at Staithes in 1896, at Liverton Mines in 1904, at Loftus in 1905 and in the Waitel Beck in 1905. During 1997 and 1998 Winter (2002) made investigations of Otters' use of the minor becks opening onto the shore and adjacent coastal habitats at sites from Saltburn to Scarborough. Otters were known to frequent the lower reaches of Scalby Beck which emerges onto the rocky shore at Scalby Mills and Otters on the Esk were known to visit Whitby Harbour. Spraint was located above Mean High Water mark on the boulder-strewn

shores at Scalby Ness and Hayburn Wyke in 1989, the Scalby Ness samples containing fish bones and the carapaces of small crabs. Signs were identified by the stream emerging onto the sandy shore at Sandsend in 1997 and at Stoup Beck, which emerges onto the shore of Robin Hood's Bay, in 1998. The only other positive coastal site was at Saltburn-by-the-Sea where Saltburn Gill and Skelton Beck merge before emptying onto the cobble beach.

Stoat *Mustela erminea*

In 1930 and 1934 John R. Flintoff (1873-1941) of 'Water Ark', Goathland, undertook a questionnaire survey of gamekeepers and estate managers, requesting the numbers, sexes and pelage forms of Stoats trapped on shooting estates. Replies were readily provided from 51 estates across Yorkshire and into adjacent counties, including 20 from the North York Moors and adjacent areas on the northern edge of the Vale of Pickering. Flintoff's pioneering survey provided an invaluable legacy of raw data, anecdotes and a preliminary interpretation on the subject of winter whitening (ermine pelage) (Flintoff, 1933, 1935 & 1936). These have enabled levels of occurrence of ermine pelage to be compared at different altitudes and in different geographical regions across Yorkshire and adjacent counties (Howes, 2002b).

Not all UK Stoat populations have the gene which gives rise to the winter whitening process. This tends to be absent in the southeast of Britain and present in the northwest (McDonald & Harris, 1998). With 'Watsonian' Yorkshire being on the boundary of these two zones, Flintoff's survey provided revealing data on the geography of the winter whitening phenomenon in the UK. 197 (7.6%) of the 2,584 stoats killed on estates in the Whitby and North York Moors region exhibited some degree of winter whitening. This compared with 15.3% for adjacent counties to the north of Yorkshire, 10.5% for the Yorkshire Dales, 5.1% for the Wolds and Holderness, 5% for the southern Pennines, 3.4% for the Vale of York and 3.5% for adjacent counties to the south. With chill air temperatures suppressing the production of melanin in the autumn moult, a re-working of Flintoff's data showed that Stoats from shooting estates with land above 1000ft exhibited a greater incidence of ermine pelage (Howes, 2000b).

20 local estates and correspondents provided records to Flintoff's survey. Their locations provide in Figure 5 an impression of local Stoat distribution from 1931-34.

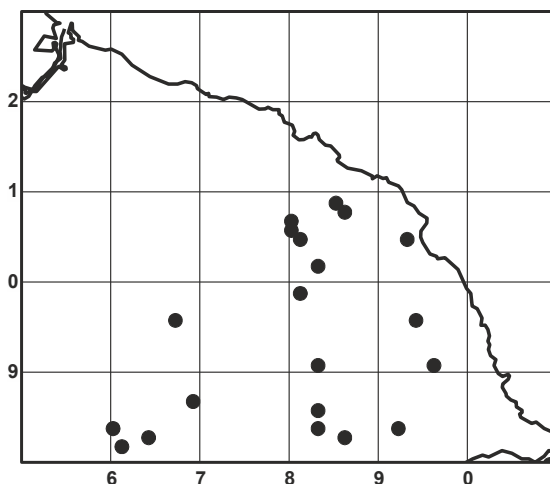


Figure 5: Locations of shooting estates on the North York Moors and the northern edge of the Vale of Pickering from where Flintoff received statistics of 2,584 Stoats killed 1931-34 (from Flintoff, 1933, 1935 & 1936).

American Mink *Neovison vison*

This versatile riparian predator which feeds on a wide range of waterside and aquatic vertebrate and crustacean prey was first imported into Britain from Canada and Alaska in 1929 to be farmed for fur. Yalden (1999) ascribes the origins of this commercial episode to surviving military officers returning from the First World War investing their pensions in the new industry of fur farming. The close association between British and Canadian forces for training and joint combat purposes no doubt provided the necessary contacts and inspiration for subsequent peacetime commercial ventures. The industry expanded considerably after the Second World War and by 1962 the number of mink keepers in the UK had peaked at around 700 with 79 established in Yorkshire, at least 7 in and adjacent to the North York Moors region (see Table 4). On January 1 2003, the Fur Farming (Prohibition) Act 2000 (Commencement) Order 2001 came into effect, after which it was illegal to keep animals in England and Wales solely or primarily for slaughter for the value of their fur.

Table 4: Evidence of mink farms in or adjacent to Whitby and the North York Moors region (from Howes 2009).

Locality	Grid ref.	Date	Stock
Eskdale, Sleights	NZ8608	1973	11 ♂ 53
Alma Fur Farm, Pickhill, Thirsk.	SE3483	1973	60 ♂ 240
Bondgate, Helmsley.	SE6183	pre-1970	4 ♂ 15
Pottergate, Helmsley	SE6183	1960	
Wood Cottage, Brompton-by-Sawdon.	SE9482	pre-1968	50 breeding Mink
Hilton Mink Farm, Hilton.	NZ4611	1960	c.250 ♂ 960 in 1962
Yarm	NZ41	1960	

Land-owners and estate workers were generally oblivious to the presence of American Mink on their land, even in riparian situations, but following awareness training provided by ADAS staff and experimental trapping sessions associated with the newly launched MAFF bounty scheme, American Mink were regularly encountered and reported. This trapping-based eradication scheme was instigated in 1965 but abandoned in 1970, when it was accepted that Mink were too well established and widely distributed for eradication by this means. Riparian landowners and occupiers have been encouraged since 1970 to undertake trapping where necessary to protect vulnerable stock (poultry, ornamental wildfowl and fish). The first records on river systems in the Whitby region, though not necessarily of established populations, were from the Esk catchment where their spread was rapid. First noticed in Westerdale in 1965, individuals had reached Ruswarp, in excess of 16 miles downstream, by 1967. They were in the Rye catchment at least by 1967 and the Upper Derwent catchment by 1968. Recently they have been photographed successfully hunting fish in coastal rock pools at Whitby and Saltwick Nab. It is likely that in future they will meet with intra-guild competition from re-colonising Otter populations across the region.

Wildcat *Felis silvestris*

A rock shelter site identified as “possibly ... a wildcat den” at Pifflehead Wood in Newtondale was excavated by Simms (1972) and contained the bones of a small Beaver *Castor fiber* amongst other prey remains. The earliest positively-dated Wildcat evidence is a single bone from an early Iron Age village site dated 2,500-2,400 b.p. on Castle Hill, Scarborough (Rutter, 1956). What is regarded as the last record of Wildcat in Yorkshire was one trapped by Mr John Harrison on his farm at Murton near Hawnby one winter around 1840 (Howes, 2002a).

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Roe Deer *Capreolus capreolus*

Evidence from a range of Yorkshire cave and fissure sites shows that Roe Deer formed part of the early post-glacial (Flandrian) fauna of the North Yorkshire region, indeed at the Mesolithic hunting camp at Star Carr in the eastern Vale of Pickering, dated at 9,500 years b.p., Roe Deer were the second most frequent quarry, being outnumbered only by Red Deer. Roe Deer were evidently common in the medieval landscape. They were hunted, or harvested, in the Forest of Pickering, where £5 was paid for cord to make nets to catch Roe Deer in 1322 (Mitchell, 1985). Roe venison featured in the banquet at the archiepiscopal palace at Cawood to celebrate the enthronement of George Neville as Archbishop of York and Chancellor of England in 1466 (Clarke & Roebuck, 1881).

After an absence of documentary records or, indeed, evidence of any description for about four centuries, Roe Deer again appeared in the North Yorkshire region in the 20th century. The formation of the Forestry Commission in 1919 quickly gave rise to the establishment of extensive areas of softwood plantations, largely in the North York Moors/Cleveland uplands and mainly in the region of what is now the North York Moors National Park. By the 1930s these early forest blocks were reaching the 'thicket' stage of development, a habitat stage known to be highly attractive to Roe Deer colonisation. The first modern encounters with Roe Deer took place in the Dalby Forest in 1936 and populations were present throughout the Forestry Commission and Duchy of Lancaster Forests in the north-east Yorkshire/Cleveland uplands within a decade (Simpson, 1969).

Whether these deer originated from an un-noticed residual north-east Yorkshire population or had moved down from the Durham/Northumbrian region is difficult to establish. However, the North Yorkshire population expanded markedly during the 1940s, 50s and 60s, with visitors to the National Park routinely enjoying encounters with groups of deer crossing rides or public highways. Sadly, the combination of an increased deer population and a greatly increased volume of traffic movements has given rise to road traffic accidents at a rate of over 100 per year in the North York Moors/Cleveland region (Gordon Simpson, pers. comm.).

Red Deer *Cervus elaphus*

Red Deer were a prime quarry in the Forest of Pickering. Incidents of poaching regularly featured in the Forest Assize records of the 14th century, Rimington (1956) noting that seven men were caught taking a stag at Ellerbeck with bows, arrows and greyhounds in 1307. An enquiry into the state of the forest in 1503 claimed that 200-300 Red Deer were present. The examiners and eight helpers then entered the woods and within two hours encountered 140-160 animals. Another survey of the mid-16th century showed evidence of 263 Red Deer

including 54 stags. By 1608 the number appears to have fallen to 15 or 16 stags and a survey of 1619-21 records that there were few Red Deer left, confined to Newtondale and woodland at Hackness (Rimington, *l.c.*).

Following the escape of the 350-strong herd from Duncombe Park at Helmsley during the Second World War, sightings were reported widely throughout the Hambleton and Cleveland Hills and in the Forestry Commission plantations north of the Vale of Pickering. Two stags were seen in the Dalby Forest in 1946, Red Deer were present in the Wass Woods area in 1947 and there were reports from woods between Ampleforth and Rievaulx in 1951 and from the Helmsley area in 1953. A feral population had become established in the conifer forests north of Allerston, where breeding was proved in 1950, and in 1969 Red Deer were present along the Hambleton escarpment (Howes, 1984).

Table 5: Deer Parks which may have provided the basis of past or present populations of feral deer in the Whitby, Cleveland and North York Moors region (from Howes 1984)

DEER PARK	Earliest date traced	Historical maps and deer species reported
Blansby Park	fl.1547	Saxton's map 1577; Speed's map 1610; Shirley (1867) Fallow
Crayke Park	fl.1530s	Leland 1530s-40s; Shirley (1867) Fallow
Duncombe Park	fl.1517	Saxton's map 1577; Speed's map 1610; Shirley (1867) 600 Fallow in 1717; Whitaker (1892) 320 Fallow, 300 Red; Victoria County History (1912) 350 Fallow, 350 Red; Whitehead (1950) Fallow
Gilling Park	Emparked 1374	Shirley (1867) Fallow
Helmsley Park	fl.1577	Saxton's map 1577; Speed's map 1610; Shirley (1867) Fallow
Kirkbymoorside Park	fl.1577	Saxton's map 1577; Speed's map 1610; Shirley (1867) Fallow
Mulgrave Park	fl.1577	Saxton's map 1577; Speed's map 1610; Shirley (1867) Fallow; Whitaker (1892) 30 Fallow; Victoria County History (1912) 30 Fallow
Newborough Park	Emparked 1382	Shirley (1867) Fallow +
Scampston Park	fl.1892	Whitaker (1892) 100 Fallow; Whitehead (1950) Fallow
Sinnington Park	fl.1577	Saxton's map 1577; Speed's map 1610; Shirley (1867) Fallow
Thornton Park	fl.1577	Saxton's map 1577; Speed's map 1610
Whorlton Park	fl.1577	Saxton's map 1577; Speed's map 1610; Shirley (1867) Fallow
Key	fl.	Flourishing = deer park in operation
		+ Park extant at time of writing (Shirley 1867)

Chinese Muntjac *Muntiacus reevesi*

Introduced into the animal collections at Woburn Abbey, Bedfordshire, around 1900, specimens escaped into the adjacent countryside and established a feral population during the 1920s. It expanded its range naturally to adjacent counties, arriving in Derbyshire by the 1970s and South Yorkshire by 1992. Its early occurrences in the Yorkshire region were reported simultaneously from widely discontinuous sites from the Doncaster, Rotherham, Wetherby, Calverley and

Bingley regions, raising suspicions that these easily trapped deer were being caught and translocated by shooting interests to woodland shoots around the county (Howes, 1993). In north-east Yorkshire it was first noticed in the Middlesbrough area in 1999 and Bond (*l.c.*) reported sightings from Errington Wood in 2008 and Wiley Cat Wood in 2011.

Fallow Deer *Dama dama*

Table 5 shows that Fallow Deer were kept in all 12 of the local deer parks with up to 600 present at Duncombe Park in 1717 (Shirley, 1867). The Duncombe Park herd escaped into the adjacent woodlands and new Forestry Commission plantations during the Second World War. They were recorded at large in Dalby Forest through the mid-1940s, small numbers were present in Wass Wood In 1947, some were in the Kirkbymoorside district in 1951 and in the vicinity of the old park at Helmsley in 1953. A small herd was seen near Rievaulx and colonisation of Allerston Forest was confirmed in 1956 and Fallow Deer were being observed in the Goathland district by the early 1960s (Howes, 1984).

These historical notes and bibliography covering the terrestrial mammals of the Whitby area will form a basis for future mammal studies within this diverse and fascinating region.

Acknowledgements

I would like to dedicate this review to the late Ian Thackrah, Mammal Recorder 1994-2004, and to all the mammal recorders of the Whitby Naturalists' Club past and present.

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Discovering the palaeontology of the Whitby coast

Dean R. Lomax

Whitby is a name familiar to most fossil collectors in Britain and Europe and specimens from Whitby feature in museum (and private) collections around the world. This part of the Yorkshire coast is often labelled the 'Dinosaur Coast', an illustrious section of coastline which has produced some spectacular fossil finds over many years. Strictly speaking, Whitby is just one location within the 'Dinosaur Coast' but is often portrayed as the only fossil-bearing locality. Thus, many eager fossil hunters collect at this one location. However, the Whitby coast consists of about 10 primary fossil-bearing localities stretching from Staithes in the north to Ravenscar in the south, each yielding a variety of fossils from the geological beds and their subdivisions. The localities also offer some of the most beautiful scenery in Yorkshire (Plate I, centre pages).

Rocks around Whitby are roughly between 170 and 200 million years old, dating to the Jurassic Period which is one of three geological periods that make up the Mesozoic Era, a stretch of time informally termed 'the age of reptiles'. The majority of rocks belong to the Lower Jurassic (Lias) and consist of mudstones, shales, sandstones and ironstones. Arguably, the fossils collected from the Lower Jurassic along the Whitby coast are amongst the best – and most well preserved – from the British Isles, rivalling those from the Dorset coastline. Dinosaur footprints are also found in the slightly younger Middle Jurassic formations and deposits.

Many fossils, including internationally important specimens, have been found along the Whitby coast. The first recording of a fossil (a crocodilian) collected for science dates to the 1700s but many of the large and most complete discoveries were made during the quarrying for alum, which was a large, booming industry in the area during the 1800s. Some of the internationally important remains include Type specimens (the first to be described). These, and many others, have been (and are still being) described by palaeontologists in scientific journals around the world.

One quite marvellous find was reported as far back as 1888. The almost complete skull and braincase of a pterosaur (flying reptiles, informally and wrongly called 'flying dinosaurs') was collected from the Upper Lias at Loftus (previously called Lofthouse), one of the inland quarries near Whitby. This skull was significant as it represented the first pterosaur collected from Yorkshire and was the only specimen of a pterosaur from the Yorkshire coast until recently. Pterosaurs were already recorded from Germany and several had been collected at Lyme Regis by the famous fossil hunter Mary Anning. The Whitby pterosaur was eventually described as a new species, *Parapsicephalus purdoni*. However, with only a skull and lacking other bones, some palaeontologists suggest that the specimen represents a dubious pterosaur taxon, a *nomen dubium*. Nevertheless, it is still regarded as one of the best skulls of its type of an Early Jurassic pterosaur. A rather fragmentary skeleton of a pterosaur was found at Saltwick Bay, south of Whitby, on October 18 2011, by fossil collector David Grocock. The specimen comprised portions of the pectoral girdle and a left humerus. It has been tentatively assigned to *P. purdoni* pending further discoveries of more complete remains.

A great variety of fossils has been discovered along this coastline. Ferocious marine reptiles such as ichthyosaurs, plesiosaurs and primitive crocodilians once ruled the seas and their many remains, now held in museums such as Whitby Museum, form important historic collections. As well as these super predators, a huge range of invertebrate life has been recorded, including cephalopod molluscs such as the famed ammonites and belemnites (Plate I, centre pages). They are amongst some of the most commonly found fossils. In addition, a whole host of other material has been recorded including crustaceans (lobsters and crabs), elegant echinoderms (such as brittle stars and echinoids) and fabulously preserved fish (including sharks!). Terrestrial remains are also plentiful and have been well documented. They include an abundance of plants, representing numerous species, and even dinosaur footprints, all of which are almost exclusively collected from the sandstones. The dinosaur tracks have been found in large variety and in huge number, including individual trackways, and have been identified as belonging to sauropod, theropod and ornithopod dinosaurs. However, one type of footprint was attributed to a stegosaur, making it one of the oldest occurrences of this group in the world.

The Whitby coast is a prime location for a fossil hunter; it is great for beginners as well as those with a thorough interest in the subject. With such a diversity of fossils discovered along this coastline, it helps portray a vivid picture of the ecosystems millions of years ago around the area we now call Whitby.

Today, spectacular finds are few and far between, though each year the coastline yields some very exciting discoveries. Recent ones have included the aforementioned fragmentary pterosaur, several partly complete ichthyosaurs and new species of gastropod molluscs. Sadly, reduced scientific attention towards the Whitby fossils has resulted in many specimens becoming somewhat neglected, scientifically speaking. Much of the taxonomic work is outdated and in need of a thorough review, something that is hopefully going to change. Who knows, a whole bunch of new species is probably waiting to be discovered, out in the field and in museum collections!

Further reading

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Robert Wynne Owen (1924-1985) and his parasitological collections at Leeds: 2. Parasites of amphibians, reptiles, birds and mammals with particular reference to Yorkshire

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A biography of Robert Wynne Owen was provided in a previous paper (Baker *et al.*, 2013) which included details of his collection of spirit specimens of fish parasites and his parasitological microscope slides. The present paper deals with the spirit specimens of parasites found in and on amphibians, reptiles, birds and mammals. This collection is housed in the Museum of the History of Science, Technology and Medicine, School of Philosophy, Religion and History of Science, University of Leeds. The parasite collection now being considered is less well documented than the fish parasite collection (Baker *et al.*, 2013) in terms of host identification and location as well as the taxonomy of the parasites themselves. Wynne Owen was primarily an expert on the parasites of fish so this is to be expected.

Comments on the collection

There are 238 tubes overall (some of which are numbered) containing material from the following phyla of parasites: Acanthocephala, Arthropoda, Nematoda and Platyhelminthes; 79 of the tubes have information on locality and 195 contain information on the host. The collecting period in the main is from the 1940s (when Wynne was at Aberystwyth) to the 1980s, though some material has been incorporated from other sources dating back to the 1910s and 1920s. Some was clearly intended for class use at the University of Leeds and is so labelled, such as *Nippostrongylus brasiliensis* (May 1974) from the laboratory rat and *Gorgoderina* from the Common Frog *Rana temporaria*.

Although most specimens are from the United Kingdom there is a small amount of material from abroad, including West Africa, Kenya, Dutch Guinea, Belgium, USA and Rangoon. This includes *Dinobothrium planum* from the spiral valve of the Basking Shark from Monterey Bay, California, Cat Fleas *Ctenocephalides felis* from Rangoon and ticks from Kenya.

There are seven tubes from the collection of a R.S.B. Brown. These are all parasites of fish (Grey Gurnard, Flounder and Turbot). No locations are given and they were not included in Wynne's fish parasite collection as they were neither collected by him nor by one of his students. There is also a small amount of other fish parasite material in the collection, including:

- ☐² *Lacistorhynchus tenuis* from Garfish *Belone belone*
- ☐² *Cernaeoceia lucei* from Pouting *Trisopterus luscus*
- ☐² *Bomolochus soleae* from Cod *Gadus morhua*
- ☐² *Lepeophtheirus pectoralis* and *Acanthochondria* sp. from Flounder *Platichthys flesus*
- ☐² *Caligus diaphanus* from Grey Gurnard *Eutrigla gurnadus*
- ☐² *Lepeophtheirus thompsoni* from Turbot *Psetta maxima*
- ☐² *Dinobothrium planum* and *Anthosoma crassum* from Basking Shark *Cetorhinus maximus*.

Other hosts include amphibians, reptiles, birds and mammals, together with a small number of invertebrates. Most of the collection comprises endoparasites but does include some ectoparasitic arthropods.

Amphibian and reptilian hosts are not particularly well represented. Amongst the amphibians are a number of parasites from the Common Frog, including an acanthocephalan, trematodes, nematodes and cestodes from different parts of the body. There are both strongylid and oxyurid nematodes from the Common Toad *Bufo bufo* and other nematodes from the African Clawed Toad *Xenopus laevis*. Among the reptiles are nematodes and trematodes from the Grass Snake *Natrix natrix* and an oxyurid nematode from the Spur-thighed Tortoise *Testudo graeca*. There are cestodes, trematodes and nematodes from Rainbow Lizards *Agama agama* from W. Africa.

Birds are very well represented. Parasites include trichiurid nematodes from a variety of ducks (domestic, Muscovy *Cairina moschata*, Scaup *Aythya marila*) and domestic goose. There are *Capillaria* sp. from the Fieldfare *Turdus pilaris* and strongylid nematodes from the Turkey *Meleagris gallopavo*, an acanthocephalan from Teal *Anas crecca*, a variety of nematodes from domestic fowl *Gallus gallus domesticus*, tetrabothrid cestodes from Fulmar *Fulmarus glacialis*, various nematodes and trematodes from gulls (Herring *Larus argentatus* and Lesser Black-backed *Larus fuscus*), a cestode from Jay *Garrulus glandarius*, nematodes from Tawny Owl *Strix aluco* and Wheatear *Oenanthe oenanthe*, cestodes from Oystercatcher *Haematopus ostralegus*, cestodes and nematodes from Rook *Corvus frugilegus*, thrush, Starling *Sturnus vulgaris* and Woodcock *Scolopax rusticola*. There are also ticks from Sand Martin *Riparia riparia* and mites from a pigeon roost.

Most of the material is from mammalian hosts, mostly domestic animals including nematodes from domestic cat *Felis catus*, *Toxoscaris leonina* from domestic dog *Canis lupus familiaris*, cestodes and nematodes from domestic cattle *Bos primigenius*, domestic sheep *Ovis aries* and Rabbit *Oryctolagus cuniculus*, a strongylid nematode from domestic pig *Sus domestica*, cestodes and strongylid nematodes from domestic horse *Equus ferus* and laboratory rat, an oxyurid nematode and a digenean trematode from a laboratory mouse, nematodes from hamster (Cricetinae), Fox *Vulpes vulpes*, Weasel *Mustela nivalis* and a wallaby, a trematode from a Porpoise *Phocoena phocoena*, nematodes and an acanthocephalan from a seal (probably Grey Seal *Halichoerus grypus*) and a cestode from a whale. There is also a pentastomid from a Rabbit, fleas from a cat and ticks from a sheep.

There are parasitic worms from a range of host body regions including the bladder, brain, bronchial system, digestive system, gall bladder, kidney, liver, vascular system and from the abdominal cavity. In the digestive system of mammals there are examples of parasites from the oesophagus, stomach, duodenum, small and lower intestine, colon, rectum and, in birds, the proventriculus and gizzard. In the respiratory system there are parasites from the trachea, bronchi and bronchioles.

Aberystwyth

All the material from Wynne's time in Aberystwyth (1940s to 1952) was from birds or mammals (Table 1). There are 13 tubes of specimens from this period that contain information on the locality from which the hosts were obtained; some specimens were from laboratory animals.

Table 1. Parasites of birds and mammals from Aberystwyth.

	Parasite	Host	Host site
Nematoda			
	<i>Ascaridia galli</i>	Domestic fowl <i>Gallus gallus domesticus</i>	Intestine, small
	<i>Capillaria aerophila</i>	Fox (vixen) <i>Vulpes vulpes</i>	Bronchii
	<i>Haemonchus contortus</i>	Lamb (experimental) <i>Ovis aries</i>	Stomach-4th
	<i>Heterakis gallinae</i>	Domestic fowl	Caeca
	<i>Tetrameres fissispina</i>	Domestic ducks <i>Anas/Cairina</i>	Proventriculus
	* <i>Trichonema</i>	Horse <i>Equus ferus</i>	Colon
	<i>Toxocara</i>	Fox <i>Vulpes vulpes</i>	Intestine

	Parasite	Host	Host site
Platyhelminthes- Cestoda			
	<i>Cysticercus bovis</i>	Cow <i>Bos primigenius</i>	Heart
	<i>Echinococcus granulosus</i> (hydatid worm)	Man <i>Homo sapiens</i>	Liver
	<i>Paranoplocephala mamillana</i>	Horse <i>Equus ferus</i>	Duodenum
	<i>Taenia taeniaeformis</i>	Rat (wild) <i>Rattus</i>	Liver

* = probable species.

Yorkshire

The Yorkshire collections are derived from the time Wynne was at Leeds University (1952-1985) and were made between 1955 and 1984. There are 40 tubes containing parasites with details of locality including Acanthocephala; Arthropoda (fleas and mites); Crustacea; Nematoda and Platyhelminthes (11 cestodes and 3 trematodes). There are 14 entries under Robin Hood's Bay and 14 from various places in Leeds, including Hawksworth (Horsforth), Kirkstall, Paul's Pond (Adel/Cookridge) and Rodley. Apart from parasite, host and locality, further details are provided in some cases, such as eggs, sex and/or numbers of the parasite and fixative used.

Some of the samples indicate that material has been sent to him for identification, for example parasites from the frontal sinuses of a Weasel from York identified as *Skrjabinogylus nasicola*, where details are given of the number of male and female parasites from the left and right sinuses (totals left 8 males and 14 females, right 5 males and 11 females). Where there is complete or almost complete information, this is summarized in Table 2.

Table 2. Parasites collected from a variety of hosts in Yorkshire.

	Parasite	Host	Host site	Location
Acanthocephala				
	<i>spiny-headed worm</i>	Starling <i>Sturnus vulgaris</i>		Rodley, Leeds
Arthropoda/Arachnida				
	mites	Pigeon roost * <i>Columba livia domestica</i>		Leeds

Parasite	Host	Host site	Location
Arthropoda/Crustacea			
<i>Athelges paguri</i>			Robin Hood's Bay
<i>Athelges</i>	Hermit Crab <i>*Pagurus bernhardus</i>	Abdomen	Robin Hood's Bay
<i>Bomolochus soleae</i>	Cod <i>Gadus morhua</i>	Nostrils	Robin Hood's Bay
copepod eggs (monstrillid)	Dog whelk <i>Thais lapillus</i>		Robin Hood's Bay
<i>Lernaeocera branchialis</i>			Robin Hood's Bay
Nematoda			
<i>Ascaridia galli</i>	Domestic fowl <i>Gallus g. domesticus</i>		Leeds
<i>*Aspicularis tetraptera</i>	Mouse (lab) <i>Mus</i>	Caecum	Leeds
<i>Capillaria</i>	Rook <i>Corvus frugilegus</i>	Intestine	Bingley
nematode	Hermit Crab	Abdomen	Robin Hood's Bay
nematode	Starling <i>Sturnus vulgaris</i>	Oesophagus	Rodley, Leeds
<i>Oswaldocruzia</i>	Toad, Common <i>Bufo bufo</i>	Intestine	Paul's Pond, Leeds
<i>oxyurid</i>	Toad, Common	Intestine	Paul's Pond, Leeds
<i>Skrjabingylus nasicola</i>	Weasel <i>Mustela nivalis</i>	Sinuses-frontal	York
<i>Strongylus sp.</i>	Horse <i>Equus ferus</i>		Keighley
<i>Tetrameres</i>	Gull, Lesser Blackbacked <i>Larus fuscus</i>		Robin Hood's Bay
<i>Toxascaris leonina</i>	Cat <i>Felis catus</i>		Leeds
<i>Toxascaris leonina</i>	Dog <i>Canis lupus familiaris</i>	Intestine	York
Platyhelminthes - Cestoda			
cestode	Starling		Rodley, Leeds
cestode	Sheep <i>Ovis aries</i>		Leeds
<i>Dilepis</i>	Rook <i>Corvus frugilegus</i>		Hawthorn, Leeds
<i>Dilepis undula</i>	Thrush <i>Turdus sp.</i>		East Keswick
<i>*Hymenolepis serpentulus</i>	Jay <i>Garrulus glandarius</i>	Intestine	Harewood, nr Leeds
<i>Tetrabothrius</i>	Fulmar <i>Fulmarus glacialis</i>	Intestine	Robin Hood's Bay
Platyhelminthes - Trematoda			
<i>Gasterostomum lophius</i>			Whitby
<i>Plagiorchis elegans</i>	Snail, Great Pond <i>Lymnea stagnalis</i>		Kirstall, Leeds
<i>Parorchis</i>	Gull, Herring <i>Larus argentatus</i>	Rectum	Robin Hood's Bay
rediae (larvae)	Limpet <i>Patella vulgata</i>		Robin Hood's Bay

*= probable species.

Four of the 40 tubes have limited information and hence are not included in the table. One contains an unidentified parasite from the gonad of a China Limpet *Patella aspersa* from Filey;

another contains a possible specimen of the hen flea *Echidnophaga gallinacea* from an unidentified host from Weetwood, Leeds. There is a tube containing a parasite from a pond in Farnley, Leeds, labelled FN11, and another which contains psocids (bark lice, which are not parasitic) from Middlesborough. As can be seen from Table 2 there are some parasites from molluscan and mammalian hosts but a notable feature of the Yorkshire collection is the numbers and species of bird hosts.

The collection can be seen by contacting the Director of the Museum of the History of Science, Technology and Medicine at the University of Leeds (Dr Claire L. Jones - c.l.jones@leeds.ac.uk), from whom a copy of the database is also available.

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Reference

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Notes on the distribution and habitat associations of dolichopodid flies in Yorkshire

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With about 7,000 species world-wide¹, the Dolichopodidae is a species-rich family of Diptera. There are currently 300 British species², of which 238 have been recorded in Yorkshire³. British dolichopodids range in size from 1.5mm to 7.0mm and many of them are metallic-green with slightly laterally-flattened abdomens. Most are thought to be predatory at all stages of life and there is often an affinity with wetland habitats.

There is a long history of collecting and recording dolichopodids in Yorkshire with a few records going back to the latter part of the 19th century, but interest in the family began in earnest with the legendary W.J. Fordham and C.A. Cheetham in the 1920s. Since those days many

¹ See *Flies: the natural history and diversity of diptera* by Stephen A. Marshall. Firefly Books Ltd, 2012. The most recent (and comprehensive) review of the Order world-wide. Copiously illustrated.

² Numbers and nomenclature follow Chandler, P.J. (1998 with up-dates). Checklists of Insects of the British Isles (New Series), Part 1: Diptera. *Handbk Ident. Br. Insects* 12 (1): 1-234

³ Information per A. Grayson (in prep.) *A Provisional List of Yorkshire Diptera*; also YNU dolichopodid record cards held by the author.

entomologists have contributed records and there has been a considerable growth in interest since the early 1980s.

Sufficient records have been amassed over the years for some patterns of distribution to be identified, usually without any obvious cause. The 'widespread and common' species include, for example, *Dolichopus plumipes*, *D. trivialis*, *D. unguatus*, *Campsicnemus curvipes*, *Sympycnus desoutteri* and *Syntormon pallipes*, all of which seem to occur wherever flies are sought. However, the majority have a much more restricted distribution. For example, 71 Yorkshire dolichopodids (c.33%) have been recorded from fewer than five localities in the county, and 22 of these (c.10% of the total fauna) are known from only one locality – and often from a single specimen. An example of the latter is the Red Data species *Dolichopus lineatocornis*⁴ which is known in Yorkshire from a single male found at North Duffield Carrs in 2007. Repeated attempts to re-locate the fly here and in similar habitats in the general vicinity have proved unsuccessful.

What appear to be clear geographical distribution patterns in the county can be seen in some species. For example, *Dolichopus campestris*, *D. festivus* and *D. latelimbatus* have a predominantly eastern distribution whereas *D. longitarsis* and *D. urbanus* are predominantly northern, as is *Rhaphium albomaculatum*. Such observations must, of course, always be treated with caution when applied to any group of animals which are studied by a mere handful of naturalists! The old adage that 'a good place for insects is where an entomologist has lived' still applies; collector bias is also an ever present possibility.

Some dolichopodids demonstrate clear habitat associations which are determined by their life histories. Good examples are the two Yorkshire species of *Aphrosylus* - *A. celtiber* and *A. ferox*. Adults of the former, which are c.4mm long, are found running around on barnacle-covered rocks in the inter-tidal zone. It is known that the larvae of an un-named *Aphrosylus* species parasitise limpets and barnacles (Parent, 1938, p.332) and circumstantial evidence suggests that this may be the case with *A. celtiber*. I have swept *A. ferox* in quantity from rotting seaweed on the beach at Dane's Dyke, which suggests that this much smaller fly may breed in such an environment. Both have been recorded from Spurn and Cayton Bay and *A. celtiber* also occurs at Reighton Sands. Other Yorkshire coastal localities for *A. ferox* are Sandsend and Hayburn Wyke.

There is a suite of dolichopodid flies associated with coastal salt-marshes and these have been described in some detail in earlier notes (Crossley, 1996; 2007). Two, which are regularly found on the south bank of the Humber as far north as Tetney, North Lincolnshire, have still not been recorded on the Yorkshire side of the estuary. These are *Muscidideicus praetextatus* and *Dolichopus notatus*, both of which are Nationally Notable. Some typical salt-marsh species occur well inland in the linear expanses of saline and brackish habitats which border the shore of the Upper Humber. In recent years representatives of this community have been found upstream from North Ferriby, including *Dolichopus diadema*, *Hydrophorus oceanus*, *Machaerium maritimae* and *Campsicnemus armatus*. *H.oceanus* is the most abundant and widespread of salt-marsh dolichopodids and, as mentioned in an earlier note (Crossley, 2007), can be found as far

⁴ National statuses follow Falk, S.J. and Crossley, R. (2005) *A Review of the Scarce and Threatened Flies of Great Britain, Part 3: Empidoidea*. Species Status No.3, Joint Nature Conservation Committee. Peterborough

as the outer parts of the Glasswort *Salicornia* zone which are subject to twice-daily flooding. The flies sometimes occur in huge numbers on the soft mud and can be seen skating on the still waters of the gutters at low tide. The practice of 'mate guarding' has been described in this species (Dyte, 1988); after copulating the small males often ride 'piggy-back' on the larger females, remaining thus for long periods, and the females can be seen making short flights carrying the attendant males. Presumably this habit ensures that no other male can mate with the female. Couples will often remain paired in this way after being placed in a specimen tube.

Another habitat which supports a distinctive dolichopodid fauna is wet, or at least moist, peat. Moorland peat bogs in the Pennines and the North York Moors support a number of dolichopodids which are generally thought of as being 'upland', and the pattern of their distribution is mainly western and northern in the county. Examples are *Dolichopus atripes*, *D. rupestris*, *Hydrophorus nebulosus*, *Rhaphium longicorne* and *Campsicnemus alpinus*. However, some of these species also occur at lowland peat sites such as are found at Askham Bog, Skipwith and Strensall Commons and Thorne and Hatfield Moors. *D. atripes*, *D. rupestris*, *H. nebulosus* and *C. alpinus* fall into this category, so in some cases it seems as if it is habitat and not altitude which determines distribution. In addition, there is the Nationally Notable *Gymnopternus angustifrons*, which is associated exclusively with lowland peat and whose distribution in Yorkshire stretches from Askham Bog and Strensall Common in the north to Thorne Moors in the south. A recent 'peat-associated' discovery in the County has been *Dolichopus phaeopus*. Found originally in 1994 in the vicinity of dykes in the peat-based old pastures near the Pocklington Canal at Thornton, it has subsequently been found at several moorland peat bogs on the North York Moors and at two Pennine sites (one of which was, unexpectedly, a river bank).

An intriguing distribution is that of *Sympycnus spiculatus*. To date, all but two Yorkshire records are from calcareous sites in the north-west, typically from places such as Grass Wood, and in the north-east from Duncombe Park and Forge Valley. In my experience the fly appears to be associated with Dog's Mercury *Mercurialis perennis*.

A habitat association of a different kind is that of *Dolichopus migrans* (see Plate II, centre pages). Until the late 1990s this Red Data insect was thought to be confined to the dry sandy Breckland of East Anglia with an outlying population at Risby Common in North Lincolnshire. In 1998 specimens were found at what is now the Calley Heath Nature Reserve of the Yorkshire Wildlife Trust, near Barmby Moor. A strong population is established at this sandy site where specimens occur in dry grassland. I have long felt that there are likely to be other suitable places for this species in the general area, and there was a report in 2013 of a single specimen having been found in dry grassland at the site of the medieval village of Towthorpe near Market Weighton, some 13km east of Calley Heath (I. Andrews *pers. comm.*).

The Nationally Notable *Dolichopus cilifemoratus* is at its most numerous in Britain in the vicinity of field dykes throughout the winter-flooded hay meadows of the Lower Derwent Valley. In recent years it has also been found in quantity in the similarly winter-flooded Fulford Ings on the banks of the River Ouse, south of York. In 2008 a single female was found at Rosekirkdale Fen near Troutsdale, a quite atypical habitat on the edge of the North York Moors and well beyond its normal range. A second aberrant record of another singleton was from Decoy Wood at

Escrick in 2001. These types of records, where insects turn up in unexpected places, quite outside their normal range and typical habitat, raise interesting questions. Is it that we don't really understand what is a 'typical' habitat or that the discovery of an isolated, 'stray' specimen is pure chance? Might they have floated down from some wind-drifted cloud of aerial plankton?

How can the presence at recently excavated lowland sand and gravel pits of species such as *Campsicnemus marginatus*, a dolichopodid typically found on the shingle of upland rivers, be explained except as wind drifted? This insect has been recorded over the past twenty years from sand and gravel excavations at Hay-a-Park (Knaresborough), Nosterfield and North Cave Wetlands. Hopefully, a second paper will deal exclusively with the colonization of a Yorkshire gravel pit by this and many other dolichopodids.

Finally, two large and conspicuous dolichopodids are worth comment. *Liancalus virens*, our largest species, measuring up to 7mm, is beautifully metallic and the male has conspicuous tiny white spots at the tips of the wings (see Plate II, centre pages). Although its life history, as with most dolichopodids, is unknown, it is likely to be predatory. This fly is widespread but localized, because it lives on vertical surfaces in the vicinity of running water, such as algal beds bordering waterfalls or lesser trickles. Thus it can be found on coastal cliffs, in woodland, even on the overflows on canals. Apart from the coastal sites the majority of records come from western and upland localities.

The second example is *Poecilobothrus nobilitatus* (see Plate II, centre pages). This relatively large (6mm) fly is a beautiful metallic green and the male has conspicuously darkened wings with milky-white tips. Males often swarm on the surface of puddles in rutted cart tracks or at the edges of pools, where they indulge in wing-flicking displays as they skate around on the water surface. It is interesting that the first Yorkshire report of this conspicuous fly was as late as 1919. This was from the Bubwith area. The next was in 1936 at Kilnwick Percy and Barmby Moor, and then in 1940 at Wombledon and at Spurn in 1953. It was not until the 1980s that records started to accumulate and even now, although widespread across much of the county, it has not yet been reported from the area west of grid line SE1000. This is such an attractive fly that it is unlikely to have escaped the attention of the early recorders of Yorkshire Diptera, which suggests that it has genuinely spread north and eastwards across the County during the past thirty or forty years.

Acknowledgements

Thanks are due to all those past and present entomologists who generously submit records, and to past YNU Recorders who have maintained them over the years. Without their dedication accounts such as this would not be possible.

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Mapping changes in the distribution of the Dark Green Fritillary in VC64 between 2000 and 2010

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Introduction to the Dark Green Fritillary

The Dark Green Fritillary *Argynnis aglaja* (DGF) is a local, single-brooded, large fritillary butterfly with adults flying from June to the end of August, the exact flight period depending on the weather (for photographs, see front cover and Plate III, centre pages). It is encountered in a variety of biotopes with abundant violets, from the early seral stages of woodland to heathland, moorland and grassland. Its main food plants are Common Dog-violet *Viola riviniana* and Marsh Violet *V. palustris* but Hairy Violet *V. hirta* is also used on calcareous sites. Adults are highly mobile and tend to occur at low densities over large areas in which there are small patches of suitable breeding habitat. On the best sites with a greater concentration of breeding habitat the adults can become more numerous and the colonies occupy more discrete areas (Asher *et al.*, 2001). For more details of its biology and life history see Clough (2005) and Thomas & Lewington (2010).

In the few detailed mark-and-recapture studies the adults were found to move freely within each breeding area but most seemed to stay within their own colonies, moving less than 1km. In a very few cases the butterfly was observed to have moved up to 5km from known breeding areas (Warren, 1994, Whitaker 2006). Discrepancies in observed adult sex ratios may indicate that a proportion of freshly emerged females emigrate (unpublished data from Whitaker, 2006).

The past status of the butterfly

Populations of the Dark Green Fritillary have fluctuated during the past century but its distributions and populations have mainly declined. It was quite well-distributed in Yorkshire until the 1850s but probably mainly in the uplands. Set against the long-term distribution decline, population levels of the Dark Green Fritillary have increased since the 1970s (Fox *et al.*, 2006). Records in the decades prior to 2000 have mainly come from the North York Moors National Park (NYMNP) and the Yorkshire Dales National Park (YDNP), near to the only sites where it was known as resident. Records from outside the National Parks included a scatter of reports and unconfirmed sightings of large fritillaries in the eastern Pennines in west central Yorkshire, where the butterfly has had a long history of solitary records and occasional colonisation (Clough, 2005; Whitaker, 2004). Between 1995 and 2002 the DGF was only recorded from 14 Yorkshire 10km squares (Whitaker, 2004). Since 2000 many more records have been submitted to Butterfly Conservation (Yorkshire Branch) and much more has been discovered about its behaviour and distribution in the west of Yorkshire (Clough, 2005; Whitaker, 2006, 2007).

Observations of Dark Green Fritillary

The location information from the records described above was entered into MapMate software in order to follow the distribution change of the butterfly. The resulting maps are shown below.

Table 1. Relationship between the number of VC64 tetrads recorded and the tetrads where Dark Green Fritillary was reported.

Year	Recorded VC64 tetrads	Tetrads with DGF	Tetrads with DGF as % of tetrads recorded in that year	Tetrads with DGF as % of all tetrads recorded 2000-10
2000	227	2	0.88	0.21
2001	118	2	1.69	0.21
2002	336	3	0.89	0.32
2003	445	10	2.25	1.07
2004	471	19	4.03	2.03
2005	375	19	5.07	2.03
2006	361	29	8.03	3.10
2007	336	36	10.72	3.85
2008	266	35	13.16	3.74
2009	343	29	8.45	3.10
2010	329	40	12.16	4.28

Notes:

- ❑ In the period up to 2004 there was a slight tendency for more observer effort in recording more tetrads to result in more DGF sites being recorded.
- ❑ After 2004 more observer effort resulted in proportionally less DGF sites being reported. Plotting a linear regression of these two variables over the period 2000 to 2010 the graph (Fig. 1) below is obtained. Between 2000 and 2004 a slightly positive linear regression accounts for 67% of the variance but afterwards, between 2005 and 2010, 39% of the variance is explained by an inverse linear relationship. Overall less than 0.07% of the variance is explained by this simple relationship.

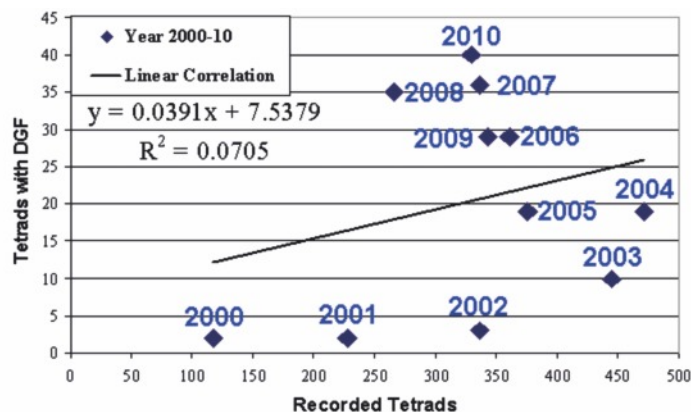


Figure 1. Correlation between tetrads with DGF and total recorded tetrads, 2000-2010.

Conclusions supported by Figure 1 are that the observed increase in tetrads where DGF was reported is NOT related to observer effort. This is related to a true population and range expansion of the butterfly, which started in 2003-2004. Regarding the progression of population and range expansion, in most years there are some records of solitary DGF. These vagrants appear to represent the capacity for colonisation by the butterfly and are more numerous in the

warmer summers. (Figs. 2 & 3).

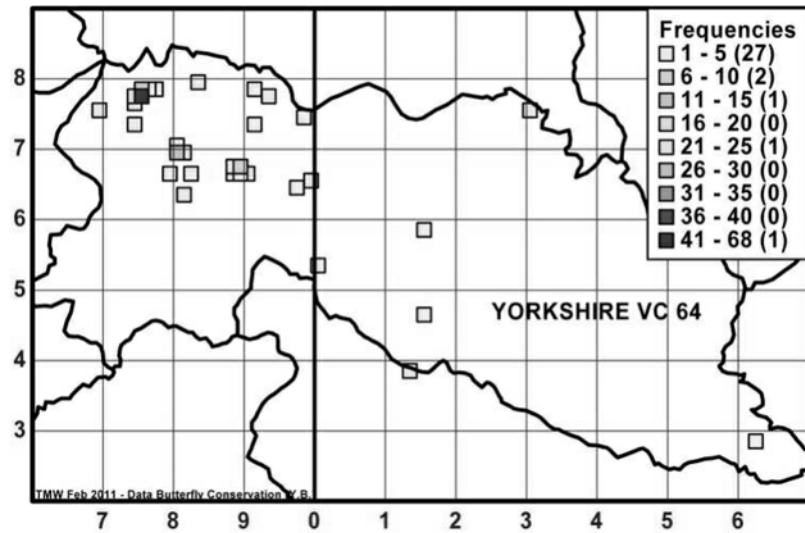


Figure 2. Recorded frequencies of Dark Green Fritillary 2000-2004

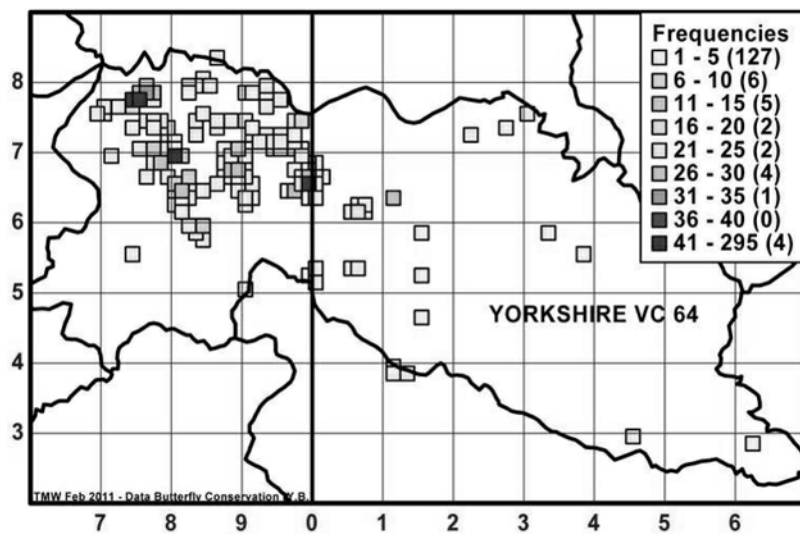
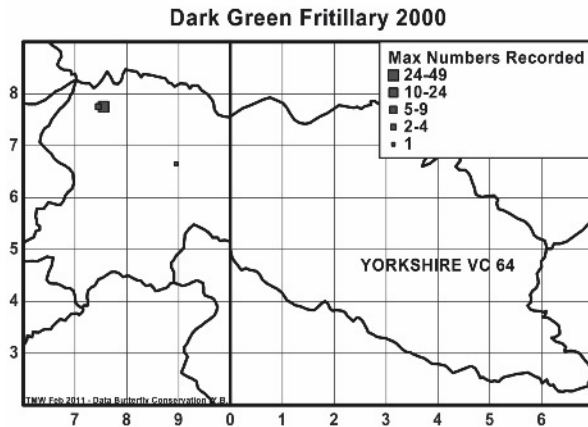


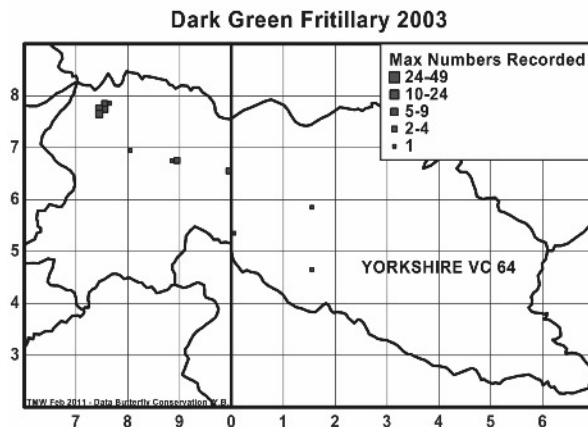
Figure 3. Recorded frequencies of Dark Green Fritillary 2000-2010

The figures below show the expansion of the butterfly in the years 2000-2010:



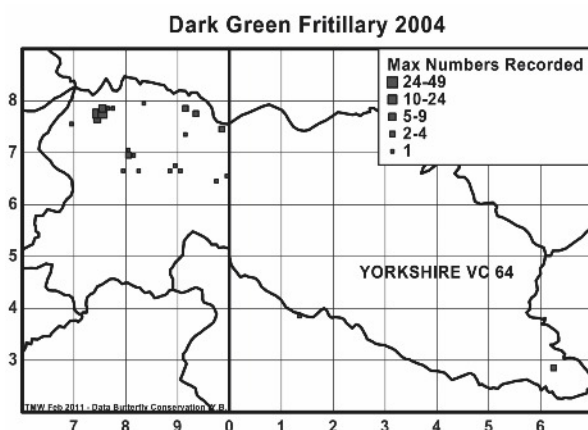
Years 2000 to 2002

Foot and mouth disease epidemic in VC64 in 2001-2002. Subsequently grazing intensity reduced over much of the south-eastern dales. The butterfly was only regularly recorded from one location (Scar Close NNR).



Year 2003

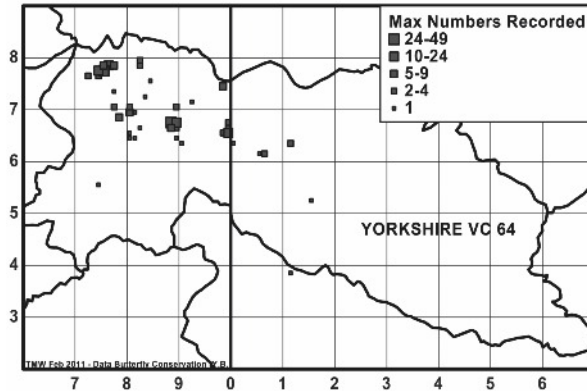
Recorded mainly from Scar Close NNR and nearby Ribbleshead but a scatter of records from Swarth Moor SSSI, Malham Tarn and Grass and Bastow Woods. Is this the start of a south-easterly spread from Scar Close NNR?



Years 2004 to 2005

A scatter of records in new locations adjacent to Swarth Moor SSSI, Malham Tarn and Grass and Bastow Woods. Sightings near Settle (Giggleswick Scar). A significant number of records from Upper Wharfedale and Langstrothdale; from Kettlewell to Greenfield Forest. Is this evidence of an easterly spread from Scar Close NNR and Ribbleshead through Greenfield Forest into Upper Wharfedale?

Dark Green Fritillary 2006



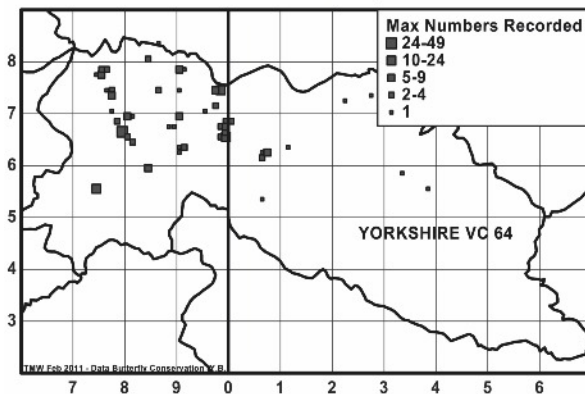
Year 2006

A year with an exceptionally warm and sunny flight period. Records from new locations, further east (Trollers Gill and Duckstreet) and also from Littondale and Gisburn Forest. Larger numbers recorded northwest of Settle (including Swarth Moor SSSI, Wharfe & Oxenber Woods SSSI and Giggleswick Scar), Malham Tarn area and Grass and Bastow Woods. Numbers increase and the population expands.

Year 2007

A year with a wet and changeable flight period. First records from Long Preston Moor. Larger numbers recorded from Upper Wharfedale and Littondale (including Kettlewell, Grassington area and Cowside Beck). Numbers increase and the population expands.

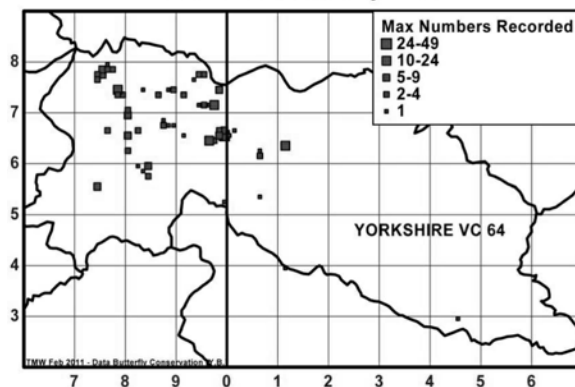
Dark Green Fritillary 2008



Years 2008 and 2009

The flight periods in 2008 and 2009 were poor. Larger numbers recorded from around Ingleborough, Long Preston Moor, Gisburn Forest, Littondale, Upper Wharfedale, Grassington area, Trollers Gill and Duckstreet. Numbers increase and the population expands.

Dark Green Fritillary 2010



Year 2010

Some retrenchment in the east of the vice-county, but a continued increase in the core areas in the west.

Conclusions

The observed increase in tetrads where the fritillary was reported is proven statistically to be unrelated to observer effort. This is a true population and range expansion eastward which started in 2003-2004.

In the ten years 2000-2010 the abundance of the Dark Green Fritillary has changed from less than one percent to over twelve percent of recorded tetrads in VC64. It has spread eastward from a single site (Scar Close NNR) in northwest Yorkshire to become established on at least 12 new sites in the YDNP and Pennine uplands, almost as far east as Pateley Bridge.

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Correction

to Archer (2013) Gains and losses of the *Andrena* and *Panurgus* mining bees (Hym., Andrenidae) in Watsonian Yorkshire – Naturalist 138: 188-191.

Chi-square tests when applied to data of less than 5 (comparison of columns '1900-1949' and '1950-1999 Adjusted' in Table 1) are not reliable for showing a significance difference. Therefore tests applied to *Andrena humilis*, *A. varians*, *A. labialis*, *A. thoracica* and *V. nigriceps* cannot be considered reliable. Nevertheless, for *A. humilis* and *A. nigriceps* the increase in the percentage change is so large that an increase in abundance can be considered.

MEA

Yorkshire Ichneumons: Part 2

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Introduction

Following the publication of Part 1 (Ely, 2013a) there is now a context for reporting additions to the county and each vice-county and I take the opportunity to update the list.

‡ = new county record

* = new vice-county record

Subfamily PIMPLINAE

Tribe *Ephialtini*

Scambus elegans (Woldstedt, 1877)

*VC63: Soughley, Deepcar 29.3.2009 J.Flanagan

Scambus eucosmidarum (Perkins, 1957)

*VC61: Skipwith Common NNR 27.8.2013 R.Crossley.

*VC62: Strensall Common YWT NR 23.8.2013 R.Crossley.

Scambus signatus (Pfeffer, 1913)

*VC65: Nosterfield NR 6.7.2013 W.A.Ely (Ely, 2013b p231).

Zaglyptus multicolor (Gravenhorst, 1829)

*VC62: Flamingo Land 20.9.2013 W.A.Ely.

Clistopyga rufator Holmgren, 1856

*VC61: North Cave Wetlands YWT NR 2-6.8.2013 R.Crossley.

Polysphincta rufipes Gravenhorst, 1829

*VC61: North Cave Wetlands YWT NR 17.7.2013 R.Crossley.

Polysphincta vexator Fitton, Shaw & Gauld, 1988

*VC61: Skipwith Common NNR 27.8.2013 R.Crossley.

Acrodactyla quadrisculpta (Gravenhorst, 1820)

*VC61: East Cottingwith Ings 4.8.2013 R.Crossley.

Tribe *Pimplini*

Itoplectis alternans (Gravenhorst, 1829)

Unconfirmed reports from VC62 by Hincks & Dibb (1940 p175) and Walsh & Rimington (1956 p277) and from VC63 by Morley (1908 p106-7), Carr (1914 p94), Anon (1914 p31) and Coldwell (1999 p61). Recorded from VC61 by Mayhew *et al.* (2009 p18), from VC63 by Ely (1992 p11, 2000 p46) and from VC64 by Hincks & Dibb (1940 p175) and Mayhew *et al.* (2009 p18).

*VC62: Malton Road, York 20.5.1944 J.H.Elliott.

*VC65: Colsterdale 27.6.1981 W.A.Ely.

Itoplectis aterrima Jussila, 1965

Recorded from VC63 by Ely (1992 p11, 2000 p46).

*VC62: Strensall Common 3.7.2012 R.Crossley.

*VC65: Witton Fell 27.5-29.8.1963 [E.Broadhead may have been the collector].

Itoplectis clavicornis (Thomson, 1889)

Unconfirmed report from VC61 by Morley (1908 p109). Recorded from VC63 by Ely (2000 p46).

Itoplectis maculator (Fabricius, 1775)

Unconfirmed reports from VC62 by Roebuck (1877 p39, 1907 p215), Morley (1908 p105) and Walsh & Rimington (1956 p276), from VC63 by Bairstow (1878 p20), Bairstow *et al.* (1882 p108), Roebuck (1907 p215), Morley (1908 p105) and Carr (1914 p94) and from VC64 by Bairstow *et al.* (1882 p108), Roebuck (1907 p215) and Morley (1908 p105). Recorded from VC61 by Hincks (1953 p135) and Mayhew *et al.* (2009 p18), from VC62 by Hincks (1943b p122), from VC63 by Hincks & Dibb (1940 p175), Ely (1992 p11) and Coldwell (1999 p61) and from VC64 by Hincks & Dibb (1940 p175), Ely (1987 p25) and Mayhew *et al.* (2009 p18).

*VC65: Witton Fell 29.8.1963 [E.Broadhead].

Itoplectis melanocephala (Gravenhorst, 1829)

†VC61: Sands Farm 7.6.1980 P.Skidmore.

*VC63: Kilnhurst Ings 19.7.2005 D.Whiteley.

Pimpla contemplator (Muller, 1776)

Unconfirmed reports from VC62 by Walsh & Rimington (1956 p276). Recorded from VC61 by Mayhew *et al.* (2009 p18), from VC63 by Ely (1992 p10) and Coldwell (1999 p61) and from VC64 by Ely (1987 p25) and Mayhew *et al.* (2009 p18).

*VC62: Strensall 11.7.1951 J.H.Elliott

*VC65: Thorpe Perrow Arboretum 17.7.1982 W.A.Ely.

Pimpla flavicoxis Thomson, 1877

This was found to be a mixture of two species, this one and the next (Shaw, 2006). Unconfirmed reports from VC61 by Hincks (1953 p135), from VC62 by Hincks & Dibb (1940 p175) and from VC63 by Ely (2000 p45). Recorded from VC61 by Mayhew *et al.* (2009 p19), from VC63 by Hincks & Dibb (1940 p175), Skidmore *et al.* (1987 p127) and Ely (1992 p11) and from VC64 by Hincks & Dibb (1940 p175) and Mayhew *et al.* (2009 p19).

*VC62: Malton Road, York 14.5.1944 + 15.6.1952 J.H.Elliott

*VC65: Colsterdale 30.8.1980 W.A.Ely.

Pimpla insignatoria Gravenhorst, 1829

Recorded from VC61 and VC62 by Mayhew *et al.* (2009 p19), from VC63 by Ely (1992 p11) and Coldwell (1999 p61) (both as *P. flavicoxis*) and from VC64 by Mayhew *et al.* (2009 p19).

*VC65: Hutton Conyers 2.10.2011 C.H.Fletcher.

Pimpla melanacria Perkins, 1941

Recorded from VC63 by Ely (2000 p47) and from VC64 by Ely (1986 p101) and Key (1987a p218, 375).

*VC62: Wass 2.6.1951 J.H.Elliott.

*VC65: Colsterdale 31.8.1980 W.A.Ely.

Pimpla rufipes (Miller, 1759)

Unconfirmed reports from VC61 by Morley (1908 p94-5) and Hincks (1953 p135), from VC62 by Roebuck (1877 p39, 1907 p215), Morley (1908 p94-5) and Walsh & Rimington (1956 p276), from VC63 by Bairstow (1878 p70), Roebuck (1907 p215), Morley (1908 p94-5) and Butterfield (1937 p47) and from VC64 by Roebuck (1907 p215) and Morley (1908 p94-5). Recorded from VC61 by Mayhew *et al.* (2009 p19), from VC63 by Ely (1992 p11), Coldwell (1999 p61) and Skidmore (2006 p148) and from VC64 by Ely (1987 p25) and Mayhew *et al.* (2009 p19).

*VC62: Malton Road, York 30.4.1944 J.H.Elliott.

*VC65: Wath Urn Bridge, Aldbrough St John 3.9.2012 W.A.Ely.

Pimpla spuria Gravenhorst, 1829

Recorded from VC63 by Ely (1992 p11, 2000 p47).

*VC62: Coatham, Redcar 7.8.2011 W.A.Ely.

*VC65: Middleton-in-Teesdale 12.6.1981 W.A.Ely.

Pimpla turionellae (Linnaeus, 1758)

Unconfirmed reports from VC61 by Carr (1914 p94), from VC62 by Roebuck (1877 p39, 1907 p215), Bairstow *et al.* (1882 p108) and Walsh & Rimington (1956 p276), from VC63 by Carr (1914 p94) and from VC64 by Bairstow *et al.* (1882 p108), Roebuck (1907 p215) and Morley (1908 p102-3). Recorded from VC61 by Fordham (1919 p16, 1940 p(ix)) and Mayhew *et al.* (2009 p19), from VC63 by Ely (1992 p11) and from VC64 by Mayhew *et al.* (2009 p19).

*VC62: N.Yorkshire ex *Euproctis similis* 9.1930 A.Smith.

*VC65: Freeholders' Wood, Aysgarth 15.6.1985 W.A.Ely.

Pimpla wilchristi Fitton, Shaw & Gauld, 1988

Recorded from VC65 by Ely (2011a p69, 2011b p222).

*VC64: Tosside & High Bentham 12.6.2014 W.A.Ely

Apechthis compunctor (Linnaeus, 1758)

Unconfirmed reports from VC62 by Walsh & Rimington (1956 p276). Recorded from VC63 by Ely (1992 p11) and Skidmore (2006 p148) and from VC64 by Mayhew *et al.* (2009 p19).

*VC61: Allerthorpe 1.7.1945 J.H.Elliott.

*VC62: Malton Road, York 23.5.1943 J.H.Elliott.

Apechthis quadridentata (Thomson, 1877)

Recorded from VC61 and VC64 by Mayhew *et al.* (2009 p19).

*VC62: Malton Road, York 13.5.1944 J.H.Elliott.

*VC63: Holmehouse Wood 16.8.1942 J.Wood.

*VC65: Birk Gill, Colsterdale 7.7.1984 A.Norris.

Apechthis rufata (Gmelin, 1790)

Unconfirmed reports from VC62 by Bairstow & Wilson (1882 p108), Roebuck (1907 p215) and Morley (1908 p102-3) and from VC63 and VC64 by Bairstow *et al.* (1882 p108), Roebuck (1907 p215) and Morley (1908 p110). Recorded from VC61 by Mayhew *et al.* (2009 p19), from VC63 by Hincks & Dibb (1940 p175) and Ely (1992 p11) and from VC64 by Mayhew *et al.* (2009 p19).

*VC62: Malton Road, York 16.6.1943 A.Smith.

Tribe **Delomeristini**

Delomerista mandibularis (Gravenhorst, 1829)

Recorded from VC63 by Ely (1992 p11).

*VC61: Allerthorpe 25.5.1952 J.H.Elliott.

Delomerista novita (Cresson, 1870)

Recorded from VC61 by Mayhew *et al.* (2009 p13) and from VC63 by Ely (2000 p47).

*VC62: Cawthorne 26.9.1990 A.Grayson.

*VC64: Scar Close NNR 16.6.2010 T.M.Whitaker.

Perithous albicinctus (Gravenhorst, 1829)

Recorded from VC61 by Shaw (2006 p219) and Mayhew *et al.* (2009 p13).

*VC63: Keighley 6.9.2007 S.M.Saxton.

Perithous divinator (Rossius, 1790)

Recorded from VC63 by Butterfield (1908 p710) and Morley (1908 p47) and from VC64 by



Plate I. The 'Dinosaur Coast' and its fossils (see pp 102-3).

Top: Looking south at Saltwick Bay, near Whitby.

Above left: Ammonite *Hildoceras lusitanicum* collected from Saltwick Bay. Scale bar measures 4 cm.

Above right: A large block of belemnites collected from Saltwick Bay. They represent at least two different species and may be the result of a mass death event. Scale bar measures 10 cm.



Plate II. Dolichopodid flies (see pp 108-112).

Top left: Dolichopus migrans showing the typically laterally collapsed body that often happens with a teneral specimen on drying.

Top right: Liancalus virens. The fly is resting typically on a wet vertical surface. The supposed 'signalling' white spots at the apex of the male wings show clearly.

Above left: Poecilobothrus nobilitatus on a water surface also showing 'signalling' spots at their wing tips (mentioned in the text). East Yorkshire.

Above right: Argyra diaphana is not named in the paper, but it is a common dolichopodid and shows a silvery-dusted abdomen.

Left: Raphium appendiculatum, a common dolichopodid similar to *R. albomaculatum* mentioned on p109.

Photos: I. Andrews



Plate III. Changes in the Dales population of Dark Green Fritillary (see pp 112-117 and front cover).

Top: Ingleborough from Scar Close NNR - these limestone pavement areas are favoured by the butterfly. *T. Whitaker*

Above left: A mating pair of Dark Green Fritillary showing the characteristic green underwings. *P. Brothers*

Above right: Close-up of the head showing the labial palps and the proboscis coiled between them among the hairs. *P. Brothers*

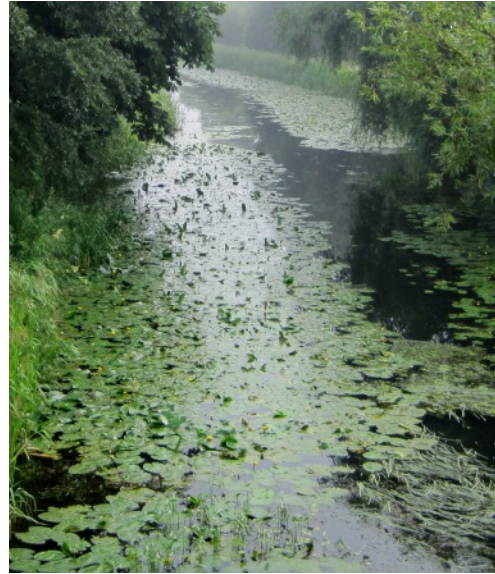


Plate IV. Plants of the Pocklington Canal (see pp 129-140).

Top left: Common Reed occupying 100% of the channel downstream of Coat's Bridge.

Top right: Botanical diversity in the non-navigable canal downstream of the restored Coat's Lock.

Above left: Cattle-poached margin on the landward side of Reed Sweet-grass and Yellow Water-lily downstream of Swing-bridge No. 1.

Above right: Luxuriant submerged/floating-leaved vegetation in the navigable channel upstream of Hagg Bridge includes Arrowhead, Unbranched Bur-reed and Yellow Water-lily.

Photos: *R. Goulder*

Morley (1918 p398) and Fordham (1920 p181).

*VC61: Barmby Moor 30.5.1930 W.J.Fordham.

Perithous scurra (Panzer, 1804)

Unconfirmed report from VC61 by Morley (1908 p47). Recorded from VC61 by Hincks (1953 p135), from VC62 by Walsh & Rimington (1956 p276) and from VC63 by Ely (1992 p12) and Coldwell (1999 p61).

*VC64: Temple Newsam, Leeds 1977 P.Skidmore.

Perithous septemcinctorius (Thunberg, 1822)

Unconfirmed reports from VC64 by Bairstow *et al.* (1882 p108), Roebuck (1907 p215) and Morley (1908 p48). Recorded from VC61 by Shaw (2006) p219 and Mayhew *et al.* (2009 p13).

Subfamily **POEMENIINAE**

This was treated as a tribe of the Pimplinae by Fitton *et al.* (1988).

Poemia collaris Haupt, 1917

Recorded from VC61 and VC64 by Shaw (2006) p219 and Mayhew *et al.* (2009 p20).

Poemia hectica (Gravenhorst, 1829)

Recorded from VC61, VC62 and VC64 by Shaw (2006) p219 and Mayhew *et al.* (2009 p20).

Poemia notata Holmgren, 1859

Recorded from VC61 by Shaw (2006) p219 and Mayhew *et al.* (2009 p20).

*VC64: Lower Dunsforth Church 3.7.2011 W.A.Ely.

Deuteroxorides elevator (Panzer, 1799)

Recorded from VC61 by Shaw (2006) p219 and Mayhew *et al.* (2009 p20), from VC63 by Ely (2000 p47) and from VC64 by Shaw (2006) p219 and Mayhew *et al.* (2009 p20).

Subfamily **RHYSSINAE**

This was treated as a tribe of the Pimplinae by Fitton *et al.* (1988).

Rhyssa persuasoria (Linnaeus, 1758)

Unconfirmed reports from VC61 by Morley (1908 p27-8) and Fordham (1940 p(xi)), from VC62 by Waddington (1901 p296), Roebuck (1907 p215), Morley (1908 p27-8) and Hincks & Dibb (1940 p175), from VC63 by Roebuck (1907 p215), Morley (1908 p27-8), Bayford (1947) and Hincks (1948 p38) and from VC64 by Stephens (1867 p2), Roebuck (1878 p66; 1907 p215), Morley (1908 p27-8) and Butterfield (1932 p59). Recorded from VC62 by Hincks (1945 p14) and Walsh & Rimington (1956 p276), from VC63 by Ely (1992 p12, 2000 p47) and Coldwell (1999 p61) and from VC64 by Hincks (1948 p38).

*VC61: Skipwith Common 16.7.1994 A.Grayson.

*VC65: Foxglove Covert NR 20-21.7.2013 E.Dickinson.

Rhyssella approximator (Fabricius, 1793)

Recorded from VC63 by Ely (1992 p12, 2000 p47) and from VC64 by Ely (1987 p25).

Subfamily **DIACRITINAE**

This was treated as a tribe of the Pimplinae by Fitton *et al.* (1988).

Diacritus aciculatus (Vollenhoven, 1878)

Recorded from VC61 and VC62 by Mayhew *et al.* (2009 p8-9), from VC63 by Key (1987b p288) and Ely (1992 p11), from VC64 by Mayhew *et al.* (2009 p8-9) and from VC65 by Hincks (1943a p59).

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State of aculeate Hymenoptera in Watsonian Yorkshire: species gains and losses

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With the development of electronic databases it is now possible quickly to access data showing the gains and losses of aculeate Hymenoptera in Watsonian Yorkshire. Originally this study was concerned with the number of records per species from the first and second fifty years of the 20th century (Archer, 2013b) but can now be extended to records from the 19th and 21st centuries (to 2013). The aim of this paper is to assess the gains and losses of aculeates with particular reference to the period from 1950 onwards.

Method

All the data required were obtained from the Yorkshire database, from the earliest records in the 19th century (Archer, 2011) until 2013. As the recorder for the aculeate Hymenoptera I am grateful for the many records provided by naturalists past and present (Archer, 2002, 2011).

Results

Table 1 shows the number of aculeate Hymenoptera that have been recorded in Yorkshire. Just over 20% (21.7%) were first recorded from 1950 onwards. Five species have been excluded from this table because three (*Tiphia femorata*, *Eumenes papillarius* and *Andrena falsifica* are vagrants and two (*Monomorium pharaonis* and *Hypoponera punctatissima* are only found in heated buildings.

Table 1. The number of aculeate Hymenoptera species recorded in Yorkshire with the number of gains and losses from 1950 onwards and losses from pre-1950.

	Total no. spp.	No. spp. 1950 onwards		Losses pre-1950
		Gains	Gains now lost	
DEB species				
Dryinidae	23	11	0	0
Embolemidae	1	1	0	0
Bethylidae	4	1	0	0
Total DEB spp.	28	13	0	0
Solitary wasps				
Chrysididae	17	1	0	2
Tiphidae	2	1	0	0
Mutillidae	2	0	0	0
Sapygidae	2	0	0	0
Pompilidae	25	8	1	0
Eumeninae	12	0	2	1
Sphecidae	2	1	1	0
Crabronidae	78	20	2	1
Total Solitary wasps	140	31	6	4
Solitary bees				
Colletidae	10	4	0	0
Andrenidae	36	6	3	1
Halictidae	32	7	2	2
Melittidae	1	1	1	0
Megachilidae	16	3	0	0
Apidae	21	3	0	0
Total Solitary bees	116	24	6	3
Social species				
Formicidae	18	2	0	3
Vespinae	9	2	0	0
Apidae	25	1	6	1
Total Social species	52	5	6	4
Total aculeate species	336	73	18	11

Twenty-three of the 336 species (Table 1) are now considered extinct in Yorkshire either because of recent dramatic declines or because current British distributions have withdrawn southwards (Table 2A). A further six may or may not be extinct in Yorkshire either because they are near the northern edge of their English distribution or are rare in Britain (Table 2B). The difficulty of knowing whether a species may be extinct or not is because there may be a long period of years between the recordings of a species (Table 3).

Table 2A. Extinct species with last recorded year and reason for accepting extinction.

	Last recorded year	Reason for extinction
<i>Ceropales maculata</i> (Fab)	1950	Rapid decline
<i>Ancistrocerus antilope</i> (Panzer)	1973	Rapid decline
<i>Ancistrocerus nigerrimus</i> (Curtis)	1955	Rapid decline northern England
<i>Symmorphus crassicornis</i> (Panzer)	1932	Rapid decline
<i>Podalonia affinis</i> (Kirby)	1974	Only Yorkshire site destroyed
<i>Ectemnius lituratus</i> (Panzer)	1852	North of current distribution
<i>Mimesa bicolor</i> (Jurine)	1979	Declined
<i>Mellinus crabroneus</i> (Thunberg)	1952	Rapid decline
<i>Andrena labiata</i> Fab.	1945	North of current distribution
<i>Andrena pilipes</i> Fab.	1950	North of current distribution
<i>Andrena thoracica</i> (Fab.)	1981	North of current distribution
<i>Panurgus banksianus</i> (Kirby)	1987	North of current distribution
<i>Lasioglossum laevigatum</i> (Kirby)	1966	North of current distribution
<i>Sphecodes miniatus</i> von Hagens	1951	North of current distribution
<i>Melitta leporina</i> (Panzer)	1980	North of current distribution
<i>Lasius fuliginosus</i> (Latreille)	1928	North of current distribution
<i>Bombus distinguendus</i> Morawitz	1974	Rapid decline
<i>Bombus humilis</i> Illiger	1988	North of current distribution
<i>Bombus ruderarius</i> (Müller)	1987	Rapid decline
<i>Bombus ruderatus</i> (Fab.)	1954	North of current distribution
<i>Bombus soroeensis</i> (Fab.)	1975	Outside British distribution
<i>Bombus subterraneus</i> (Linn.)	1935	Rapid decline
<i>Bombus sylvarum</i> (Linn.)	1951	Rapid decline

Table 2B. Other species that could be extinct with last recorded year.

	Last recorded year	Reason for extinction
<i>Chrysis mediata</i> Lisenmaier	1946	Near northern edge of current distribution
<i>Cleptes nitidulus</i> (Fab.)	1850	Near northern edge of current distribution
<i>Lasioglossum quadrinotatum</i> (Kirby)	1935	Near northern edge of current distribution
<i>Lasioglossum parvulum</i> (Schenck)	1907	Near northern edge of current distribution
<i>Lasius mixtus</i> (Nylander)	1937	Rare in northern England
<i>Lasius umbratus</i> (Nylander)	1937	Rare in northern England

Table 1 also shows that 18 of the 73 species gained from 1950 onwards are now extinct (losses) (Table 1, 2A). A further 11 were only recorded pre-1950, listed in Table 1 as 'Losses pre-1950', with five of them considered extinct (Table 2A) and the other six (Table 2B) could be extinct. Fig. 1 shows the gains per decade from 1950 until 2009 and from 2010 until 2013. The gains are particularly noticeable between the 1970s and 2000s. Overall the 55 species gained from 1950 onwards exceed the total losses of 29 species (Table 1). The losses of bumblebees (7 species, 29% loss) and the gains of dryinids, embolemiids and bethylids (DEB species - 14 species, 50%

gain) are particularly noticeable.

Table 3. Species with long period of years between recordings

	Dates when recorded
<i>Omalus aeneus</i> (Fab.)	1907:1977
<i>Sapyga claviventris</i> (Linn.)	1852:1956
<i>Andrena humilis</i> Imhoff	1914:1971
<i>Andrena nitida</i> (Müller)	1840:2002
<i>Lasioglossum lativentre</i> (Schenck)	1927:2006
<i>Lasioglossum leucozonium</i> (Schrank)	1908:1983
<i>Lasioglossum morio</i> (Fab.)	1936:2000
<i>Nomada obtusifrons</i> Nylander	1918:1975
<i>Nomada integra</i> Brullé	1922:1973
<i>Melecta albifrons</i> (Forster)	1922:1997



Fig.1 The number of new species recorded in Yorkshire per decade from 1950 until 2009 and from 2010 until 2013.

Discussion

The recorded gains from 1950 onwards (Table 1) were mainly due to the activities of three persons: M.E. Archer, J.T. Burn and W.A. Ely. These three found or identified many of the new species including the following which are still only known by single records: *Gonatopus distinguendus*, *Bethylus dendrophilus*, *Priocnemis hyalinata*, *P. cordivalvata*, Two-coloured Mimic Wasp *Mimesa bicolor* and *Lasioglossum pauxillum*. These three persons also developed skills so that they could identify the records of several other recorders of the gain species. Through the recording and educational activities of the Bees, Wasps and Ants Recording Society (www.bwars.com) at least 14 of the gain species (e.g. Bee Wolf *Philanthus triangulum*, *Nomada flava*, *Dolichovespula media* and Tree Bumblebee *Bombus hypnorum*) were gained due to a northward increase of their English ranges. The reasons for this northwards dispersal are not known but generally are believed to be related to more favourable weather, particularly during the 1990s and early 2000s (Brohan *et al.*, 2006; Jones & Moberg, 2003), resulting in an increased movement of insects (Unwin & Corbet, 1991). Archer (2013a) was able to show that the first

recordings of solitary aculeates in a Leicester suburban garden could be related to higher temperature, increased sunshine and decreased rainfall.

The loss of bumblebees has been related to the loss of habitat due to intensive arable farming, resulting in the removal of hedgerows, increased drainage and the use of pesticides (Goulson, 2010; Benton, 2006). These changes would result in the loss of nesting sites and the interruption of the insects' continuous need for flowers for pollen and nectar resources from April until September.

The reasons for the losses of solitary aculeates are generally unknown except for the Mud Wasp *Podalonia affinis* whose nesting sites in a sand quarry were removed. Often the loss can be related to a general British decline sometimes leading to extinction (e.g. *Ancistrocerus antilope* and the Sand Digger Wasp *Mellinus crabroneus*) or a loss from northern England (e.g. the potter wasps *Ancistrocerus nigricornis* and *Symmorphus crassicornis*).

The ants have been less investigated in comparison with other aculeate groups so that *Lasius mixtus* and *L. umbratus* may still be present in Yorkshire, but some directed study will be necessary to establish this. A recent study by E. Robinson (pers. comm., 2013) has re-established the presence of the Shining Guest Ant *Formicoxenus nitidulus* in the nests of the Hairy Wood Ant *Formica lugubris* on the North York Moors.

Summary

To 2013, 336 aculeates have been recorded in Watsonian Yorkshire, of which 73 species were first recorded from 1950 onwards. Additionally three vagrants and two species restricted to heated buildings have also been recorded. Twenty-three aculeates are now considered extinct in Yorkshire, including 18 recorded from 1950 onwards and five first recorded prior to 1950. A further six first recorded prior to 1950 may also be extinct. Some explanations are suggested for the species gains from 1950 onwards and for the extinctions.

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Obituary: Helen Margaret Jackson B.A. 1930-2013

Helen was born in Bradford and, following her education at Bingley Grammar School, gained a B.A. in English at Manchester University. She moved to Harrogate in 1953 and taught English at all levels at Harrogate Grammar School until her retirement.

She joined the Harrogate and District Naturalists' Society in 1961 and soon became involved in its organization, becoming Programme Secretary in 1968, arranging winter lectures for 35 years and was also involved in organizing and leading summer field outings. In 1991 she became Editor of the Society's Annual Report, continuing in that post until 2007 when she produced the 60th Anniversary edition. She was made an Honorary Life Member of the Society in 2005.

Helen was a keen and proficient botanist, taking part in many recording schemes, one of the most important being for the Botanical Atlas of the Harrogate District, compiled by W.H. Jowsey and published in 1978. A lifetime interest in birds ran alongside her botanical pursuits and she was a keen member of the British Trust for Ornithology, taking part in its surveys and regularly attending its annual November conferences at Swanwick in Derbyshire. During the 1960s and 70s, together with her friend the late Margaret Sanderson, she undertook a long-term survey of breeding Nightjars *Caprimulgus europaeus* on Sawley High Moor near Brimham Rocks and also on Thorne Moors. In the 1980s she went on to develop a keen interest in moth trapping.

Her most active involvement was with the Yorkshire Naturalist Trust (now Yorkshire Wildlife Trust), being elected as a trustee in October 1985 and serving without a break until 2008. She became a member of the Trust's Nature Reserves Committee also in 1985 and became its Chairman from 1992 until such voluntary positions were taken over by professional staff in 2001. She was Secretary of the Trust's Yorkshire Dales Regional Committee from 1988 to 2006, promoting the Trust's work in that area, and was also Chairman of the Burton Leonard Lime Quarries Reserve's Management Committee. Elected to the Vice Presidency of the Trust in 2001, she remained in that office until 2008.

Her involvement with the Yorkshire Naturalists' Union, which she joined in 1985, ran parallel to her interests in other organizations. She was particularly interested in the Botanical Section and regularly attended the Union's Natural Sciences Committee meetings. She was elected to serve as the Union's President in 2005, her Presidential address *Some aspects of natural history and conservation in Yorkshire* being delivered at the Spa Hotel, Ripon, on 25th November 2006.

Her very quiet, unassuming personality concealed a hard-working tenacity for whatever project she undertook, as evidenced by her long periods of office in important roles. Helen died peacefully after a long stay in Heath Lodge Residential Home, Harrogate, and her cremation took place at Stonefall Crematorium, Harrogate, on 14th October 2013. With her passing, Yorkshire lost one of its most committed all-round naturalists and conservationists.

See also YNU Bulletin 45, 2006 pp 46-47.

JRM

Aquatic plants in the Pocklington Canal: a decade of change

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Introduction

The Pocklington Canal in East Yorkshire was opened throughout to navigation in 1818; it had a length of 14.8km and descended from Canal Head at 1.5km south of Pocklington through nine locks to join the River Derwent at Cottingwith. Commercial navigation came to an end in the 1930s and the whole canal fell into dereliction. The voluntary Pocklington Canal Amenity Society (PCAS), with support from diverse statutory bodies, has worked towards the restoration of the canal for leisure navigation since about 1970. By 1987 dredging and the restoration of locks and bridges allowed navigation from Cottingwith to Melbourne along 8.3km of canal. Beyond Melbourne the canal remains derelict, although four of the seven locks between Melbourne and Canal Head have been restored (Anon, 2008a). The 6.5km of derelict canal between Thornton Lock at Melbourne and Canal Head is regarded as having high nature conservation status. This length of canal was notified as a SSSI in 1987, in part because of its diverse aquatic flora that included several nationally scarce plants (Anon, 2013b) but by 2010 the condition of the SSSI was judged to be unfavourable and deteriorating, largely because of a decrease in plant diversity (Anon, 2013b).

The aims of the study described in this article were: (1) to compare the current (2013) aquatic flora of the non-navigable (SSSI) canal between Pocklington and Melbourne with that of the navigable canal between Melbourne and Cottingwith; (2) to examine change in aquatic flora over the past decade by comparison of records made in 2002 with those of 2013. These aims were achieved, firstly by recording the emergent, floating-leaved and submerged aquatic plants along six 500m lengths of the non-navigable canal and six 500m lengths of the navigable canal in summer 2013, and secondly by comparison of these records with those from a 2002 study that was carried out by the same recorder at the same sites and using identical methods (Goulder, 2003).

Materials and Methods

Aquatic plants were recorded in July 2013. The lengths surveyed on the non-navigable canal were:

(1 & 2) 0-500m downstream of Canal Head (SE800473) and 500-1000m downstream of Canal Head;

(3 & 4) 0-500m upstream of Coat's Bridge (SE785452, c.2.8km from Canal Head) and 0-500m downstream of Coat's Bridge;

(5 & 6) 0-500m upstream of Walbut Bridge (SE771442, 5.6km from Canal Head) and 0-500m downstream of Walbut Bridge.

Those on the navigable canal were:

(7 & 8) 0-500m upstream of Swing-bridge No. 6 (SE747445, 8.0km from Canal Head) and 0-500m downstream of Swing-bridge No. 6;

(9 & 10) 0-500m upstream of Hagg Bridge (SE717451, 11.5km from Canal Head) and 0-500m downstream of Hagg Bridge;

(11 & 12) 0-500m upstream of Swing-bridge No. 1 (SE711440, 13.1 km from Canal Head) and 0-500m downstream of Swing-bridge No. 1.

Aquatic plants in 500m lengths of canal were recorded from the towing path by eye, which was generally facilitated by clear water, and by means of at least 20 grapnel hauls. Emergent plants on the far side were, when necessary, identified using binoculars. A checklist was used when recording: i.e. those plants listed by Palmer & Newbold (1983) as aquatic plants found in England and Wales plus stoneworts, Greater Water-moss⁵ and all species of rushes. The abundance of each plant was recorded on a three point scale (Holmes, 1983):

1 = <0.1% whole-channel cover;

2 = 0.1-5% cover;

3 = > 5% cover .

The sum of the abundance scores of the plants recorded in each 500m length (ΣA) was used as an approximate indicator of both species richness and abundance. In addition the hierarchical richness index (HRI) (French, 1994) was calculated for each 500m length. This is a relative measure that aims to combine both species richness and species abundance to give a combined indicator of both variety and abundance. It has previously been used, for example, to describe the flora of hedgerows (French & Cummins, 2001). Nomenclature follows Stace (2010).

Aquatic plants in 2013

The non-navigable canal

The lengths of non-navigable canal surveyed between Canal Head and Melbourne were largely dominated by emergent vegetation. This generally formed wide marginal stands and had often spread to occupy all or most of the width of the canal, with open water reduced to a narrow channel often sinuous and, in places, indiscernible or less than 1m wide and no more than 20cm deep. The emergent vegetation was often a more or less pure stand of either Reed Sweet-grass or Common Reed while Branched Bur-reed and Bulrush were in places conspicuous although much less abundant. Submerged and floating-leaved plants generally occupied a lesser area than the emergent vegetation, although the floating leaves of Yellow Water-lily were dominant where a several metres wide central channel persisted, most notably in Length 5, upstream of Walbut Lock. Furthermore, grapnel hauls from the central channel frequently yielded Canadian and/or Nuttall's Waterweeds while Common and Ivy-leaved Duckweeds were often conspicuous amongst emergent plants and wherever open water remained.

There were exceptions to the dominance of emergent vegetation in the non-navigable canal. For example:

- (1) the initial 190m from Canal Head to Top Lock was largely open water with extensive patches of Curled and Fennel Pondweeds and Fan-leaved Water-crowfoot;
- (2) areas of deep and open water associated with the restored Coat's Lock and Walbut Lock (Lengths 3 & 5) supported diverse communities that included both submerged/floating-leaved and emergent plants. Hence, over c.20m of canal that receives by-flow water downstream of Coat's Lock there were the submerged/floating-leaved Canadian and Nuttall's Waterweeds, Common and Ivy-leaved Duckweeds, stonewort, Yellow Water-lily and Unbranched Bur-reed and emergent Reed Sweet-grass, Common Reed and Branched Bur-reed. In the c.15m of deep open

⁵ Scientific names of all plants mentioned in the text are to be found in Tables 1 and 2.

water upstream of Walbut Lock submerged/floating leaved plants included Canadian Waterweed, Yellow Water-lily, Broad-leaved Pondweed and Unbranched Bur-reed and emergent ones included Flowering-rush, Reed Sweet-grass, Yellow Iris and Common Reed.

The navigable canal

The lengths of navigable canal that were surveyed between Melbourne and Cottingwith had a central channel, depth perhaps 80-120cm, and there were broad margins of emergent vegetation several metres wide, in places interrupted by tree shading. The central channel supported a luxuriant community of submerged/floating-leaved vegetation that frequently approached 100% cover. Reed Sweet-grass was much the most important emergent plant in the navigable canal, although Reed Canary-grass was conspicuous in places. Furthermore, more species of emergent plants were recorded in the navigable canal. This greater diversity was notable, for example: (1) Length 7 – probably the most intensively navigated length of canal because of regular weekend trips by the PCAS narrow boat *New Horizons* – where a diversity of emergent plants had colonized the interface between Reed Sweet-grass/Reed Canary-grass marginal vegetation and the open central channel. These included Fool's-water-cress, Lesser Water-parsnip, Flowering-rush, water-cress, Arrowhead, Branched Bur-reed and Bulrush; (2) Length 12 where there was grazing and poaching by cattle as far as they could reach outwards on the landward side of the Reed Sweet-grass marginal vegetation. Species here included Creeping Bent, Water-plantain, Fool's-water-cress, Lesser Water-parsnip, Flowering-rush, Common Spike-rush, Marsh Horsetail, Yellow Iris, Toad Rush, Soft-rush, Hard Rush, Water Mint, Tufted and Water Forget-me-nots, water-cress, Reed Canary-grass, Celery-leaved Buttercup, Arrowhead, Branched Bur-reed, Brooklime and Pink Water-speedwell.

The floating leaves of Yellow Water-lily were by far the most conspicuous component of the luxuriant vegetation of the open central channel of the navigable canal, often occupying the whole width of the channel. The leaves of Unbranched Bur-reed were frequently observed trailing on the water surface and were abundant in Length 9. Amongst submerged plants Nuttall's Waterweed was abundant, notably in Lengths 9-12, while Shining Pondweed was abundant in Lengths 9-11 and Flat-stalked Pondweed, which is nationally scarce, was recorded in Lengths 7-9, although few plants were present.

Quantitative comparison of non-navigable and navigable lengths of canal

The diversity of aquatic plants in the non-navigable canal between Canal Head and Melbourne in July 2013 was much less than in the navigable canal between Melbourne and Cottingwith. Altogether 47 plants were recorded, 27 in the non-navigable canal and 44 in the navigable canal (Tables 1 & 2). The mean number of species per 500m was significantly less in the non-navigable lengths of canal, i.e. 13.8 compared to 25.0 in navigable lengths ($P < 0.05$) (Table 3). Likewise, the indicators of integrated species richness and abundance (ΣA and HRI) were significantly less for non-navigable lengths: mean $\Sigma A = 24.8$ compared to 38.3 for navigable lengths and mean HRI = 158 compared to 396 for navigable lengths ($P < 0.05$) (Table 3).

Thirty-one emergent plants were recorded: 16 in the non-navigable canal and 30 in the navigable canal (Tables 1 & 2). The mean number of species (8.0), mean ΣA (13.5) and mean HRI (55.5) for emergent plants in non-navigable lengths of canal were all significantly less than in navigable lengths (16.8, 24.0 and 177 respectively) ($P < 0.05$) (Table 3). Sixteen taxa of

submerged/floating-leaved plants were recorded: 11 in the non-navigable canal and 14 in the navigable canal (Tables 1 & 2). The mean number of taxa in non-navigable lengths (5.8) was significantly less than in navigable lengths (8.2) ($P=0.05$). Mean values of ΣA and HRI were numerically less for non-navigable lengths but were not significantly different from mean values for navigable lengths ($P>0.05$) (Table 3).

The complete data set from the July 2013 survey is given as electronic Appendices 1 and 2 on the YNU website at <http://ynu.org.uk/node/440>

Comparison of aquatic plants in 2002 and 2013

The non-navigable canal (see Plate IV, centre pages)

Sixteen emergent and 11 floating-leaved/submerged plants of the 37 recorded in the non-navigable canal in 2002 were still there in 2013 (Table 1). Ten of them were, however, not found in 2013: seven emergents (Water-plantain, Common Marsh-bedstraw, Soft-rush, Water Mint, Water Forget-me-not, water-cress and Celery-leaved Buttercup) and three submerged taxa (water-starwort, Greater Water-moss and Small Pondweed). The number of 500m lengths of canal in which each plant was recorded in 2002 and 2013 is given in Table 1; this allows assessment of increase or decrease in the range of each one. Amongst the plants that were not recorded in 2013, water-starwort had formerly been recorded in three 500m lengths, otherwise the missing taxa had previously been recorded in only one or two (out of six) 500m lengths. No new plants were recorded in the non-navigable canal in 2013.

The navigable canal (see Plate IV, centre pages)

33 aquatic plants were recorded in the navigable canal in 2002. All 22 emergents were still there in 2013 while all but one of the 11 submerged/floating-leaved plants also persisted (Table 2). The missing one was Fat Duckweed, which had been recorded in three out of six 500m lengths in 2002. Several of the emergent plants had markedly increased their ranges between 2002 and 2013 (Table 2). The number of 500m lengths with records had increased from one to three for Water-plantain and Yellow Iris, from two to six for water-cress, three to five for Amphibious Bistort and Bittersweet, one to five for Celery-leaved Buttercup, one to six for Arrowhead, three to six for Branched Bur-reed and two to four for Bulrush. Amongst submerged/floating-leaved plants there were apparently both decreases and increases in range. Thus the number of 500m lengths with Rigid Hornwort decreased from six to one, with stoneworts from five to one, with Flat-stalked Pondweed from six to three and with Fennel Pondweed from three to one. On the other hand, lengths with Canadian Waterweed increased from one to five.

Twelve plants were recorded in the navigable canal in 2013 that were not found there in 2002 (Table 2). Eight of these were emergents and of these Lesser Water-parsnip and Flowering-rush had colonized all six of the 500m lengths that were surveyed. Four were submerged/floating-leaved plants and Fan-leaved Water-crowfoot and Unbranched Bur-reed had colonized to the extent that they were recorded in three and five 500m lengths respectively. Nine plants had been previously recorded in non-navigable lengths in 2002 including eight of the 10 plants that have apparently been lost from the non-navigable canal since 2002 (Table 1). New to the canal in 2013 were Toad Rush, Tufted Forget-me-not and Pink Water-speedwell.

Discussion

The lesser floristic richness of aquatic plants in the non-navigable lengths of canal (shown by fewer species and lower values of ΣA and HRI) (Table 3) and also the notable loss of species between 2002 and 2013 (Table 1), is likely to be a result of unchecked hydrosere succession. Continuing siltation and development of pure stands of Reed Sweet-grass or Common Reed, often across the whole width of the channel, have probably led to the out-competition of less robust plants. It is notable that much of the botanical interest in the non-navigable canal persisted at sites where there had clearly been disturbance that has checked succession, for example: (1) the 190m from Canal Head to Top Lock that continues as open water because it is periodically dredged to remove silt brought in by the feeder (this also enhances visual amenity at this visitor hot-spot and facilitates angling, there being constructed fishing stages along this section of canal); (2) areas of deep and open water created by the restoration of Coat's Lock and Walbut Lock.

The greater floristic richness in the navigable lengths of canal (Table 3) and colonization by additional species between 2002 and 2013 (Table 2) are likely to be related to greater habitat diversity. The navigable canal has both a deep central channel that is kept open by boat movements (Fig.1) and broad margins of emergent vegetation, a pattern that will have developed following dredging during canal restoration. There has also been occasional use of a weed-cutting boat.



Figure 1. A typical leisure boat using the Pocklington Canal.

An especially favourable habitat for emergent species in the navigable canal tends to be found at the interface between the open water central channel and the bulk of the Reed Sweet-

grass/Reed Canary-grass-dominated marginal vegetation; here a range of plants is to be found including the now-widespread post-2002 colonizers Lesser Water-parsnip and Flowering-rush (Table 2). A further favourable habitat for emergents in the navigable canal is cattle-poached margin. This occurred along part of Length 10 (but on the far side from the towing path and inaccessible) and especially along Length 12. Here trampling by cattle and their grazing on Reed Sweet-grass have produced an open poached muddy strip along the landward side of the Reed Sweet-grass margin extending out into the canal as far as the cattle can reach. This has allowed colonization by a diversity of emergent plants. Poached margins such as this can be a valuable resource for the conservation of plants of muddy places (Chatters, 1996).

It is well known that submerged and floating-leaved vegetation is liable to be suppressed in heavily navigated canals because of high turbidity limiting underwater photosynthesis and because of mechanical damage (e.g. Murphy & Eaton, 1983). There are, however, relatively few boat movements along the navigable section of the Pocklington Canal; thus Gardham Lock between East Cottingham and Melbourne was operated at most only 166 times during 2011 (Anon, 2013) and no boat movements were observed during the mid-week vegetation surveys of July 2013 that are described herein. It is evident that boat traffic does not reach the level at which coexistence between boats and vegetation becomes problematic. Instead the central channel has luxuriant submerged and floating-leaved vegetation and abundant filamentous green algae, which are doubtless encouraged by the high inorganic-nutrient status of the canal. Goulder (2003) cited data from the Environment Agency that showed a mean phosphorus (as phosphate) concentration of 358µg per litre and mean nitrogen (as nitrate) concentration of 8.3mg per litre at Melbourne in 2002. Furthermore elevated phosphate levels downstream of the Melbourne feeder have been shown to promote enhanced growth of submerged plants taken from the canal (Canadian Waterweed) under laboratory conditions (Mahami & Goulder, 2011).

The community tends to be dominated by only a few plants that are often associated with eutrophic habitats and have relatively high Ellenberg's N indicator values (≥ 6) (Hill *et al.*, 1999). Thus Yellow Water-lily is ubiquitous in the navigable canal, both its floating leaves and its underwater 'cabbage' leaves being conspicuous; otherwise Nuttall's Waterweed often forms luxuriant submerged stands while Shining Pondweed is abundant in some sections (Lengths 9-11). Some of the less abundant submerged/floating-leaved plants that occur in the navigable canal (Flat-stalked, Broad-leaved and Fennel Pondweeds, Fan-leaved Water-crowfoot and Unbranched Bur-reed) may be helped by the occasional boat movements that prevent complete cover by the dominant plants. It was clear, for example, that boats had kept open a mid-canal gap 2-3m wide between encroaching floating leaves of Yellow Water-lily along Lengths 9 & 10.

When the Pocklington Canal was notified as an SSSI in 1987 its wildlife conservation value was, in part, considered to lie in its diversity of aquatic plants and the presence of nationally scarce taxa (Anon, 2013b). The 2013 survey described in the present paper emphasizes continuing diversity (Tables 1 & 2), especially in the navigable canal, but nationally scarce aquatic plants were not much in evidence. Plants that are nationally or locally/regionally rare or scarce which are found in South-east Yorkshire (VC61) are listed by Middleton & Cook (2013). The only nationally scarce aquatic plant that was found in the Pocklington Canal in 2013 is Flat-stalked Pondweed, which appears to have decreased since 2002 when it was recorded in all six of the

500m lengths that were surveyed along the navigable canal (and at 0.1-5% cover in two of these lengths) (Goulder, 2003) whereas in 2013 it was recorded at <0.1% cover and in only three 500m lengths. This plant appears to do well when there is a degree of disturbance; in East Yorkshire it is found in the Hull Valley in drains where there is annual weed cutting and periodic dredging (Goulder, 2000, 2010). It was also found in the Leven Canal where submerged and floating-leaved macrophytes (largely Rigid Hornwort and Yellow Water-lily) had been cleared to facilitate angling (Goulder, 2006). It is possible that Flat-stalked Pondweed in the Pocklington Canal has suffered from competition with other, much more abundant, submerged/floating-leaved plants, notably Nuttall's Waterweed, Yellow Water-lily and Shining Pondweed.

There are at least 20 vascular aquatic plant species that have been recorded in the Pocklington Canal since 1986 but were not found in 2013 (Table 4). Eleven are either nationally rare/scarcely or regionally/locally rare/scarcely in vice-county 61 (Middleton & Cook, 2013). Some may have been missed in 2013 because only twelve 500m lengths of canal were surveyed whereas other studies (Tolhurst, 1987; Head, 1991; Anon, 1997; Anon, 2008b) have considered the entire length of the canal. Furthermore, when surveying canals with high marginal vegetation and using a grapnel only at intervals, it is easy to miss sparsely distributed plants, especially submerged ones. The lost species of most concern are the eight that are rare/sparse and were also not recorded in 2007 along the whole canal by Scott-Wilson Ltd (2008) (Table 4). These are Lesser Water-plantain, Soft Hornwort, Opposite-leaved Pondweed, Fat Duckweed, Creeping Forget-me-not, Small and Perfoliate Pondweeds and Common Water-crowfoot. The most important of these losses are probably Lesser Water-plantain, Soft Hornwort and Fat Duckweed. Lesser Water-plantain was last recorded in VC61 in 2003 in a drain at North Cave; there are no VC61 records for Soft Hornwort other than for the Pocklington Canal, while for Fat Duckweed there is a 2008 VC61 record for the River Derwent (Middleton & Cook, *l.c.*). Opposite-leaved Pondweed is found in drains in East Yorkshire (Goulder, 2000, 2010) and there is also a 2009 record for the Pocklington Canal Head (Middleton & Cook, *l.c.*). Small Pondweed is also found in drains, is easily overlooked and may be under-recorded in the vice-county (Middleton & Cook, *l.c.*). Perfoliate Pondweed was recorded in the Market Weighton Canal at Newport in 2005 (Middleton & Cook, *l.c.*), VC61 records of Creeping Forget-me-not are possibly identification errors while Common Water-crowfoot, like many batrachian water-crowfoot species, is also difficult to identify reliably.

Overall, the 2013 survey suggests that the current botanical conservation value of the Pocklington Canal lies more in the diversity and luxuriance of its aquatic vegetation rather than in the presence of rare or scarce plants (with the exception of Flat-stalked Pondweed). The apparent losses from the non-navigable canal since 2002 are likely to be a result of unchecked hydrosere succession but it is encouraging that, except perhaps for Small Pondweed, none of the ten missing plants is rare or scarce in VC61 and that eight of them were found in 2013 in the navigable canal (the exceptions being Greater Water-moss and Small Pondweed). The apparent loss of Fat Duckweed from the navigable canal is regrettable but the evidence of greater plant diversity and species gains since 2002 suggests that habitat disturbance, associated with restoration and light boat usage and the presence of cattle-poached muddy areas, may have enhanced the plant-conservation value of the canal.

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Table 1. Aquatic plants in non-navigable lengths of Pocklington Canal, 2002 and 2013.

Emergent species	Submerged and floating-leaved species
Recorded in both 2002 and 2013 Amphibious Bistort <i>Persicaria amphibia</i> (4,2) Bittersweet <i>Solanum dulcamara</i> (4,2) Branched Bur-reed <i>Sparganium erectum</i> (4,4) Brooklime <i>Veronica beccabunga</i> (1,1) Bulrush <i>Typha latifolia</i> (4,4) Common Reed <i>Phragmites australis</i> (4,4) Creeping Bent <i>Agrostis stolonifera</i> (4,4) Flowering-rush <i>Butomus umbellatus</i> (1,2) Greater Pond-sedge <i>Carex riparia</i> (2,3) Hard Rush <i>Juncus inflexus</i> (3,1) Jointed Rush <i>Juncus articulatus</i> (1,1) Lesser Pond-sedge <i>Carex acutiformis</i> (3,3) Lesser Water-parsnip <i>Berula erecta</i> (1,3) Reed Canary-grass <i>Phalaris arundinacea</i> (4,3) Reed Sweet-grass <i>Glyceria maxima</i> (6,6) Yellow Iris <i>Iris pseudacorus</i> (3,5) Number of species = 16	Recorded in both 2002 and 2013 Broad-leaved Pondweed <i>Potamogeton natans</i> (1,1) Canadian Waterweed <i>Elodea canadensis</i> (5,5) Common Duckweed <i>Lemna minor</i> (6,6) Curled Pondweed <i>Potamogeton crispus</i> (2,2) Fan-leaved Water-crowfoot <i>Ranunculus circinatus</i> (2,2) Fennel Pondweed <i>Potamogeton pectinatus</i> (1,1) Ivy-leaved Duckweed <i>Lemna trisulca</i> (5,5) Nuttall's Waterweed <i>Elodea nuttallii</i> (4,3) stonewort <i>Chara/Nitella</i> (1,2) Unbranched Bur-reed <i>Sparganium emersum</i> (2,4) Yellow Water-lily <i>Nuphar lutea</i> (4,4) Number of species = 11
Recorded in 2002 but not in 2013 Celery-leaved Buttercup <i>Ranunculus sceleratus</i> (1,0) Common Marsh-bedstraw <i>Galium palustre</i> (1,0) Soft-rush <i>Juncus effusus</i> (1,0) Water Forget-me-not <i>Myosotis scorpioides</i> (2,0) Water Mint <i>Mentha aquatica</i> (1,0) water-cress <i>Nasturtium officinale</i> agg. (2,0) Water-plantain <i>Alisma plantago-aquatica</i> (1,0) Number of species = 7	Recorded in 2002 but not in 2013 Greater Water-moss <i>Fontinalis antipyretica</i> (1,0) Small Pondweed <i>Potamogeton berchtoldii</i> (1,0) water-starwort <i>Callitriche</i> sp. (3,0) Number of species = 3
Recorded in 2013 but not in 2002 Number of species = 0	Recorded in 2013 but not in 2002 Number of species = 0

Values in brackets indicate the number of 500m lengths (out of six) in which each plant was recorded in 2002 and 2013 respectively.

Table 2. Aquatic plants in navigable lengths of Pocklington Canal, 2002 and 2013.

Emergent species	Submerged and floating-leaved species
Recorded in both 2002 and 2013 Amphibious Bistort <i>Persicaria amphibia</i> (3,5) Arrowhead <i>Sagittaria sagittifolia</i> (1,6) Bittersweet <i>Solanum dulcamara</i> (3,5) Branched Bur-reed <i>Sparganium erectum</i> (3,6) Brooklime <i>Veronica beccabunga</i> (2,1) Bulrush <i>Typha latifolia</i> (2,4) Celery-leaved Buttercup <i>Ranunculus sceleratus</i> (1,5) Common Marsh-bedstraw <i>Galium palustre</i> (1,2) Common Reed <i>Phragmites australis</i> (1,1) Common Spike-rush <i>Eleocharis palustris</i> (1,1) Creeping Bent <i>Agrostis stolonifera</i> (5,6) Fool's-water-cress <i>Apium nodiflorum</i> (3,4) Greater Pond-sedge <i>Carex riparia</i> (2,1) Hard Rush <i>Juncus inflexus</i> (1,1) Marsh Horsetail <i>Equisetum palustre</i> (1,1) Marsh-marigold <i>Caltha palustris</i> (1,1) Reed Canary-grass <i>Phalaris arundinacea</i> (6,6) Reed Sweet-grass <i>Glyceria maxima</i> (6,6) Water Forget-me not <i>Myosotis scorpioides</i> (2,3) water-cress <i>Nasturtium officinale</i> agg. (2,6) Water-plantain <i>Alisma plantago-aquatica</i> (1,3) Yellow Iris <i>Iris pseudacorus</i> (1,3) Number of species = 22	Recorded in both 2002 and 2013 Canadian Waterweed <i>Elodea canadensis</i> (1,5) Common Duckweed <i>Lemna minor</i> (6,6) Fennel Pondweed <i>Potamogeton pectinatus</i> (3,1) Flat-stalked Pondweed <i>Potamogeton friesii</i> (6,3) Ivy-leaved Duckweed <i>Lemna trisulca</i> (6,6) Nuttall's Waterweed <i>Elodea nuttallii</i> (6,6) Rigid Hornwort <i>Ceratophyllum demersum</i> (6,1) Shining Pondweed <i>Potamogeton lucens</i> (4,4) stonewort <i>Chara/Nitella</i> (5,1) Yellow Water-lily <i>Nuphar lutea</i> (5,6) Number of species = 11
Recorded in 2002 but not in 2013 Number of species = 0	Recorded in 2002 but not in 2013 Fat Duckweed <i>Lemna gibba</i> (3,0) Number of species = 1
Recorded in 2013 but not in 2002 Flowering-rush <i>Butomus umbellatus</i> (0,6) Lesser Pond-sedge <i>Carex acutiformis</i> (0,2) Lesser Water-parsnip <i>Berula erecta</i> (0,6) Pink Water-speedwell <i>Veronica catenata</i> (0,1) Soft-rush <i>Juncus effusus</i> (0,1) Toad Rush <i>Juncus bufonius</i> (0,2) Tufted Forget-me not <i>Myosotis laxa</i> (0,4) Water Mint <i>Mentha aquatica</i> (0,2) Number of species = 8	Recorded in 2013 but not in 2002 Broad-leaved Pondweed <i>Potamogeton natans</i> (0,1) Fan-leaved Water-crowfoot <i>Ranunculus circinatus</i> (0,3) Unbranched Bur-reed <i>Sparganium emersum</i> (0,5) water-starwort <i>Callitriche</i> sp. (0,1) Number of species = 4

Values in brackets indicate the number of 500m lengths (out of six) in which each plant was recorded in 2002 and 2013 respectively.

Table 3. Summary of species richness, Σ abundance scores and hierarchical richness index for aquatic plants in the Pocklington Canal, July 2013

	Non-navigable canal	Navigable canal	<i>p</i> *
	Mean (range) s.d.	Mean (range) s.d.	
Number of plants per 500m			
All plants	13.8 (7-18) 4.0	25.0 (21-34) 4.6	<0.05
Emergent plants	8.0 (3-12) 3.1	16.8 (12-24) 3.6	<0.05
Submerged and floating-leaved plants	5.8 (4-8) 1.3	8.2 (6-10) 1.6	0.05
Σ abundance scores per 500m			
All plants	24.8 (13-33) 7.1	38.3 (31-48) 5.8	<0.05
Emergent plants	13.5 (5-19) 5.6	24.0 (19-33) 4.3	<0.05
Submerged and floating-leaved plants	11.3 (8-15) 2.1	14.3 (8-18) 4.3	NS
Hierarchical richness index per 500m			
All plants	158 (41-255) 74.2	396 (265-660) 134	<0.05
Emergent plants	55.5 (8-96) 33.6	177 (96-331) 73.3	<0.05
Submerged and floating-leaved plants	33.8 (17-58) 12.9	53.5 (24-72) 20.7	NS

s.d.= standard deviation. *Mann-Whitney *U*-test, $n_1=n_2=6$. NS= $P>0.05$.

Table 4. List of checklist vascular aquatic plants (excluding water-starworts) that have been recorded from the Pocklington Canal in earlier surveys but were not recorded in 2013

Species	Year of survey				
	1986 ¹	1990 ²	1996 ³	2002 ⁴	2007 ⁵
* <i>Alisma lanceolatum</i> Narrow-leaved Water-plantain	+	+	+	-	+
<i>Azolla filiculoides</i> Water Fern	-	+	-	-	-
* <i>Baldellia ranunculoides</i> Lesser Water-plantain	+	+	-	-	-
* <i>Ceratophyllum submersum</i> Soft Hornwort	+	+	-	-	-
<i>Equisetum fluviatile</i> Water Horsetail	+	-	-	-	-
* <i>Groenlandia densa</i> Opposite-leaved Pondweed	+	+	+	-	-
<i>Juncus conglomeratus</i> Compact Rush	+	-	-	-	-
<i>Juncus subnodulosus</i> Blunt-flowered Rush	+	-	-	-	-
* <i>Lemna gibba</i> Fat Duckweed	+	+	+	+	-
* <i>Myosotis secunda</i> Creeping Forget-me-not	+	-	-	-	-
* <i>Myosoton aquaticum</i> Water Chickweed	-	-	-	-	+
<i>Myriophyllum spicatum</i> Spiked Water-milfoil	+	-	+	-	-
* <i>Oenanthe fistulosa</i> Tubular Water-dropwort	-	-	-	-	+
* <i>Potamogeton berchtoldii</i> Small Pondweed	+	-	+	+	-
* <i>Potamogeton perfoliatus</i> Perfoliate Pondweed	-	-	+	-	-
<i>Potamogeton pusillus</i> Lesser Pondweed	-	+	-	-	-

Species	Year of survey				
	1986 ¹	1990 ²	1996 ³	2002 ⁴	2007 ⁵
[†] <i>Ranunculus aquatilis</i> agg. Common Water-crowfoot	+	-	-	-	-
<i>Rumex hydrolapathum</i> Water Dock	-	-	-	-	+
<i>Veronica anagallis-aquatica</i> Blue Water-speedwell	+	-	-	-	-
<i>Zannichellia palustris</i> Horned Pondweed	+	+	+	-	-

(+) indicates a record at least at one site along the canal, (-) indicates not recorded.

The earlier surveys were: ¹Tolhurst (1987); ²Head (1991); ³Scott Wilson Resource Consultants (1997); ⁴Goulder (2003); ⁵Scott-Wilson Ltd (2008).

[†]Species considered to be rare/scarce using national criteria; *Species considered to be rare/scarce using local/regional criteria (Middleton & Cook, 2013).

Notable spiders recorded in Yorkshire in 2013

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This report lists the spiders recorded by myself in Watsonian Yorkshire during 2013 which are considered to be noteworthy, owing to the lack of recent records. Almost all the survey work was undertaken in upland habitats (mires, peatbogs and acid grassland) within the Yorkshire Dales and North York Moors National Parks. These surveys focussed on habitats and locations with historical records of some of our rarest spiders (i.e. UK Priority species/species of principal importance). Surveys were completed during three separate periods (January-April, August-October and November-December 2013). Separate reports will be published in due course describing these surveys in more detail. A total of 114 species were recorded in VC62, VC64 and VC65 of which 13 are considered noteworthy and are detailed in tables 1 and 2 below.

Table 1. Family Linyphiidae

Species	Site and VC	Status in Yorkshire	General comments
<i>Ceratinella scabrosa</i>	Great Shunner Fell (VC65)	First record for VC65 and only the ninth record for Yorkshire. Most records are post-1990.	A species of southern Britain, it is frequent (historically). However, in recent times, records have become less frequent but no obvious decline. Yorkshire is at the northern edge of its range.
<i>Walckenaeria alticeps</i>	Tarn Moss, Malham (VC64)	First Watsonian Yorkshire record.	Probably a northern species in Europe, though only separated from <i>W. antica</i> in 1952. It is associated with <i>Sphagnum</i> mires and bogs shaded by taller vegetation (e.g. Purple Moor-

Species	Site and VC	Status in Yorkshire	General comments
			grass <i>Molinia caerulea</i> , Bog Myrtle <i>Myrica gale</i> or birches. Appears to be rarely recorded.
<i>Walckenaeria nodosa</i>	Tarn Moss, Malham (VC64)	Only the 5th record in Yorkshire since the early 1980s.	Widespread though uncommon in Britain and reportedly declining, though not included in the UK's priority list. Most recent records largely confined to Wales and Scotland. It is recorded in wetlands amongst moss within a wide range of habitats. Appears to be autumn and winter active.
<i>Pelecopsis parallela</i>	Pen-y-Ghent (VC64)	Only the 2nd record for VC64 (last in July 1961) and 6th record for Watsonian Yorkshire.	Widespread but scattered south of the Humber, rarely recorded inland to the north. Occurs in a variety of habitats including moss, detritus in woods, under stones and, especially, in calcareous and acid grasslands.
<i>Scotinoylus evansi</i>	Ingleborough and Rylton Fell (VC64)	First records in VC64 since 1985.	Another species associated with high ground, restricted to northern England and Scotland but absent in Wales. It is associated with grassland and heather, possibly amongst stones and other refugia. This may be under-recorded owing to its cryptic lifestyle.
<i>Latithorax faustus</i>	Ingleborough and Rylton Fell (VC64)	First records in Watsonian Yorkshire since 1990 and first for VC64 since 1984.	An upland species of open habitats such as grassland and mire. Lack of modern records in Yorkshire has restricted our understanding of its ecology as it may be under-recorded.
<i>Semijicola caliginosus</i>	Bull Bogs, Buttertubs Pass and Great Shunner Fell (VC65)	Apart from one record in October 2003, no previous records for 30 years.	Nationally Notable b (Nb) & UK Priority species. A species associated with dense <i>Sphagnum</i> seepage lines within wet mire vegetation.
<i>Leptothrix hardyi</i>	Egton Moor (VC62)	A rare species with only 17 previous records; 3 of which have been in the last 20 years.	Generally recorded in wet habitats in heathland during the winter months. Old records in southern England. Most modern records in west Wales and northern Scotland.
<i>Hilaira nubigena</i>	Buckden Pike (VC65)	First record for 33 years and only the 14th record since 1900.	Nationally Notable a (Na). A species of wet areas, usually in association with <i>Sphagnum</i> or <i>Juncus</i> on moorland, mostly between c.400m and 700m. Adults are found in Aug. and Sept. and probably over-winter.

Species	Site and VC	Status in Yorkshire	General comments
<i>Hilaira pervicax</i>	Ingleborough and Tarn Moss, Malham (VC64) and Whernside (VC65)	Only 3 records in Watsonian Yorkshire in last 30 years. First record from VC65 since the mid-1980s	Nationally Notable (b). Found in wet places on high ground, associated with <i>Sphagnum</i> and other wetland vegetation. Consequently, it is restricted to the northern Pennines in England with most records in the Highlands of Scotland and an outlying population in Snowdonia.
<i>Centromerus arcanus</i>	Buckden Pike (VC65)	First record for VC65 and first anywhere in Watsonian Yorkshire for more than 30 years.	A species of north-western Britain and much of Wales. Yorkshire falls at the south-eastern edge of its range. It occurs in upland bogs and woodlands amongst moss.
<i>Lepthyphantes angulatus</i>	Rylton Fell (VC64)	Only the 6th record in 20 years.	Associated with the north Pennines and the higher areas of Scotland and north Wales, but does not appear restricted to a particular habitat. The lack of Yorkshire records probably reflects under-recording.

Table 2. Family Araneidae

Species	Site and VC	Status in Yorkshire	General comments
<i>Hypsosinga albovittata</i>	Moorsholm Moor (VC62)	Only 7 previous records in Watsonian Yorkshire from Strensall or Skipwith Commons. New record for North York Moors NP.	A small orb-web spider associated with heathland which has a scattered distribution in the UK. Note that this was an immature specimen.

The majority of the noteworthy spiders have not been recorded in Yorkshire for several decades, some upwards of 30 years. This may reflect a lack of recording effort in these upland habitats, especially during the winter months. Having said this, the mires and peatbogs associated with Malham Tarn National Nature Reserve have been visited by many arachnologists (e.g. Eric Duffey) who have failed to record these species regularly, so they may well be genuinely rare or at least present at very low densities. Information on ecology is taken from the Spider Recording Scheme website (<http://srs.britishspiders.org.uk>).

Acknowledgements

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The social history of ornithology: inscriptions in copies of Robert Dunn's 1837 *Ornithologist's Guide*

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Introduction

The Hull taxidermist-dealer Robert Dunn (1789-1859) has until fairly recently been a somewhat obscure figure, known mainly from information published in his only book *The Ornithologist's Guide to the Islands of Orkney and Shetland* (Dunn, 1837). However, more details about his life and family, particularly one of his sons, Joseph Henry (1827?-1872), are now emerging (Limbert, 2007; Williams, 2012a). During a bibliographical study of *The Ornithologist's Guide* (Williams, 2012b), 57 copies, some of which contain presentation inscriptions by the author or other persons, or signatures and notes of owners, were traced in various libraries around the world.

The inscriptions found are transcribed herein, providing a contribution to the social history of ornithology centred on Robert Dunn. Whilst some of the persons mentioned clearly could not have known Dunn, their ownership of his book might add to knowledge of their connections with other persons in the field of ornithology or even more widely. Of greatest importance, however, are revelations of hitherto unknown associates of Dunn himself. Moreover, some inscriptions have already provided valuable information on the publishing history of *The Ornithologist's Guide* (Williams, 2012b).

Author's presentation inscriptions

Three presentation inscriptions by Robert Dunn were discovered (Table 1) but, unfortunately, none is dated. Figure 1 shows one of them, providing a sample of Dunn's handwriting. Attempts were made to identify the recipients of these presentation copies of *The Ornithologist's Guide* (numbered in bold type according to Table 1):

Table 1. Verbatim presentation inscriptions by Robert Dunn in copies of *The Ornithologist's Guide*.

No.	Presentation inscription	Library and shelf-mark
1	<i>To Captn Parker. From the <u>author</u></i>	Hull History Centre, Hull, UK (L.001 DUN)
2	<i>R. C. H. Wallendahl Esqr. Bergen Norway Presented by the Author.</i>	David R. Wilson, UK (DW/1)
3	<i>To Mr. Driffill. From the author</i>	Thomas Fisher Library, Toronto, Canada (Science 00802)

1. It seems very likely that the “Captn Parker” was John Parker (1800-1867), master for many years of the barque *Truelove* (Lubbock, 1937), perhaps the most famous of the Hull whalers. From the “Weide Fiord, East-side Davis’ Straits”, Parker (1853) wrote “An unexpected chance of despatch permits me the opportunity of inflicting a few hasty lines upon your patience with a very brief epitome of the leading occurrences which have happened to this jolly old barque.” This light-hearted introduction belied the dramatic account of the *Truelove*’s survival of storms, ice and a stove-in hull. She was the last of the Hull whaling fleet to sail to the Davis Strait in 1867, there having been more than sixty ships in older times (Anon, 1867).

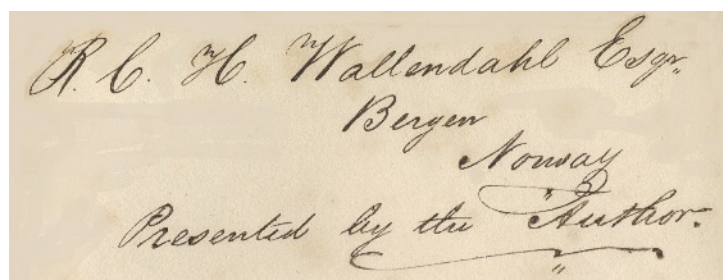


Figure 1. Presentation inscription (no. 2) of Robert Dunn to R. C. H. Wallendahl of Bergen, Norway.

Parker had relinquished command of the *Truelove* by 1854 (Anon, 1854) but continued as master of other ships at least until 1858 (McClintock, 1858). He was renowned for his bravery and humanitarian values, having saved the lives of wrecked sailors (Anon, 1852), played a significant role in the search for the ill-fated Franklin Expedition (Anon, 1849; Parker, 1851), and brought back to Hull in 1847 a young married couple of “Esquimaux” (Anon, 1847, 1867) in order to bring to the attention of the British public the poor treatment of the Inuits at the hands of European whalers and sealers. The Esquimaux couple, 17 and 15 years old, were accompanied by a live half-grown Polar Bear *Ursus maritimus*! (Anon, 1847).

Though this identification of Parker is practically certain to be correct, his particular connection with Robert Dunn must at present remain speculative. Doubtless, however, Parker could have been an invaluable source of information on the natural history of arctic waters and islands, may have brought back specimens and may even, on occasion, have transported Dunn with his heavy equipment to the Shetland Islands and back. Dunn made his first collecting-trip to Shetland on 21 March 1831 (Dunn, *l.c.*), where the Davis Strait whalers would often break their journeys northwards to take on extra crew and prepare for the Atlantic crossing (Scoresby, 1820; Dunn, *l.c.*). It was certainly not Parker, however, who transported Dunn in 1831 since he had already sailed for the Davis Strait from Lerwick, Shetland, on 27 January (Anon, 1831), commanding the *Harmony*.

Nevertheless, Dunn's trip falls within the period when most whalers sailed north out of Hull and Newcastle. For instance, Captain George Palmer of the *Cove* logged his northward voyages between 18 March and 11 April during the years 1820-1832, with dates of return to the home port between 21 September and 10 November (Stonehouse & Gunn, 2013). The whalers would yet again stop off at Orkney or Shetland during their home voyages, and these dates are consistent with Dunn's return from Shetland to Hull in October or November of 1831 (Dunn, *l.c.*: 1). Likewise, Dunn's visit to Orkney in 1832 spanned spring to autumn (Dunn, *l.c.*: 1), during which time he married a Stromness woman (Limbert, *l.c.*: 2). Closing another visit to Orkney in 1833 he obtained a passage back to Hull on the whaler *Isabella* on 13 October, her having just rescued the survivors of Captain John Ross's polar expedition (Dunn, *l.c.*; Limbert, *l.c.*: 2). Master of the *Isabella* was Captain Humphreys (Anon, 1833); hence, Parker was just one of several whaler captains who could have facilitated Dunn's expeditions to the northern islands. Of course, Dunn could also have availed himself of the various commercial steam-vessels plying between Hull and Leith or the schooners and sloops sailing from Leith to Lerwick, Kirkwall and Stromness (Dunn, *l.c.*: 127-128).

2. The name of R.C.H. Wallendahl and his association with the town of Bergen (Figure 1) is so distinctive that it is extremely unlikely to have been anybody other than Rasmus Carolius Hansen Wallendahl (1823-1896), the son of Ellert Andreas Wallendahl, who established the Wallendahl Trading House as a supplier of hardware in 1822. Rasmus passed the merchants' examination in 1839 at the age of 16, after which he was sent on an educational tour of England, France and Germany, although the dates of this tour are uncertain. He became a partner in his father's company in 1848, ultimately becoming a very wealthy businessman.

The circumstances surrounding Robert Dunn's presentation to Wallendahl are puzzling; unfortunately, it is not dated. Wallendahl would have been only 14 years old when *The Ornithologist's Guide* was published in 1837 and he could have visited England no earlier than 1839, so his meeting Dunn around that time seems rather unlikely. Furthermore, it is difficult to envisage what interest the young man might have had in Dunn's book. His only tenuous link to natural history appears to be his gift of a stuffed "Mountain Grouse" (presumably a Ptarmigan *Lagopus muta*) to the Bergen Museum in 1853. Other than that, he became involved in the manufacture of fishing-hooks, but that was not until the 1870s, so ornithology and hunting do not seem to have been of any special interest to him.

However, Dunn did not necessarily present his book to Rasmus Wallendahl in England. Plausible explanations for this presentation copy might depend on Robert's travels. There is now firm evidence that he collected eggs in Norway in 1840 (see Appendix 1) and there are tenuous clues that he may also have made other visits there. For instance, Cambridge University Zoological Museum has a Golden Plover *Pluvialis apricaria* skin from Norway in the H.E. Strickland Collection, supplied by Robert in 1838 (Salvin, 1882) and in 1842 he offered eggs and skins of the Great Auk *Pinguinus impennis* to the Doncaster taxidermist-dealer Hugh Reid, who wrote to Robert Champey in 1860 "I believe he had them from Norway" (Grieve, 1885), although it is certain that Great Auk specimens could not have been actually collected there (M. Limbert, *in litt.*, 4 September 2013). Hence, neither of these instances proves absolutely that Robert visited Norway; in either case, material could equally have been sent to him in Hull by some Norwegian

agent. Unless further evidence emerges, Dunn's only proven visit to Norway remains that in 1840.

Perhaps he obtained supplies for his 1840 and/or other Norwegian expeditions in Bergen and, if that were the case, he might well have presented his book to Rasmus when dealing with his father as a way of developing a rapport with the Wallendahl family and cementing a firm business relationship. The words "Presented by the Author" certainly seem more formal than simply "From the author", as in the other presentation inscriptions. Furthermore, the Bergen Museum's "Mountain Grouse" might have been a Dunn specimen originally presented to the Wallendahl family but it has not proved possible to confirm this. Another possibility is that Rasmus and Dunn met in Shetland at some time after Dunn settled there in 1842 (Limbert, *l.c.*), since the Wallendahl Trading House might have had business connections in Shetland.

3. There are no clues to identify "Mr. Driffill". Whoever he was, he was quite probably a local resident, since that surname is concentrated particularly in Yorkshire and Lincolnshire. However, Pigot's 1834 Directory of Hull has only a single record of that name in trade: Thomas Driffill, a ship chandler of West End Old Dock. Whilst it is possible that Robert Dunn, as a fellow tradesman and occasional seagoing traveller, might have had a connection with such a person, I have no evidence at present.

Table 2. Owners' and presentation inscriptions in Robert Dunn's *The Ornithologist's Guide*. Additional notes and queries in square brackets.

No.	Named owners' inscriptions	Library and shelf-mark
4a & b	<i>Thos B Locke</i> [or Loche, or Lache?]. <i>From the library of J. Cochin</i> [?]	Hull History Centre, Hull, UK (L.001 DUN)
5a & b	<i>C.D. Heathcote London 21 April 1899.</i> <i>So scarce that when I was first at Stromness in 1861 the Author's Son (who was afterwards drowned) could neither give or sell me a Copy. He is mentioned on Page 24 & 61.</i> <i>H. W. Feilden. From C. D. Heathcote 10 February 1900</i>	Hull History Centre, Hull, UK (L.001 DUN)
6	<i>W^m Jardine</i> [Notes on provenance and references to Elwes (1930)]	Royal Ontario Museum, Toronto, Canada [RB.QL690.G7D86.1837]
7a & b	<i>W. B. Alexander.</i> <i>Cpt. Kellan</i> [?] <i>Johnstone</i>	Alexander Library of Ornithology, Oxford, UK (RBC)
8	<i>This book is now scarce & worth threble its former value.</i> <i>H.S. 1870</i>	University Library, Bristol, UK (Restricted W)
9	[Erasure] <i>16th Feby 1837</i> <i>Alfred Newton, 19 May 1864</i>	Newton Library, Zoology Department, Cambridge, UK (Brit 143)
10a & b	<i>Charles Waterton, Walton Hall a present from him to his ever dear friend Doctor Hobson</i>	Newton Library, Zoology Department, Cambridge, UK (Brit 171)
11	<i>William Lagin 1840</i>	David R. Wilson, UK (DW/3)

No.	Named owners' inscriptions	Library and shelf-mark
12a, b, c & d	<i>B^t from Quaritch Aug 1918 for 13/- E Forbes in remembrance of T. Bazett Tytte 1841 [sic] Percy E. Coombe Nov.' 1857.</i>	Radcliffe Science Library, Oxford, UK (18961.E.271)
?13	<i>H. E. Dresser 7. New Broad Street EC.</i>	John Rylands Library, Manchester, UK (R216484)
14	<i>H. Wyndham</i>	Hull Reference Library, Hull, UK (598.294113 RT)
15	<i>William MacGillivray</i>	University Library, Aberdeen, UK (SB 5987(4112) Dun 1)
16	<i>From J. A. Harvie-Brown</i>	David L. Clugston, UK
17	<i>C.D. Heathcote, London, 4th May. 1903. So scarce, that when I was first at Stromness in 1861, the Author's Son (who was afterwards drowned) could not sell me a Copy. He is mentioned on Pages 24 & 61. Great Awk. P. 103 [At the end of this copy is a manuscript excerpt from Evans & Buckley (1899: xix)]</i>	Shetland Museum and Archives, Lerwick, UK (SA4/1759)
18	<i>JH Gurney Jun Northrepps May / 83</i>	Natural History Society of Northumbria, UK (598.29411)
19a & b	[Letter from William Yarrell to J. G. Barclay tipped in - see transcription by Williams (2012b: 70)]	Royal Library, Copenhagen, Denmark (8 Zool. 15265/500)
20a & b	<i>Presented to John Barrow Esq with the best respects of the Editor Edwin C Prince Jan. 25 : 1854.</i>	Smithsonian Institution Libraries, Washington DC, USA (QL690.G7D86 1837 SCNHRB)
21a & b	<i>John Scott Esquire of Scalloway from his Affectionate Son John James Scott</i>	Shetland Museum and Archives, Lerwick, UK (SA4/2475/111)

Other inscriptions

Eighteen other copies of *The Ornithologist's Guide* were found to contain presentation inscriptions, signatures of owners or other notes. Although some names are those of well-known personages, others remain enigmatic. Some later owners of Robert Dunn's book would not, of course, have known him at all, crucial time-points being Dunn's removal from Hull to Shetland in 1842 and his death in Hull in 1859 (Limbert, *l.c.*). Nevertheless, all the inscriptions found are here transcribed (Table 2) since they may provide important information relevant to future research on Robert Dunn, his associates or later owners of *The Ornithologist's Guide*. Notes on persons identified with certainty and some slightly questionable identifications (numbered in bold type according to Table 2) follow:

5b. Henry Wemyss Feilden (sometimes spelt Fielden) (1838-1921), Confederate soldier in the American Civil War, British army officer, amateur ornithologist and naturalist on *H.M.S. Alert* (National Arctic Expedition, 1875-76) (see Mullens, 1921; Sauer, 1982: 196; Mearns & Mearns, 1998; Beolens & Watkins, 2004). Feilden was a close friend of Rudyard Kipling (1865-1936), who habitually addressed his letters to "Colonel Sahib" or "The Destroyer of Winged Birds" (Pinney, 1999). A mutual acquaintance was J.H. Gurney, junior (**18**) (Pinney, *l.c.*: 20). Kipling's letters to Feilden include several observations on ornithology but, interesting though they may be, neither

individual would have known Robert Dunn and Feilden received his copy of *The Ornithologist's Guide* as a gift from C.D. Heathcote (**5a**) as late as 1900.

6. Sir William Jardine (1800-1874), 7th Baronet of Jardine Hall, Applegirth, Dumfriesshire (see Mullens & Swann, 1917: 309-311; Jackson & Davis, 2001). Since Jardine most certainly knew John Gould and his business manager Edwin Prince, who edited Robert Dunn's book (see **20b**), he may well have known Dunn through them.

7a. Wilfrid Backhouse Alexander (1885-1965), founder of the Alexander Ornithology Library and first director of the Oxford Bird Census (predecessor of the Edward Grey Institute) (see Nicholson, 1966). Alexander was born too late to have had any connection with Robert Dunn.

8. The style of handwriting of the initials "H.S." closely matches that of Howard Saunders (1835-1907) and the date '1870' is consistent with that identification. The inscription probably dates from when Saunders obtained his copy, long after Robert Dunn had died, and no doubt is a rueful reflection on the price he had to pay! His spelling "threble" is most odd; it appears that he was uncertain whether to write "thrice" or "treble".

9. Alfred Newton (1829-1907), Professor of Zoology and Comparative Anatomy, University of Cambridge, 1866-1907 (see Mullens & Swann, *l.c.*: 442-448). Newton could not have known Robert Dunn when he published his book but may have become acquainted with him shortly before he died. Newton apparently acquired the book in 1864, long after Dunn died; the date '1837' in the other inscription must be associated with the original, unidentified owner whose name is apparently erased.

10a. Charles Waterton (1782-1865) of Walton Hall, Wakefield, the well-known eccentric naturalist (see Moore, 1871; Mullens & Swann, *l.c.*: 615-617). Considering Robert Dunn's depredations of the birds of Orkney and Shetland and in view of his own sympathetic attitude to nature conservation, this book was a curious gift for Waterton to have made to his friend Richard Hobson. Doubtless, though, Waterton lived at a time and place that would have facilitated possible contact with Dunn, and they also shared a common interest in taxidermy.

10b. Richard Hobson (1782-1865) of Park Place, Leeds, Honorary Physician at Leeds General Infirmary (1832-1839) and close friend and biographer of Charles Waterton (see Hobson, 1866).

12a. "Quaritch" was the well-known London book-dealer Bernard Alexander Christian Quaritch (1819-1899) but only his company name survived when this copy was bought in 1918.

12b. "E. Forbes" is very likely to have been Edward Forbes (1815-1854), the eminent marine biologist, botanist and geologist who died having only just been appointed Professor of Natural History at Edinburgh University. Although Forbes is not generally known for any great interest in birds (Mullens & Swann, *l.c.*: 211), Salvin (*l.c.*: xi) lists "FORBES, E., Professor, *Edinburgh*" as one of the sources of bird skins in the Hugh Strickland (1811-1853) Collection in the Cambridge University Museum of Zoology. All the Forbes specimens are given as "Orkney (*Forbes*) 1837" or "Orkney (*E. Forbes*) 1837", the year being that when Strickland received the skins. The 18-years-old Forbes had visited the Orkneys in June 1833 but was ashore for only a few hours and,

although close to sea-bird roosts, he apparently collected mostly botanical specimens; he did not return to the Orkneys until 1839 (Wilson & Geikie, 1861: 204-206, 245). Coincidentally, Dunn was also in the Orkneys from January to September 1833 (Dunn, *l.c.*). Could he have supplied some bird skins to Forbes, who later passed them to Strickland? So far, however, there is no evidence that Forbes met Dunn on that occasion and the identity of the person who presented Dunn's book to Forbes remains unknown. Whilst Forbes and Strickland interacted professionally as geologists, their shared ornithological interest is not widely known, although letters (E-0532, 16 February 1841; E-1779, 26 August 1841; E-1780, 20 April 1842) between them about making observations on birds and obtaining specimens during Forbes's travels are held by the Cambridge University Museum of Zoology (Rookmaaker, 2010). However, Dunn's direct connection with either Forbes or Strickland is tenuous at best. Although Edwin Brown, a Burton-on-Trent naturalist, informed Strickland of Dunn's Shetland address (E-0158, 3 October 1850), no letters between them are preserved in the Strickland archive (Rookmaaker, 2010).

12c. Disappointingly, T. Bazett Tytte, mentioned "in remembrance" in the 1841 E. Forbes inscription, is not recorded as an associate of the famous Edward Forbes (see Wilson & Geikie, *l.c.*), nor could I find any other record of this man.

13. Henry Eeles Dresser (1838-1915), businessman and sometime Secretary of the British Ornithologists' Union 1882-1888 (see Mullens & Swann, *l.c.*: 178-180). Considering his year of birth and his profession, Dresser is unlikely to have known Robert Dunn. The address "7 New Broad Street EC" adds another to the four private addresses in London, besides the Athenaeum Club, listed for Dresser in the archives of the Natural History Museum, London.

15. William MacGillivray (1796-1852), Conservator of the Museum of the Edinburgh College of Surgeons (1831-1841) and Professor of Civil and Natural History in Marischal College, Aberdeen (1841-1852) (see Mullens & Swann, *l.c.*: 367-372). MacGillivray was an eminent ornithologist and author who was likely to have had an interest in the northern islands and so may well have known Robert Dunn.

16. John Alexander Harvie-Brown (1844-1916) of Dunipace House, Larbert, Stirlingshire, sometime editor of the *Scottish Naturalist* and author of several volumes on the vertebrate fauna of Scotland (see Mullens & Swann, *l.c.*: 279-284; Freeman, 1980). Considering his year of birth, Harvie-Brown almost certainly could not have known Robert Dunn, but he took considerable interest in his past activities and those of his son Joseph in the Orkneys (Buckley & Harvie-Brown, 1891).

17. C.D. Heathcote remains unidentified but might have been related in some way to John Moyer Heathcote (1834-1912) and John Norman Heathcote (1863-1946) (see Mullens & Swann, *l.c.*: 290), although I have no evidence for that at present. This inscription is almost identical to the one he made in another copy (see Table 2, **5a**) and shows that he met Joseph H. Dunn in Stromness. In the copy containing inscription no. **17** there is an account of Robert's visits and residence in Shetland on the rear free endpaper taken from a book and transcribed *verbatim* here:

"In 1838 M^r. R. Drozier of Holt in Norfolk visited Shetland, & with his paper in the 3rd. volume of Loudon's Magazine began a new epoch for the islands. Since that date the

interest aroused in the ornithologists of England has never flagged, though a regrettable increase in the number of birds shot & of eggs taken has to be recorded. The 1st. serious instance of depridation [*sic*] was in 1831, when Robert Dunn, a Hull bird-stuffer, resided in Shetland from the end of March till October or November; he subsequently paid a couple of visits to the Orkneys, & returned to Shetland in 1835. Possibly he has been made to some extent the scapegoat of the sins of others, but that he distinctly contributed to the diminution of various species cannot be doubted, & evidence to that effect can be gathered from his Ornithologist's Guide to the Islands of Orkney & Shetland, published at Hull in 1837. Dunn was again in the islands from the spring of 1843, until the same season of 1848, if not later, during which years his main residence was at Helister [*sic*], near Weisdale." Shetlands. By T. E. Buckley & A. H. Evans. 1899. (?).

Heathcote's stated source of this excerpt is incorrect; it should be Evans & Buckley (1899: xix).

18. John Henry Gurney, junior (1848-1922) of Northrepps, Norfolk, philanthropist and eminent ornithologist and son of John Henry Gurney, senior (1819-1890), an equally eminent ornithologist (see Mullens & Swann, *l.c.*: 259-264; Gurney, 1923). Considering his year of birth, Gurney is unlikely to have known Robert Dunn.

19a. William Yarrell (1784-1856), London newspaper agent, sportsman, naturalist and author (see Mullens & Swann, *l.c.*: 667-672). Yarrell's letter is transcribed in full by Williams (2012b: 70); it refers to a London agent for Robert Dunn's book, most probably (in view of its date) John Van Voorst (1804-1898). Yarrell's personal friendship with Van Voorst is well known (Williams, 2004). However, the mutual interconnections involving Yarrell, John Gould (Dunn's other selling agent), Gould's secretary Edwin Prince (see **20b**) and William Jardine (see **6**) are not so generally known (Jackson & Davis, *l.c.*: 130). Clearly, Dunn was known to Prince, who edited *The Ornithologist's Guide*, and he also could have had direct contact with Yarrell and maybe Jardine, although no letters between them appear to be known. However, letters between both Robert and Joseph H. Dunn and John Gould do exist (Limbert, *l.c.*: endnotes 22, 50; Sauer, 1995). These men would have had much in common, since Gould was also a taxidermist in his early life (Lambourne & Jackson, 1993).

19b. Joseph Gurney Barclay (1816-1898), Quaker banker and amateur astronomer of Knotts Green House, Leyton (or Leighton), Essex. As well as Yarrell's 1839 letter to him, this copy of *The Ornithologist's Guide* contains Joseph Barclay's bookplate (presumably as of 1839) and also the bookplate of his son Edward Exton Barclay (1860-1948) of Brent Pelham Hall, Hertfordshire, Master of the Puckeridge Hunt. Barclay knew Yarrell personally, as indicated by the note: "Joseph Gurney Barclay, Esq., who lives at Leighton, on the London border of Epping Forest, pointed out to me a nest of this bird [the Hawfinch *Coccothraustes coccothraustes*] in an apple tree in his garden. This gentleman had also taken a nest from a tall whitethorn on [*sic*] the forest, from which example the figure forming the vignette to this account was drawn." (Yarrell, 1839: 485). Though not a well-known ornithologist, J. G. Barclay clearly took a more than passing interest in birds and made a small contribution to Yarrell's classic British bird book.

20a. This "John Barrow" cannot be Sir John Barrow (1764-1848), commemorated in the eponymous Barrow's Goldeneye *Bucephala islandica*, since he had died by 1854 when this

presentation was made. No such person is numbered among the associates of Edwin Prince (see **20b**) nor John Gould by Sauer (1982, 1995).

20b. Edwin Charles Prince (1809-1875), secretary and business manager from 1830 to 1875 for John Gould (1804-1881), the self-published ornithologist (see Sauer, 1982; Lambourne & Jackson, *l.c.*; Jackson & Davis, *l.c.*: 129-130). This inscription (Table 2, also Williams, 2012b: Figure 2) provides the evidence for Prince's having edited *The Ornithologist's Guide* for Dunn (Mullens & Swann, *l.c.*: 186) and, furthermore, for Gould's acting as its selling agent (Williams, 2012b: 67-68). Pennington (2004) commented on the inclusion in Dunn's book of several quotations from Edmondston (1809). It seems quite likely that such insertions were made by Prince since he was well educated and, unlike Dunn, would presumably have had relatively easy access to such works. Prince's literary advice was apparently also valued by more eminent authors since he suggested (E-1198, 25 February 1845) changes to a paper by Hugh Strickland regarding public and private natural history collections (Rookmaaker, 2010).

21a. John Scott (1791-1850) of Scalloway, Shetland (see Grant, 1893: 239). As Robert Dunn lived at Hellister, not far from Scalloway, from 1842 to 1854 (Williams, 2012a), it is quite possible that he knew Scott and his son (**21b**), although neither father nor son appears to have published anything on birds.

21b. John James Scott (1816-1844), son of John Scott of Scalloway, Shetland (see Grant, *l.c.*: 239).

Supplementary notes

Two eggs collected by Robert Dunn and apparently once owned by John Gould are in the Natural History Museum at Tring (NHMT) (see Appendix 1 for details). Letters from Dunn to Gould c.1832 and 1848 (Limbert, *l.c.*: endnote 22) confirm that they knew each other, so it is possible that Dunn supplied the eggs directly. Other, admittedly tenuous, connections between Robert Dunn and egg-collectors, notably Henry Seebohm (1832-1895), are suggested by the occurrence of eggs supplied by him in other collections held in the NHMT (Appendix 1). There is often difficulty in proving whether Dunn collected those eggs personally and, furthermore, whether he was the direct supplier or only an intermediary. However, there is no doubt that John Drew Salmon (1802-1859) knew and personally dealt with Dunn; Salmon's egg-collection catalogue also provides firm evidence for Dunn's collecting in Norway, at least in 1840 (Appendix 1). Incidentally, there is the skin of a Golden Plover from Norway, supplied by Robert Dunn, in the Hugh Strickland Collection in the Cambridge University Museum of Zoology (Salvin, *l.c.*: 594). It is not known whether Dunn was the collector, direct supplier or intermediary; and since Strickland received the skin in 1838, none of this provides clear evidence for when the skin was actually collected nor whether Robert visited Norway to obtain it. Salvin (*l.c.*: x) attributed eight skins in the Strickland Collection index to "Dunn, Dealer, Hull" but six of the individual entries actually state "Illinois (*T. Dunn*) 1851", clearly a different person.

Robert was not the only one of his family to collect specimens in Norway (see previously in Wallendahl notes (**2**)). William Boynton Dunn did so in 1834, although that was in Svalbard in the far north (Williams, 2012a), where he unfortunately died. Furthermore, Buckley & Harvie-Brown (*l.c.*: 205) noted that "Dunn" (presumably Joseph, who succeeded to Robert's business in

1859) possessed some Norwegian Turnstone *Arenaria interpres* eggs (see also Appendix 3); whether he collected them himself or obtained them from some agent is unknown but perhaps they were inherited from Robert. Incidentally, another link between Robert and William B. Dunn, discovered since publication of Williams (2012a), is that whilst Robert was recorded as “late of 10, Castle-street” on 4 July, 1834 (Williams, 2012a: 141) William was resident at that address according to Pigot’s 1834 Directory of Hull. Perhaps some clues about the timing of Robert’s foreign collecting trips might be gained by analysing dates of the occasions when William apparently looked after the business in his absence (see Limbert, *l.c.*: endnote 4).

Some information on Robert and Joseph when at Stromness was recorded by Elwes (1930). Henry John Elwes (1846-1922) never knew Robert but bought eggs from him when only a schoolboy c.1854, ordered apparently from a printed catalogue. I have been unable to trace any such catalogue in British libraries but use of the word “published” (Elwes, *l.c.*: 14) might not necessarily allude to *printed* copies. Sale lists issued by Dunn are rare but the Natural History Society of Northumbria possesses a manuscript one of bird skins and eggs (Great North Museum: Hancock accession no. NEWHM: 2002.H1005) dated 19 April 1852, when the Duns lived in Shetland. However, perhaps what Elwes actually saw c.1854 was an earlier version of the list of British birds printed by Edward Newman that Dunn issued from Stromness in 1857, annotated with prices of eggs (Limbert, *l.c.*: Figure 2). If that were so, it would represent the earliest known example of a British egg-dealer’s catalogue (*cf.* Limbert, *l.c.*: 5). Interestingly, this allusion by Elwes to a published catalogue in 1854 coincides with Robert’s removal from Shetland to Orkney, when he might well have decided to issue more business-like lists from his new address. Furthermore, if Elwes really saw a *printed* egg-catalogue it would predate the earliest yet known, that published by Joseph, perhaps c.1867 (Limbert, *l.c.*: 9).

Such printed lists of bird names had been available for some years. Issued as folio sheets or folded into sections they were printed either on both sides for exchange lists or on one side for labelling collections (Williams, 1993). Significantly, the title of the list annotated by Robert, although reprinted by Newman, coincides almost exactly with that of one issued c.1845 by F. Makeig of Crewkerne (see Freeman, *l.c.*: no. 3677). Van Voorst later advertised *A List of British Ornithology* at 2s. per dozen (inserted in Newman, 1849), followed by *The ‘Zoologist’ List of Birds Observed in Great Britain and Ireland* (c.1856, at 2d. each) which, as *The Zoologist List of British Birds*, cost 3d. post-free, printed on both sides, or 5d. post-free, printed on one side in July 1866 (inserted in Crichton, 1866). These lists would have been available in bulk but, because of their particular purposes, few now survive intact.

Elwes went with A.W. Crichton to Stromness in 1865 where they lodged with Joseph, who also acted as their guide and boatman (Elwes, *l.c.*: 23) (see Appendix 2 for further details). More anecdotes involving field-trips with Joseph are provided in Crichton (*l.c.*), which records his earlier visit during May and June of 1860. Clearly, Joseph regularly supplemented his naturalist’s trade in the Orkneys by providing comprehensive “package holidays” for bird collectors (see also Limbert, *l.c.*: 9); he advertised accommodation and various activities in his printed *Priced Catalogue* (see Cole, 2006). However, these island expeditions were not for the faint-hearted; sadly, Joseph and his boatman John Heddle were drowned returning from a shooting excursion on 28 November 1872, although their client, an army officer named Captain Campbell, survived (Anon, 1872a, 1872b, 1872c; Elwes, *l.c.*: 23).

J.A. Harvie-Brown (16) certainly never met Robert Dunn but he took considerable pains to obtain information about him for Buckley & Harvie-Brown (*l.c.*). In Appendix 3 of the present paper may be found transcriptions of references to Robert and his son Joseph in that book; these original anecdotes and extracts from letters obtained from acquaintances of the Dunn family complement the newspaper articles gathered by Williams (2012a). However, none of the unidentified names among the inscriptions in *The Ornithologist's Guide* was found among the many characters mentioned by Buckley & Harvie-Brown (*l.c.*).

Concluding remarks

Among the identifiable inscriptions, the most interesting personages certainly known to Robert Dunn are Captain John Parker of Hull (1), the Norwegian, Rasmus C. H. Wallendahl (2) and Edwin Prince (John Gould's secretary) (20b). Inscriptions of various contemporary naturalists, such as William Jardine (6), William MacGillivray (15), Charles Waterton (10a) and William Yarrell (19a), may hint at direct, but so far unconfirmed, associations with Dunn, while Prince's inscription further strengthens the possibility of links with Jardine and Yarrell. The extant letters from Dunn (see previously) provide a certain link with Gould, as would be expected from the inscription by Prince.

Unfortunately, persons mentioned in inscriptions by the names of John Barrow (20a), J. Cochin [?] (4b), Percy E. Coombe (12d), Mr Driffill (3), C. D. Heathcote (5a & 17), Cpt. Kellan [?] Johnstone (7b), William Lakin (11), Thos B. Locke [?] (4a), T. Bazett Tytte (12c) and H. Wyndham (14) could not be identified. Extensive searching of standard biographical and bibliographical sources, as well as the online catalogue of the archives of the Natural History Museum in London (NHML), failed to find them.

It is regrettable that in one dated copy of *The Ornithologist's Guide*, there is an erasure before the date of 16 February 1837, because it has obliterated what was most probably the name of the owner of the earliest recorded copy (Williams, 2012b). Surprisingly, the culprit may have been none other than Professor Alfred Newton of Cambridge (9), one of the most finicky ornithological authors of his time.

The inscriptions of C.D. Heathcote (5a & 17) indicate that he met Joseph H. Dunn at Stromness in 1861; furthermore he provides a later link with an intriguing wider network including Colonel H.W. Feilden (5b), J.H. Gurney, junior (18) and Rudyard Kipling (Pinney, 1999). In addition, ownership of a copy of *The Ornithologist's Guide* by Edward Forbes (12b) has serendipitously revealed an unexpected ornithological connection between him and Hugh Strickland. Hence, a fascinating result of the research on these inscriptions has been the emergence of links between certain eminent individuals not generally known to have shared particular interests.

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Appendix 1: eggs collected by Robert Dunn, held by the Natural History Museum (Tring)

For completeness, details are given here of eggs supplied by Robert Dunn and now in the ornithological collections of the Natural History Museum at Tring, Hertfordshire (NHMT). The following entries are extracted *verbatim* from the post-1906 egg accession slips (my notes in square brackets):

2 eggs of *Hydrobates* via Seebohm 1901.1.1.1376.
Egg of *Catharacta* via Salmon 1947.16.109.
Eggs of *Turdus iliacus* via Salmon 1947.16.20 (with letter from Robert Dunn quoted in cat.) [Salmon's own MS catalogue]
Eggs of *Gallinago gallinago* 1901.1.1.5097.
" " " " 1962.1.1307 (via Gould).
" " " " 1979.1.13 via Waller. [?G.H. Waller (1880-1953?)]
" " *Pluvialis apricaria* 1902.3.10.271-2 via Crowley. [Philip Crowley (1837-1900)]
1902.3.10.231-2 *Ch[aradrius]. dubius* via Crowley.
1901.1.1.6812 *Circus cyaneus* via Hargitt/Seebohm. [Edward Hargitt (1837-1900)]
1901.1.1.6821-4 " " " Seebohm.

The accession dates are sometimes several decades later than the acquisition dates. I examined some, but not all, of these specimens. Three eggs donated by John Gould and accessioned as "*Gallinago gallinago faeroeensis*. Shetland Islands. 1962.1.1307" are of some interest. Each egg bears "Common Snipe. R. Dunn. Helister [*sic*] Shetland" in black ink, in Dunn's hand. They are also labelled "GOULD" in red ink. Although there is no supporting documentary evidence of Dunn's having supplied these eggs directly to Gould, the existence of letters from Dunn to Gould (see previously) confirms that they knew each other.

Two eggs inscribed "Redwing" in Dunn's hand (*cf.* Fig. 1) are of more importance, donated to NHMT by John Drew Salmon along with his own manuscript catalogue. Salmon's catalogue records that Dunn collected these eggs himself in Norway during 1840 and sold them to Salmon for 2s. 6d. each in January 1841. Salmon also transcribed part of a letter dated 11 March 1841 that he received from Dunn (NHMT shelf-mark EGGs MS. SALMON, page 94).

The NHMT also holds the Milton Abbey School Egg Collection (NHMUK daybook 2001/137) of mixed and somewhat complicated provenance, which includes two swans' eggs supplied by Robert Dunn. Both are inscribed in Dunn's hand (*cf.* Fig. 1): "Rob^t. Dunn. Naturalist. Stromness. Orkney. Scotland". Each also bears a printed label, thus: "CYCNUS [*sic*] BEWICKII, Yarr. Bewick's Swan." or "CYCNUS [*sic*] MUSICUS, Tem. Hooper." Although undated, they must have been collected or obtained between c. March 1854, when Robert moved from Shetland to Stromness (Williams, 2012a), and July 1859, when he died (Limbert, *l.c.*). Note that he seems to have favoured the descriptor "naturalist" rather than "animal preserver" for his trade towards the end of his working life; indeed, he is described as a naturalist on his death certificate (Limbert, *l.c.*: endnote 3). Joseph apparently always described himself thus.

No details of specimens from either Robert or Joseph Dunn could be found in Sharpe (1906) but that book is nevertheless valuable in tracing ever wider networks of ornithologists and collectors centred on those known to have been associated with the Dunns. Eggs collected by the Dunns are, of course, likely to exist in other museums as, for instance, Robert's held by the Doncaster

Museum and Art Gallery (Common Gull *Larus canus*, accession no. 1963.658.74; and Black-headed Gull *Chroicocephalus ridibundus*, 1963.658.73), and Joseph's held by the Norfolk Museums & Archaeology Service (Limbert, *l.c.*: 8, and endnote 36).

Appendix 2: anecdotes from H.J. Elwes (1930)

References to Robert and Joseph Dunn occur in Elwes (*l.c.*). Additional information and page numbers are in square brackets.

There was a certain ornithologist named [Robert] Dunn who then [c.1854, when Elwes was an eight-year-old in Tunbridge Wells] lived at Stromness in the Orkney Islands, who published a [printed?] catalogue of birds' eggs, which we studied with as much care and anxiety as any art connoisseur studies a sale list of pictures ... The eggs were sent by post packed in chip boxes, which sometimes arrived considerably broken, and great was the ingenuity displayed in mending up the broken eggs ... [Elwes recalled the price of a Great Northern Diver's egg being perhaps ten shillings.] [p. 14].

In April, 1865 [aged nearly 20 years], before going up for the Army examination, I made my first independent expedition to collect birds in company with Mr. A. Crichton. We went to Stromness in Orkney and lodged with J. H. Dunn, the ornithologist, who collected birds and eggs for sale ... At Stromness I went out shooting in a small boat with Dunn whenever the weather allowed, and used to think that he was over cautious about the weather. But the strong tides and winds in Scapa Flow made boating more hazardous than I then thought, and we had one or two near shaves of being swamped. Dunn, with another companion, was drowned from his own boat some years afterwards on one of these excursions. [The other fatality was Dunn's boatman; their client survived (Anon, 1872a, 1872c).] [p. 23].

In one of the "near shaves" Elwes was, in fact, "nearly drowned during one of their expeditions in the very boat in which Dunn lost his life a few years afterwards" (Sharpe, *l.c.*: 345).

There is a manuscript catalogue of Elwes's egg collection (shelf-mark EGGS MSS. ELWES) in the Library and Archives of the NHMT. Listed therein are eggs taken by Joseph Dunn in the Orkneys between 1862 and 1864 as well as those of "*Vanellus cristatus*" (Lapwing), collected at Stromness by Elwes himself on 21 April 1865 during his expedition with Arthur William Crichton (1833-1882). According to Fuller (1999), Crichton was the brother-in-law of Lord Lilford (1833-1896), the bird collector and ornithological author (Mullens & Swann, *l.c.*: 352-356).

Appendix 3: anecdotes from T. E. Buckley & J. A. Harvie-Brown (1891)

Herein are references to Robert and Joseph Dunn and their acquaintances, copied *verbatim* from Buckley & Harvie-Brown (*l.c.*). Information derived directly from Robert Dunn's *The Ornithologist's Guide* is omitted but all other independent sources are noted. Background information is given in square brackets; terminal page numbers refer to Buckley and Harvie-Brown (*l.c.*).

In 1837 R. Dunn published his *Ornithologist's Guide to the Islands of Orkney and Shetland*, which contains a very fair list of the mammals and birds, though there are one or two curiously strange omissions. If his statements are entirely to be relied on,

the avi-fauna of the islands has much altered within the last fifty years, as will be seen by a reference to the various species. Dunn was more of a collector than a naturalist, and, we are afraid, contributed not a little to the decimation of the rarer birds of both Orkney and Shetland. [p. xix]

We made inquiries as to whether any ornithological notes had been left by the late Joseph Dunn, and in this search we were much assisted by Mr. Eagle Clarke [William Eagle Clarke (1853-1938); see Mullens & Swann (*l.c.*: 131-135)] and Mr. Porritt [George Taylor Porritt (1848-1929)]. Correspondence with some of Dunn's relatives and intimate friends elicited the fact that there were no notes forthcoming, and as all his effects were sold and scattered after his wife's death [Catherine Gray Dunn died at Stromness, 27 July 1884 (Williams, 2012a)], if there ever were any they must have been lost. We found that others besides ourselves had been inquiring in the same direction, but apparently with no better results. This is a pity, as with Dunn's long experience of the Orkneys his notes must have proved of great interest. [p. xxii]

Mr. Cowan mentions that there was a Hoopoe in the late J. Dunn's collection, shot in Sanday. [pp. 133-134]

Dunn, the naturalist in Stromness, used to give 6d. each for the Hen-Harrier's and Short-eared Owl's eggs. Although this was cheap, adds Mr. Irvine-Fortescue, the natives thought it dear, and the birds decreased in consequence. [Since no date is given, this story may refer to Robert or Joseph. Likewise, Mr Irvine-Fortescue could have been either Archer Irvine-Fortescue (1819-1907) or his son William Archer Irvine-Fortescue (1851-1941), both of whom lived at Swanbister and served as Justices of the Peace for Orkney. On balance, it seems most likely that the informant was Mr Irvine-Fortescue, senior, and that Robert was the egg-dealer.] [p. 137]

Mr. Boyes [possibly Frederick Boyes (1842-1929); see Mullens & Swann (*l.c.*: 88)] informs us that when in Orkney in 1866, he saw a Marsh Harrier, stuffed, in J. Dunn's possession at Stromness, but got no particulars. [p. 141]

In a letter from Robert Dunn to T. C. Heysham, dated December 23d, 1844, he says:- "The Golden Eagles do not breed in Shetland that I know of at all. I know of *one pair* that breeds in Hoy." We have italicised this statement, as it bears out what we are trying to make good, viz., that only one pair of Golden Eagles bred in the Orkneys. Gray [apparently Robert Gray; see p. 148] was informed by J. Dunn, Stromness, that no Golden Eagles had bred in Hoy for a number of years, and that the only recent specimen procured there was one shot in 1857, and supposed at the time to be one of the only pair that had many years previously bred near Radwick (? Rackwick) on the west side of Hoy. [Thomas Coulthard Heysham of Carlisle was the son of John Heysham (see Mullens & Swann, *l.c.*: 294). Robert offered two Great Auk skins to Heysham in 1842 (Macpherson, 1892).] [p. 146]

Dunn told Groundwater [Andrew Groundwater of Linnadale] afterwards that if he ever shot another eagle [Golden Eagle *Aquila chrysaetos*] he would give him a guinea for it.

[Since its exact date is uncertain, this anecdote may have referred to Robert or Joseph.] [p. 147]

J. Dunn, writing R. Gray [presumably Robert Gray (1825-1887), mentioned on p. 146; see Mullens & Swann (*l.c.*: 248-252)], says, "Only one pair of Sea-Eagles have nested in Hoy for several years back; they are supposed to be very old birds, and unproductive. In 1865 their nest was got at, but was found to be empty, and, in the following year, their nest in another part of the cliffs was also reached, but found to contain one egg, and that an addled one." [p. 148]

Referring to the specimen mentioned by Messrs. Baikie and Heddle [this refers to Baikie & Heddle (1848)], we have received the following note: "Buffel-headed Duck. This is a mistake; the skin came from Dunn [before 1848, so probably Robert Dunn], and was not even killed in Great Britain." [p. 176]

Many [Surf Scoters *Melanitta perspicillata*] have been recorded in the *Field*, and we cannot do better than quote, *in extenso*, what has been written about these later Orcadian occurrences in the 4th volume of the 4th edition of Yarrell, pp. 482, 483:- "In the Orkneys, however, it seems to be of frequent and perhaps annual occurrence, from autumn to spring, although never in great numbers. An adult male was shot at Swanbister, in the parish of Orphir, in March 1866. One--perhaps the same specimen--was in the collection of the late Joseph H. Dunn, and another, which was doubtless killed in the Orkneys, is in the local museum at Stromness." [p. 184]

As far back as October 4th, 1851, J. H. Dunn obtained a nest containing eleven eggs [of Quail *Coturnix coturnix*], and it has since then been found breeding in other parts of the Mainland. [Joseph accompanied Robert to Shetland in 1835, when about eight years old (Limbert, *l.c.*) but this is perhaps the earliest specific date recorded so far of Joseph's collecting specimens on his own account. However he claimed to be "a practical collector & have been for more than 30 years" in a letter written in 1871 (Limbert, *l.c.*: 8), which would have made him younger than 14 years old when he began collecting with his father.] [p. 193]

Begg [Mr. Begg of Stromness], by the way, said that Dunn would not believe about the eggs being Turnstone's until he compared them with Norwegian examples that he had, and was then compelled to admit that they were genuine. [Apparently in 1860, so this must refer to Joseph.] [p. 205]

At page 90 of his *Rambles in the Orcades* [*sic*] Crichton [A. W. Crichton; see Mullens & Swann (*l.c.*: 155)] mentions one shot by Dunn from the carcass of a whale, in or about 1860. [This refers to a Glaucous Gull *Larus hyperboreus* shot by Joseph Dunn, actually in June 1860. Crichton hired Dunn as a guide on what appears to be little more than a shooting holiday and there are many mentions of his assistance in Crichton (*l.c.*), though nothing of intrinsic scientific importance.] [p. 234]

Calendar 2014

Up-to-date information can also be found on the YNU website at:
www.ynu.org.uk/events/general

- | | | |
|------|------|--|
| Aug | 22 | YNU Entomology Section. Inkle Moor & Bell's Pond, Thorne Moors. Meet at 10:30 at the junction of Goole Road with Moorends Road (SE692163). |
| Sept | 6-7 | Nudibranch Identification Course at the Scarborough Campus of Hull University. A mixture of theory and practical sessions will include a visit to a local shore on Sunday morning. Cost £70, which includes course materials.
For further information contact Paula Lightfoot on p.lightfoot@btinternet.com |
| | 8-13 | Conchological Society Field Meeting with the Conchological Society of Great Britain and Ireland and Seasearch. A week-long field meeting to record the Molluscan fauna of Yorkshire, with a particular focus on marine molluscs. Based at the University of Hull's Scarborough Campus where laboratory facilities will be available. There is no cost for attending the field meeting, but booking is essential. Participants are welcome to join for the whole week or just part of it. |
| Oct | 4 | Bryological section field meeting VC61, Wheldrake. Meet in the car park at SE690446 at 10:00. |
| | 4 | Joint Freshwater Ecology and Conchological section Field Meeting to the River Derwent at Low Hutton. Meet in car park on east side of railway near suspension bridge SE764677. |
| | 10 | Marine and Coastal Section joint meeting with the Cleveland Ironstone Mining Museum at Skinningrove. Meet at 9:15 at the Cleveland Ironstone Mining Museum (NZ712192) or on the shore at 9:45 (NZ718202). Everyone is welcome to join us on the shore, but space in the classroom is limited and places must be booked in advance via Jean Banwell on jean@ironstonemuseum.co.uk
<i>Low water 0.40m at 11.45am.</i> |
| | 11 | Marine and Coastal Section. North Landing, Flamborough. Meet at 11:00 at the bottom of the slipway which leads down to the beach from the car park (TA239720). This is a joint field meeting with the Harrogate and District Field Naturalists' Society. For further information contact p.lightfoot@btinternet.com
<i>Low water at 0.86m at 1.15pm.</i> |
| | 18 | Entomological Section AGM at Doncaster Museum, Chequer Road, Doncaster. 11:00 to 16:00. |
| | 25 | Conchological Section AGM at 17 West Park Drive, Leeds, LS16 at 13:00. |
| Nov | 15 | YNU AGM, Malham Tarn Field Centre. For details see p81. |

YNU Entomology Section meetings - contact Bill Ely via billely@hotmail.com for further details.

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- using any paragraph formatting and line spacings other than single.
- using tabs to tabulate information (please use MS Word table format or separate the column entries in a single row with commas and enter a paragraph mark at the end of the row).
- inserting any figures, graphs or plates into the text; indicate their proposed locations in the text and send as separate files.

Good quality, high resolution images are very welcome and should be sent as .jpg files, with a separate MS Word file containing the caption and name of the person to whom the image should be attributed.

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APPENDIX 1. Emergent aquatic plants and their abundance in 500m lengths of the Pocklington Canal, July 2013

	Lengths along the non-navigable canal						Lengths along the navigable canal					
	1	2	3	4	5	6	7	8	9	10	11	12
<i>Agrostis stolonifera</i> Creeping Bent	1	1	1	-	-	1	1	1	1	1	2	2
<i>Alisma plantago-aquatica</i> Water-plantain	-	-	-	-	-	-	-	-	1	-	1	1
<i>Apium nodiflorum</i> Fool's-water-cress	-	-	-	-	-	-	1	1	-	1	-	1
<i>Berula erecta</i> Lesser Water-parsnip	-	-	-	1	2	2	1	2	2	1	2	1
<i>Butomus umbellatus</i> Flowering-rush	-	-	-	-	2	1	1	1	1	1	1	2
<i>Caltha palustris</i> Marsh-marigold	-	-	-	-	-	-	-	-	-	-	1	-
<i>Carex acutiformis</i> Lesser Pond-sedge	-	-	2	2	1	-	1	2	-	-	-	-
<i>Carex riparia</i> Greater Pond-sedge	-	-	1	1	-	1	1	-	-	-	-	-
<i>Eleocharis palustris</i> Common Spike-rush	-	-	-	-	-	-	-	-	-	-	-	1
<i>Equisetum palustre</i> Water Horsetail	-	-	-	-	-	-	-	-	-	-	-	1
<i>Galium palustre</i> Common Marsh-bedstraw	-	-	-	-	-	-	-	-	-	1	1	-
<i>Glyceria maxima</i> Reed Sweet-grass	3	3	3	3	2	3	3	3	3	3	3	3
<i>Iris pseudacorus</i> Yellow Iris	1	-	1	1	2	1	1	1	-	-	-	1
<i>Juncus articulatus</i> Jointed Rush	-	-	-	-	1	-	-	-	-	-	-	-
<i>Juncus bufonius</i> Toad Rush	-	-	-	-	-	-	-	1	-	-	-	1
<i>Juncus effusus</i> Soft-rush	-	-	-	-	-	-	-	-	-	-	-	1
<i>Juncus inflexus</i> Hard Rush	-	-	-	1	-	-	-	-	-	-	-	1
<i>Mentha aquatica</i> Water Mint	-	-	-	-	-	-	-	-	-	-	1	2
<i>Myosotis laxa</i> Tufted Forget-me-not	-	-	-	-	-	-	-	1	1	1	-	1
<i>Myosotis scorpioides</i> Water Forget-me-not	-	-	-	-	-	-	-	-	-	1	2	2
<i>Nasturtium officinale</i> agg. Water-cress	-	-	-	-	-	-	1	1	1	1	1	1
<i>Persicaria amphibia</i> Amphibious Bistort	-	-	-	-	2	1	1	1	-	1	1	1
<i>Phalaris arundinacea</i> Reed Canary-grass	-	-	1	2	-	2	3	3	3	2	1	1
<i>Phragmites australis</i> Common Reed	-	-	3	3	3	3	-	-	-	2	-	-
<i>Ranunculus sceleratus</i> Celery-leaved Buttercup	-	-	-	-	-	-	-	1	1	1	1	2
<i>Sagittaria sagittifolia</i> Arrowhead	-	-	-	-	-	-	2	2	2	2	2	1
<i>Solanum dulcamara</i> Bittersweet	-	1	-	-	-	1	1	-	2	1	1	1
<i>Sparganium erectum</i> Branched Bur-reed	-	-	2	2	1	1	2	1	1	2	1	3
<i>Typha latifolia</i> Bulrush	1	-	-	2	2	2	2	2	-	1	1	-
<i>Veronica beccabunga</i> Brooklime	1	-	-	-	-	-	-	-	-	-	-	1
<i>Veronica catenata</i> Pink Water-speedwell	-	-	-	-	-	-	-	-	-	-	-	1
<i>n</i> of taxa	5	3	8	10	10	12	15	16	12	17	17	24
Σ Abundance scores	7	5	14	18	18	19	22	24	19	23	23	33
Hierarchical richness index	17	8	49	79	84	96	138	160	96	169	169	331

Included are Palmer & Newbold (1983) aquatic-plant checklist spp. + all *Juncus* spp. + stoneworts.

Values are abundance scores: 1=<0.1% whole-channel cover, 2=0.1-5% cover, 3=>5% cover. (-) indicates not recorded.

APPENDIX 2. Submerged and floating-leaved aquatic plants and their abundance in 500m lengths of the Pocklington Canal, July 2013

	Lengths along the non-navigable canal						Lengths along the navigable canal					
	1	2	3	4	5	6	7	8	9	10	11	12
<i>Callitriche</i> sp. Water-starwort	-	-	-	-	-	-	-	-	-	-	-	1
<i>Ceratophyllum demersum</i> Rigid hornwort	-	-	-	-	-	-	-	-	-	-	1	-
<i>Chara</i> sp. Stonewort	-	-	-	-	-	-	-	-	-	1	-	-
<i>Elodea canadensis</i> Canadian Waterweed	2	-	3	3	1	1	-	1	1	2	1	1
<i>Elodea nuttallii</i> Nuttall's Waterweed	-	3	1	2	-	-	1	2	3	3	3	3
<i>Lemna minor</i> Common Duckweed	2	2	2	2	2	3	1	1	1	1	1	1
<i>Lemna trisulca</i> Ivy-leaved Duckweed	-	1	1	2	3	3	1	1	2	2	2	1
<i>Nitella</i> sp. Stonewort	-	-	2	1	-	-	-	-	-	-	-	-
<i>Nuphar lutea</i> Yellow Water-lily	-	-	2	1	3	2	3	2	3	3	3	3
<i>Potamogeton crispus</i> Curled Pondweed	3	-	-	2	-	-	-	-	-	-	-	-
<i>Potamogeton friesii</i> Flat-stalked Pondweed	-	-	-	-	-	-	1	1	1	-	-	-
<i>Potamogeton lucens</i> Shining Pondweed	-	-	-	-	-	-	-	-	3	3	3	2
<i>Potamogeton natans</i> Broad-leaved Pondweed	-	-	-	-	1	-	-	-	-	-	2	-
<i>Potamogeton pectinatus</i> Fennel Pondweed	2	-	-	-	-	-	-	-	-	-	-	1
<i>Ranunculus circinatus</i> Fan-leaved Water-crowfoot	2	2	-	-	-	-	-	-	1	1	-	1
<i>Sparganium emersum</i> Unbranched Bur-reed	-	-	1	2	2	1	2	-	3	2	2	1
<i>n</i> of taxa	5	4	7	8	6	5	6	6	9	9	9	10
Σ Abundance scores	11	8	12	15	12	10	9	8	18	18	18	15
Hierarchical richness index	31	17	39	58	34	24	25	24	70	66	72	64

Included are Palmer & Newbold (1983) aquatic-plant checklist spp. + all *Juncus* spp. + stoneworts.

Values are abundance scores: 1=<0.1% whole-channel cover, 2=0.1-5% cover, 3=>5% cover. (-) indicates not recorded.