Nature in Cambridgeshire

No 54 2012

Plate 1. Overall design and arrangement of planting types in Madingley 800 Wood. (See article on page 60)

Plate 2. : An overview of Madingley 800 Wood in its fifth growing season (2011). (See article on page 60)

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Cover Illustration: A Chinese Water Deer in a plot of sallow coppice at Woodwalton Fen National Nature Reserve

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EDITORIAL

This year Nature in Cambridgeshire covers flowering plants (*Potamogeton compressus*, Marsh Stitchwort, Sulphur Clover), birds (Marsh Harriers near Cambridge), grazing effects of deer at Wood Walton Fen, Dingy Skippers on the Devil's Dyke, fungi in Eversden Wood, molluscs in the Cambridge Botanic Garden and lichens on Cambridge Walls. Ray's seventeenth century catalogue of Cambridgeshire plants and annotated copies of Babington's Flora of Cambridgeshire are discussed.

For the first time since 1988, we have nothing from Hilary Belcher and Erica Swale. Unfortunately, ill health has prevented them from sending a contribution. We wish them both well, and hope that 'normal service' can be resumed next year.

Other regular articles includea report of the 2011 survey of The Backs by members of Cambridge Natural Society, the regular sections on vascular plants, bryophytes and invertebrates, book reviews and obituaries. John Kapor has again contributed weather notes from the Botanic Garden.

I have mentioned previous editorials that I am keen to include some shorter articles in the journal. I am still keen to do so, and if anyone has made observations that would take up around half a page, please let me have them. Any subject of natural history interest in Cambridgeshire will be acceptable.

Following the recent large increases in postal charges and ever-rising costs, we are again compelled to increase the price of each issue, from £6 to £7, with postage and packing extra.

ERRATA

I must have had a 'senior moment' last year, as I twice referred to *Arabis turrita* as Tower Mustard rather than Tower Cress (in my editorial and in the caption to the photograph on the inside of the cover). That caption should have read "Tower Cress (*Arabis turrita*) photographed in May 2011, exactly four weeks after the picture on the front cover."

Potamogeton compressus recolonises Cambridgeshire, 2004–2010

J.J. Graham and C.D. Preston

Introduction

One of the more surprising changes in the Cambridgeshire flora in the early 21st century has been the recolonisation of the county by the pondweed *Potamogeton compressus*. This distinctive species was first discovered by John Ray (1660), who found it "*In the river Cam in many places*" and described it new to science (Preston, 2010; Oswald & Preston, 2011). It persisted in ditches in Cambridge until 1848 but there are no later records from the city; it was one of the few aquatic species that was lost from this area in the Victorian period (Preston, 2008). In the first half of the 19th century it was also collected along the Cam valley downstream of Cambridge at Fen Ditton, Baitsbite and Clayhithe; there is also a record which is not supported by a specimen from Bottisham Fen (which seems likely to be correct, given its proximity to Clayhithe) and from Wicken, where it was noted by the pondweed specialist Alfred Fryer in the late 19th century (Crompton, 2001). The only other historic records are from Stretham Fen on the River Great Ouse, upstream of its junction with the Cam, and from Ely downstream of the confluence of the two rivers. The last confirmed records from the county were from Roswell Pits, Ely, where it was first recorded by A. Shrubbs in 1887 and last collected by R.S. Adamson in 1912. Photographs in the Cambridgeshire Collection, Cambridge Central Library, show that Roswell Pits was then an area of small, inter-connecting clay pits rather than the few large pits familiar to current botanists. A record made in the Ouse Washes in 1978 (Thomas *et al*., 1980) lacks voucher material and cannot be accepted. Perring *et al.* (1964) and Preston (2000) treated *P. compressus* as extinct in the county.

P. compressus is a nationally scarce species. By 1994 it was clear that it had "decreased markedly" in Britain as a whole (Preston, 1994) and by 2002 it was known from only nine sites (Lockton & Whild, 2002a, b). Preston (2002) described it as having been "in gradual decline for over a hundred and fifty years" and this decline was so severe that Cheffings & Farrell (2005) classified it as an Endangered species. It therefore seemed extremely unlikely, in the early years of the 21st century, that the species would ever be seen in the county again. Remarkably, however, it was rediscovered in Cambridgeshire (v.c. 29) by P. Kirby in 2004 in Moreton's Leam near Peterborough, which is connected to the River Nene, and in the river itself in 2005 (Leslie, 2006). These are areas in which it had not been recorded historically in Cambridgeshire, and the species appears to have recolonised the county from populations in the River Nene upstream of Peterborough.

In view of the national importance of the populations of *Potamogeton compressus* in the River Nene, the Environment Agency (Northern Area, Anglian Region) commissioned J.J.G. to survey the species in the River Nene corridor in 2008 and 2010. This paper outlines the records made in this survey

and discusses the information it provided on the ecology and population dynamics of the species.

P. compressus in the R. Nene corridor and Middle Level drainage area

In 2008 and 2010 J.J.G. surveyed the River Nene and its adjacent flood plain lakes and drains from Kislingbury, west of Northampton (v.c. 32) to the east end of the Nene Washes at the Dog-in-a-Doublet sluice (v.c. 29). The results of the survey show that the species grows at intervals in the river corridor between Northampton and Thrapston; between Thrapston and Peterborough the only populations detected were at Oundle but east of Peterborough it again occurs at intervals downstream to Dog-in-a-Doublet, where the river becomes tidal.

In addition to records from the River Nene corridor in Cambridgeshire, *P. compressus* was discovered in the Twenty Foot River in 2009, when N.C. Hall found that it was fairly abundant both upstream and downstream of the outfall of the March sewage treatment works. This site lies in the Middle Level drainage area, which covers the majority of the low-lying land between the Nene Washes in the north-west and the Ouse Washes in the south-east. A photograph of the site was published in the newsletter *The Natural Level* (Carson, 2009) and the record was also published by Leslie (2010). A brief survey by J.J.G. in August 2010 showed that *P. compressus* was also present in King's Dyke and Bevill's Leam, two water courses which connect the River Nene and the Twenty Foot River. However, searches in the River Nene (Old Course) N.W. of Benwick (TL330912), the junction of River Nene (Old Course) and Whittlesey Dyke at Flood's Ferry (TL356936) and Whittlesey Dyke S.W. of Whittlesey (TL306955) were unsuccessful. However, this area has not been surveyed as thoroughly as the corridor of the River Nene. It seems likely that it is more widespread in the Middle Level area than current records suggest; the habitat in the River Nene (old course) at Flood's Ferry and in Whittlesey Dyke, for example, seemed ideal for this species.

The sites at which *P. compressus* has been recorded since 2000 in the Nene corridor are listed (with details of the most recent record) in Tables 1 & 2 and mapped in Figures 1 & 2.

Habitat

P. compressus usually grows from turions buried rather shallowly in the substrate and anchored by rather few roots. It is easily uprooted and the branched stems of mature plants also fragment rather readily, so that populations frequently consist of both rooted and floating plants or fragments. In addition, floating plants move down stream with the current, some becoming trapped in marginal mud or between other floating aquatics (typically between floating *Nuphar lutea* and *Sparganium emersum* leaves). Such transported plants can easily be mistaken for plants growing *in situ*, thus hampering the understanding of the true ecology of this species.

Within the River Nene corridor, populations of *P. compressus* are found in deep (0.5–1.2 m), slow-moving water in canal-like branches of the Nene. All known river populations occur where there are controlled water levels such as

sites upstream and downstream of locks and large sluices, in 'cuts' off the main river to boat yards or marinas, or within sections of the main river that are artificial, such as at Peterborough where the river is widened and has stone edging. When growing in deep open water with little or no competition from floating aquatics, *P. compressus* can form very large plants that have a dense apical mass composed of proliferating and tangled stems that reach the surface. When growing between floating leaves of aquatics, smaller more straggly plants develop. *P. compressus* is always associated with a relatively rich macrophyte assemblage dominated by larger *Potamogeton* species including *P. lucens, P. perfoliatus, P. crispus* and in the upper Nene *P. praelongus* and occasionally *P. friesii*.

Life-cycle and population dynamics

Fruiting plants of *P. compressus* have been observed in July and August but they appear to be very rare and represent less than 1 plant in 1000. The principal mode of reproduction appears to be vegetative. Figure 3 shows the vegetative life-cycle of *P. compressus* in the River Nene. Plants mature between July and August and start to fragment naturally, a process encouraged by late summer aquatic weed cuts, boat traffic and sudden changes to flow after heavy rain. Detached stems drift down stream, some becoming caught in marginal floating vegetation. Some of these continue to grow to some degree but their leaves always look slightly battered and less green and shiny than those still attached to rooted plants. *P. compressus* produces conspicuous specialised reproductive structures, known as turions, lengths of stems 2.5–4.5 cm long which develop at the end of short axillary branches and have closely spaced, very short leaves (Preston, 1995). They are able to spend the winter in a dormant state. Turions begin to develop on floating stems by August, earlier than those on stems which are still attached to rooted plants which form turions in September. Individual floating turions have been observed as late as December and by this point in the season plants of *P. compressus*, whether rooted or floating, have usually broken up so that they can no longer be observed in the river.

J.J.G. has grown *P. compressus* in a small, shallow garden pond in Whittlesey since 2008. Although the plants are always small, they are able to produce turions and persist from year to year. This suggests that the species might be able to survive as inconspicuous populations in the wild during periods when conditions are suboptimal. Over-wintered turions in the garden pond begin to grow into small plants in April. However, such small plants have not been observed in the field, presumably because of the difficulty of seeing small plants in deep water on the bed of the river.

Table 3 gives the estimated population size for *P. compressus* at the 14 sites in the River Nene corridor where it was found in 2008 and resurveyed in 2010. The species was refound at 11 of these sites; the three lost sites were all localities which held four or fewer plants in 2008. There are more dramatic changes to the number of plants in some of the sites in which it persisted. In the lower Nene corridor, for example, there were large decreases in population size at three sites (16, River Nene, Stanground; 17, River Nene, Back River & 18,

Moreton's Leam, Stanground Sluice) whilst at one location (21, Moreton's Leam, Poplar House Farm) there had been a dramatic increase in population size. This variation in population size is likely to be due to the almost total reliance of *P. compressus* on reproduction by over-wintering turions. This means that populations of plants occur each year at slightly differ locations and contrasts with rhizomatous *Potamogeton* species such as *P. lucens* or *P. praelongus* where large beds can be seen at the same locations on the river each year.

Discussion

Has *P. compressus* recolonised Cambridgeshire, as the records suggest, or might it have been overlooked in the water bodies in which it has been seen in recent years? This question cannot be answered with total certainty, but it seems very likely that the species has recolonised recently. Although the northern areas of the county have not been surveyed as intensively as sites nearer to Cambridge, or botanical hotspots such as Wicken Fen, there are sufficient records of aquatic plants from Bevill's Leam, Moreton's Leam, King's Dyke and the Twenty Foot River to suggest that a relatively conspicuous pondweed such as *P. compressus* would have been discovered had it been present long before 2000.

Historically the headquarters of *P. compressus* in Northamptonshire has been the Grand Union Canal. However, it has also been recorded, although less frequently, in the River Nene. It was found in the Nene corridor at Earl's Barton by G. Crawford in 1984, collected at Wellingborough by George Taylor in 1942 and B.A. Adams in 1981, and at Titchmarsh Heronry, Thrapston, by Adams in 1971. By the time that Lockton & Whild (2002a, b) reviewed the British records it was only known in Northamptonshire from the Grand Union Canal at Watford Locks, but it was found in a marina at Weston Favell Mill by G.M. Gent, A.J. Lockton & S.J. Whild in 2003 and rediscovered at Earl's Barton in 2007 (Lockton, 2008).

The source of the Cambridgeshire plants seems certain to have been populations upstream in the River Nene in Northamptonshire. These populations are in turn connected to the historic populations in the Grand Union Canal (the Nene connects to the canal at Gayton, Northampton). It is also likely that populations within the north-west part of the Middle Level drainage area have been introduced by water transfers from the River Nene via Stanground Sluice.

P. compressus is clearly a plant for which the concept of a metapopulation is appropriate. Turions are dispersed along connected water bodies and give rise to large or small populations which persist for variable periods. This variation, coupled with the intrinsic difficulties of surveying aquatic habitats, means that our knowledge of its precise distribution will always be rather fuzzy. However, its recolonisation of Cambridgeshire represents an unexpected and welcome resurgence of what appeared a decade ago to be one of our more threatened vascular plant species, and one which we certainly never expected to see in Cambridgeshire.

Acknowledgments

J.J.G. thanks the Environment Agency (Northern Area, Anglian Region) for co-ordinating survey work of *P. compressus* for the River Nene. We are also grateful to Alan Leslie for his comments on the text.

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Site number	Site (vice-county)	Grid reference	Most recent record
1	R. Nene, Weston Favell (32)	SP79426046	2010
2	Clifford Hills Gravel Pits, Upper Nene Valley Gravel Pits SSSI (32)	SP792606	2003 (Gill Gent & Rob Wilson)
3	R. Nene upstream of Cogenhoe Lock (32)	SP83016123	2010
4	R. Nene, Oxbow and Mill Race, near Earls Barton (32)	SP856618	2007(Alex Lockton & Sarah Whild)
5	R. Nene, White Mills Lock, near Earls Barton (32)	SP85826205	2010
6	R. Nene, S. of Wellingborough	SP89876611	2010
7	W. branch of R. Nene upstream of Irtlingborough Lock (32)	SP95897116	2010
8	Central branch of R. Nene downstream of Upper Ringstead Lock	SP96757460	2010
9	Small cut between central and far E. branch of R. Nene downstream of Upper Ringstead Lock (32)	SP96757460	2010
10	R. Nene, Denford Lock	SP99207689	2010
11	Oundle Marina fishing lake, S.E. of R. Nene (32)	TL03918717	2008
12	Cut to Oundle Boat Club, A427 road bridge, Oundle (32)	TL04598897	2010 (Peter Stroh & Jonathan Graham)
13	Peterborough Rowing Lake (32)	TL17429823	2008
14	Thorpe Meadows Marina, outside the Boathouse Pub, near the rowing course (32)	TL17499836	2010
15	Peterborough Boat House cut (32)	TL17639842	2010
16	R. Nene, Stanground (29)	TL199978−206979	2010
17	R. Nene, Back River, Peterborough, near the edge of the playing field (29 and 31)	TL20809736	2010
18	Moreton's Leam, Stanground Sluice (29)	TL21039745	2010
19	Moreton's Leam, Ball Bridge, King's Dyke (29)	TL23849826	2010
20	Moreton's Leam, Bathing Bridge, Whittlesey (29)	TL23849822	2010
21	Moreton's Leam, Poplar House Farm (29)	TF35280085	2010
22	Moreton's Leam, Goosetree Farm (29)	TF37960192	2010

Table 1. The known sites for *P. compressus* in the River Nene and its associated drains and flood plain lakes, 2000-2010, with details of the most recent record. All records are by J.J.G. unless stated. See Figure 1 for a maps of these sites. The vice-counties indicated by numbers in brackets are the site names are Northamptonshire (v.c. 32), Huntingdonshire (v.c. 31) and Cambridgeshire (v.c. 29).

Site number	Site	Grid reference	Notes on population
23	King's Dyke, E. of Whittlesey	TL237966	One rooted plant, with *P. lucens* and *P. perfoliatus*, plus four floating plants
24	Twenty Foot River, near Goosetree Farm, N.W. of March	TF 379010	Hundreds of rooted plants along margins of drain in open water, with *P. lucens* and *P. perfoliatus*
25*	Twenty Foot River, March SewageWorks	TL44209920	Fairly abundant
26	Bevill's Leam, N.E. of Pondersbridge	TL266925	Small numbers of plants frequent along margins of drain; population estimated at hundreds of rooted plants, with *Nymphoides peltata*, *Nuphar lutea*, *P. lucens* and *P. perfoliatus*

Table 2. Sites for *P. compressus* in the Middle Level drainage area, Cambridgeshire (v.c. 29), 2009-2010. Site numbers continue the sequence in Table 1. See Figure 2 for a map of these sites. All were recorded by J.J.G., August 2010, except for the asterisked site which was the first locality for the species in this area, discovered by N.C. Hall in 2009 (Leslie, 2010).

Site number	Number of rooted (floating) plants, 2008	Number of rooted (floating) plants, 2010	2010 rooted population size as percentage of 2008
1	100+	100+	100
3	1 (2)	1 (1)	100
5	1	0	0
6	2 (1)	0	0
7	3 (10)	2 (1)	67
8	2	16	800
9	2	5	250
10	4	30	750
14	c. 50	c. 50	100
15	4	0	0
16	100+	5 (15)	5
17	c. 100	3	3
18	20	1	5
21	1	50 (1)	5000

Table 3. The number of rooted plants of *P. compressus* at selected sites, 2008 and 2010. The site numbers follow Table 1. The number of additional floating plants are given in brackets

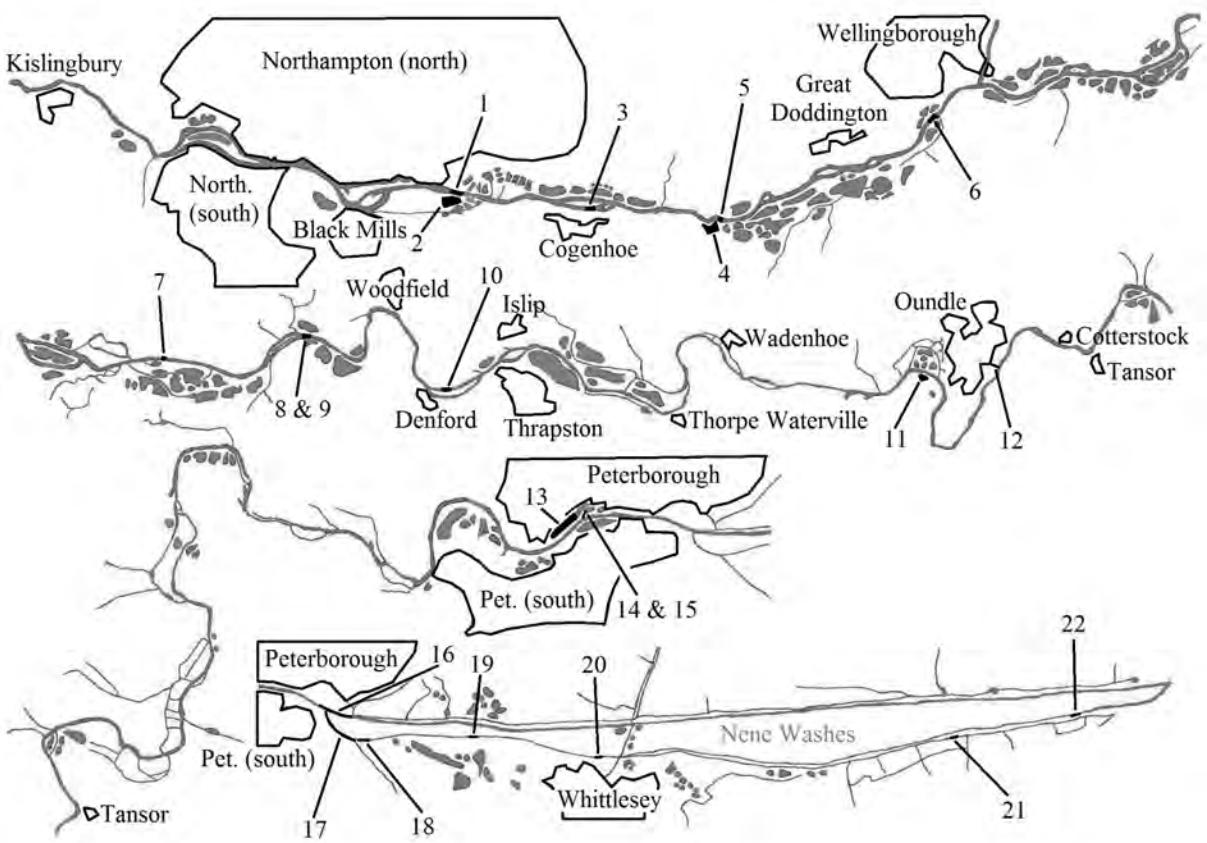

Figure 1. Map of the known sites for *P. compressus* in the River Nene corridor, 2000–2010. See Table 1 for details of the numbered sites.

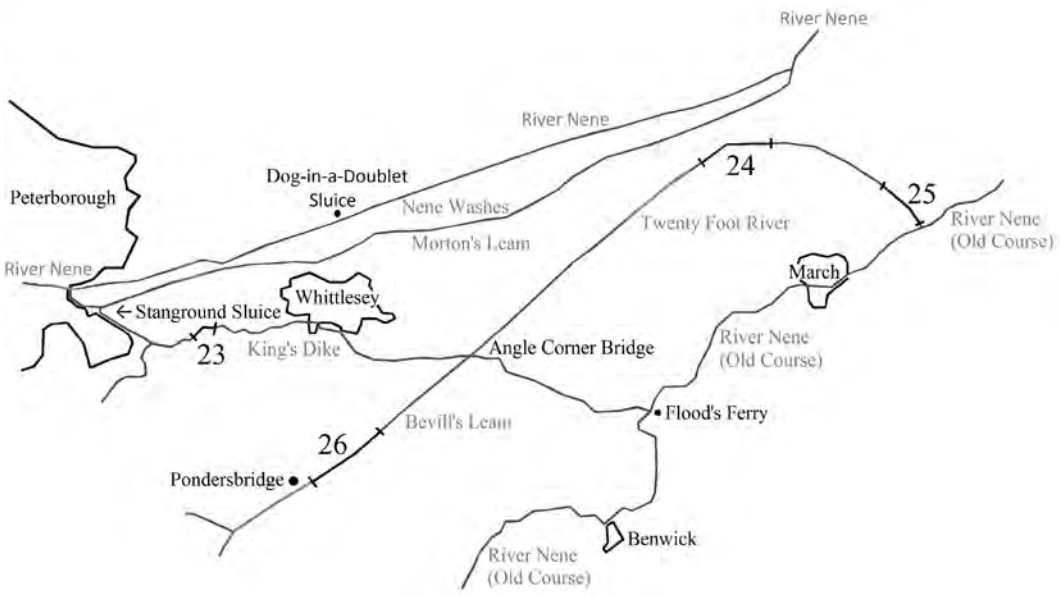

Figure 2. Map of the known sites for *P. compressus* in the Middle Level drainage area, 2000–2010. See Table 2 for details of the numbered sites.

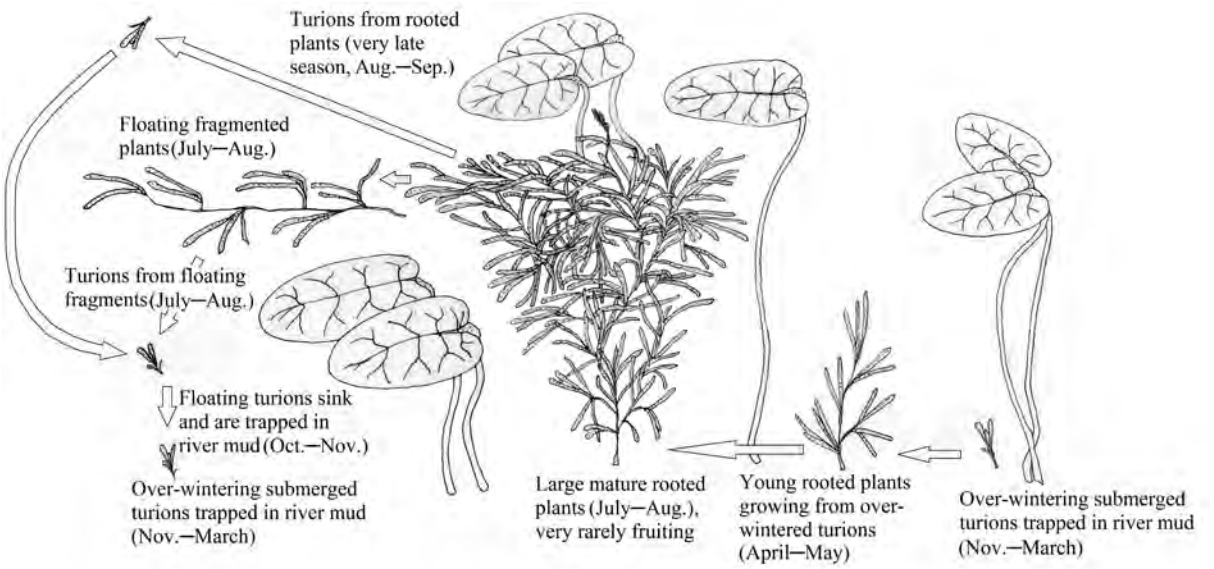

Figure 3. Diagram illustrating the life-cycle of *P. compressus* in the River Nene.

Marsh Stitchwort (*Stellaria palustris*) thriving on Cambridgeshire's washlands

C. James Cadbury

Abstract

Marsh Stitchwort (*Stellaria palustris*) (a nationally Vulnerable species) has become extinct at most of its former locations in 'old' Cambridgeshire (v.c. 29). Except for one location it is now restricted to the Ouse and Nene Washes, where a systematic survey was undertaken in June 2011. At the Ouse Washes the plant was recorded at 84 sites in 23 washes, 13 1-km squares and three 10km squares from Mepal to the Welney road. At 11 of these sites there were extensive patches with a maximum dimension exceeding 20 m. At the Nene Washes 15 patches of Marsh Stitchwort were recorded in three adjacent washes.

At the Ouse Washes the species was found in the upper quarter of washes that are subject to up to two months of prolonged winter flooding. Here it was growing in a zone where Reed Sweet-grass (*Glyceria maxima*) was dominant (NVC **S5**). At the Nene Washes the habitat was flood-meadow that was drier with only sporadic flooding. Although nearly all the Whittlesey Low Washes were ploughed and cultivated until about 1980, two of those with Marsh Stitchwort avoided ploughing.

Introduction

The purpose of this paper is to provide more detail on the recent status of Marsh Stitchwort in Cambridgeshire (v.c. 29) than the information that is to be published in the new *Cambridgeshire Flora* (A.C. Leslie, in prep.).

Marsh Stitchwort is not Nationally Scarce, having been recorded in 161 10km squares in Great Britain and 51 in Ireland for the *New Atlas* (Preston *et al.*, 2002), but it is Vulnerable on account of many sites lost through drainage (Cheffings & Farrell, 2005). It has undergone a major contraction in its Cambridgeshire distribution. It has been historically recorded from 17 10km squares in v.c. 29 since it was first recorded in 1696 (Crompton, 2004). Since 1987 it has been seen in only six (Leslie, in prep.).

In June 2011 the author and Paul Harrington undertook a systematic survey of Marsh Stitchwort at the Ouse Washes. Up to then records had been unsystematic, mainly in the course of ditch surveys, notably one in 1992 (Cadbury *et al.*, 1993). At the Nene Washes, on 16 June the author was taken by Charlie Kitchen and Jonathan Taylor to three washes where the species had been seen recently.

Methods

At the Ouse Washes most of the upper quarter (Cradge Bank side) of the washes between the Wildfowlers' Washes (south-west of Welches Dam) and the Welney road were visited on 7, 10 and 14 June. An 8-figure grid reference was taken for each patch (site). Wash numbers and names used by the RSPB's staff were recorded for the sites. As it is a rhizomatous plant it is not usually possible to count individual plants of Marsh Stitchwort; the widest dimension of each patch was therefore recorded. For analysis these measurements were divided into four categories:

Extensive	**Large**	**Small**	**Plants**
> 20 m	5–20 m	< 5 m	< 5 individuals

The distinctive grey-green leaves of the typical form were relatively easy to pick out even though the surrounding vegetation was usually fairly rank. Marsh Stitchwort was coming into flower at the time of the survey (see photo).

Results

Distribution

In 2011 at the Ouse Washes within v.c. 29, Marsh Stitchwort was recorded in three 10km squares (TL 48, 58 and 59) and 13 1-km squares. It was noted in a total of 82 sites (discrete patches) in 21 washes, and two further sites in two other washes were recorded by J. Graham (pers. comm.) (Table 1). All the sites were in the upper quarter of the washes. There are three further washes where the plant has occurred in recent years but was not seen in 2011. Two former sites just outside the main washes were also checked. The Triangular Wash at Welches Dam (TL 468858), where Marsh Stitchwort was known from 1963 to 1992 (Cadbury *et al.*, 1993), is now dense Reed (*Phragmites australis*) and

Greater Pond-sedge (*Carex riparia*). In 1989 and 1990 Marsh Stitchwort was abundant in glades in an Osier (*Salix viminalis*) bed near the Counter Drain between Sutton Gault and Mepal (TL 432810) (Cadbury *et al.*, 1993). By 2011 the uncut Osiers had grown up and shaded out much of the ground vegetation. Both sites are now totally unsuitable for Marsh Stitchwort. There are no records for the washes themselves south-west of TL 4684, except one in TL 4582 by J. Graham in 2011.

Table 1

Distribution of *Stellaria palustris* at the Ouse and Nene Washes (v.c. 29) in 2011

Wash numbers are those used by RSPB and at the Ouse Washes start at the Welney road.

Ouse Washes

Mepal – Welches Dam: 12 sites

TL 4582 (1 site), 4684 (2), 4784 (1), 4785 (8)

5 washes: Wash 187 (1 site, J. Graham), 148 (2 sites) – also in 1992, 142 (1) – also in 1992, 133 (5) – also in 1993, 129 (3)

Welches Dam – Pymore Viaduct: 37 sites

4886 (1 site), 4887 (21), 4988 (11), 4088 (4)

12 washes: Wash 95 (1), 87 (1), 86 (4), 83 (8), 82 (4), 80 (1), 79 (2), 76 (9), 75 (1), 71 (1), 69 (1), 68 (4)

Pymore Viaduct – Welney road: 35 sites

5089 (21 sites), 5189 (3), 5190 (5), 5291 (3), 5392 (3)

6 washes: Wash 53 (10), 52 (14), 43 (5), 34 (3), 17 (2), 6 (1, J. Graham)

In 1997 but not 2011: 5089 Wash 57 (1 site)

In 2010 but not 2011: 5292 Wash 16 (1 site), 5392 Wash 11 (1 site)

Totals: 13 1-km squares, 23 washes, 84 sites

Nene Washes

TL 3099, Low Whittlesey Washes (15 sites)

3 washes: Wash 52 (7 sites), 53 (5), 55 (3)

In 1988 but not surveyed in 2011: 2698 Common Wash on the High Washes (2 sites)

At the Nene Washes Marsh Stitchwort is known from two 10km squares (TL 29 and 39) and from two 1-km squares (Table 1). The three washes visited in 2011 were adjacent on the south side of the central drove on the Low Whittlesey Washes, 3 km east of the B1040 road. Here there was a total of 15 patches of Marsh Stitchwort scattered over the three washes. R. Payne saw it in two of these washes in 1988. The plant was also recorded from the Common Wash to the west of the road in 1988 – TL 268987 and 269985 (Crompton, 2004). Marsh Stitchwort has been known from Bassenhally Pits close to the south side of the Nene Washes since 1967 (TL 288985) and was still there in 2008 (J.O. Mountford & J. Graham, pers. comm.).

Populations

At the Ouse Washes 11 of 82 Marsh Stitchwort patches were extensive, with maximum dimensions ranging from 21 to 306 m; four were over 60 m across. Five of these were in Wash 83 (TL 493874, 493875, 493876), one in Wash 71 (499882), one in Wash 76 (495882–497880) with maximum dimensions 306 × 12 m, one in Wash 53 (509897), one in Wash 52 (510897) and two in Wash 17 (531925) including the largest (maximum dimensions 70 × 62 m). There were 14 large patches with maximum dimensions of 5–20 m (Table 2).

At the Nene Washes only one of the 15 patches was extensive (100 × 22 m in Wash 55) and three were large (Table 2).

Table 2

Population sizes of *Stellaria palustris* at the Ouse and Nene Washes (v.c. 29) in 2011

Maximum dimension	Extensive > 20 m	Large 5–20 m	Small < 5 m	Plants	Total
Ouse Washes					
Wildfowlers' Washes – Welches Dam	–	1	4	6	11
Welches Dam – Pymore Viaduct	7	8	19	3	37
Pymore Viaduct – Welney Road	4	5	20	5	34
Total	11	14	43	14	82
Nene Washes	1	3	10	1	15

Habitat

At the Ouse Washes all Marsh Stitchwort sites were in the upper quarter of the washes nearest the Cradge Bank. Even this zone has been under prolonged flooding for at least two months between December and March in recent years. This has accounted for the spread of dominant Reed Sweet-grass right across the washes. Most of the sites were within 40 m of a ditch. Out of the 21 washes in which Marsh Stitchwort was recorded in 2011 only four had been grazed at the time of the survey in mid-June, though most would be grazed later. All but one of the 11 Marsh Stitchwort sites in the grazed washes had three or fewer plants or small populations of less than 5 m in extent. Another wash (11), where the plant was present in 2010, was heavily grazed by horses in June 2011 and had none.

The Nene Washes are subject to much less extensive and frequent flooding than the Ouse Washes. The majority of the Whittlesey Low Washes were cultivated as arable until the 1970s but subsequently reverted to wet grassland. However Washes 52 and 53, which supported Marsh Stitchwort, had no recent history of ploughing, though Wash 52 may have been sprayed with a herbicide in the past. These two washes were relatively dry at the time of the visit. The third wash with Marsh Stitchwort had been ploughed until about 1980 and was wetter. All three were subject to mowing in August followed by aftermath grazing by cattle. Meadowsweet (*Filipendula ulmaria*), Yellow Loosestrife (*Lysimachia vulgaris*) and Common Meadow-rue (*Thalictrum flavum*) had all

recently greatly increased in Wash 53 in response to the mowing and grazing regime.

Plants associated with *Stellaria palustris*

The main associates are listed in Table 3.

Table 3
***Stellaria palustris* associates at the Ouse and Nene Washes (v.c. 29) in 2011**

	Ouse Washes (n = 71)		Nene Washes (n = 15)	
Glyceria maxima	69	97.2%	*Festuca pratensis*	10
Phalaris arundinacea	57	80.3%	*Carex disticha*	9 (2*)
Agrostis stolonifera	40	56.3%	*Filipendula ulmaria*	7 (2*)
Galium palustre	38	53.5%	*Galium palustre*	5
Persicaria amphibia	27	38.0%	*Thalictrum flavum*	4 (1*)
Mentha aquatica	26	36.6%	*Carex riparia*	3
Rorippa sylvestris	22	31.0%	*Agrostis stolonifera*	3
Myosotis scorpioides	17	24.0%	*Glyceria maxima*	3
Thalictrum flavum	10	14.1%	*Pericaria amphibia*	3
Bidens tripartita	8		*Rumex acetosa*	2
Senecio aquaticus	5		*Lysimachia vulgaris*	2
Potentilla anserina	4		*Iris pseudacorus*	2
Ranunculus repens	4		*Mentha aquatica*	2
Rumex crispus	3		*Eleocharis palustris*	2
Atriplex prostrata	2		+ 11 species	1
Carex hirta	2			
Carex riparia	2		(*present in abundance)	
Elytrigia repens	2			
+ 14 species	1			

At the Ouse Washes the dominance of Reed Sweet-grass and Reed Canary-grass (*Phalaris arundinacea*) reflects the prolonged inundation of sites supporting

Marsh Stitchwort. Creeping Bent (*Agrostis stolonifera*), Marsh Bedstraw (*Galium palustre*), Amphibious Bistort (*Persicaria amphibia*), Water Mint (*Mentha aquatica*) and Creeping Yellow-cress (*Rorippa sylvestri*) all occurred at 56–31% of the sites. This vegetation equates with the NVC *Glyceria maxima* swamp community **S5**.

At the Nene Washes there was a different community, particularly in two drier washes. Here Meadow Fescue (*Festuca pratensis*), Brown Sedge (*Carex disticha*) and Meadowsweet were prominent. This is a flood meadow community, possibly NVC **MG8**.

Discussion

The Ouse Washes clearly support the major populations of Marsh Stitchwort in Cambridgeshire and may be one of the most important stations in Britain for the plant. Apart from its restricted distribution at the Nene Washes and neighbouring Bassenhally Pits, there are no other recent records in v.c. 29 except at Middle Fen, Swavesey (TL 360708), in 1987 by O. Mountford (Crompton, 2004). It has apparently become extinct in ten 10km squares in the county, mostly before 1900. It was last recorded at Wicken Fen in about 1913 (Evans, 1939) and at Gamlingay in 1920 (Crompton, 2004).

As shown, Marsh Stitchwort is tolerant of up to about two months of winter flooding at the Ouse Washes, but it can also flourish in drier conditions at the Nene Washes, where the flooding is more transient. It can compete fairly well with lush vegetation dominated by Reed Sweetgrass on eutrophic washlands but disappears when shaded by osiers and reed. It is not suited to intensive grazing, but some grazing is important to prevent the development of rank vegetation and remove litter. Drainage and ploughing have been the cause of most of the losses of Marsh Stitchwort. At the Nene Washes, however, it has recolonised a wash ploughed up until 1980, probably from rhizome propagules or seed from an adjacent uncultivated wash.

Marsh Stitchwort was apparently ‘rediscovered’ at the Ouse and Nene Washes in the 1960s (Leslie, in prep.), but very few botanists penetrate the less accessible areas of these sites, even now. However, at least at the Ouse Washes the plant seems to be on the increase and favoured by the increased flooding both in winter and in spring. No major changes in the management of RSPB land on the Ouse and Nene Washes reserves are anticipated.

Acknowledgments

Gigi Crompton’s website for the Cambridgeshire flora was invaluable as a source for historical records of Marsh Stitchwort. I am most grateful for the assistance that I received from RSPB wardens – Paul Harrington at the Ouse Washes and Charlie Kitchen and Jonathan Taylor when I was surveying the Nene Washes. Most of the washes at the Ouse Washes and all three at the Nene Washes that were surveyed in 2011 are on RSPB reserve land. Alan Leslie carefully checked the text and made some useful comments. Philip Oswald kindly edited the final text.

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Marsh Harriers (*Circus aeruginosus*) breeding near Cambridge – continued – 2011

Bob Jarman

Abstract

The Marsh Harriers from 2010 returned to breed in 2011 at a site very close to Cambridge and raised six young. Nest site placement adjacent to dry Carr may be a strategy to avoid predation from Bitterns (*Botaurus stellaris*). Evidence suggests that most UK Marsh Harriers migrate south to West Africa in August and September, but some local breeding birds overwinter.

Introduction

In 2010 the author wrote a short paper about Marsh Harriers (*Circus aeruginosus*) breeding at a site near Cambridge (Jarman, 2011). Three young birds were successfully reared in 2010 from one nest; two nests were frequented but one was probably predated.

The return of breeding Marsh Harriers is due to the successful re-establishment of reed bed habitat by all the conservation charities and organisations and protective legislation, most importantly the Wildlife and Countryside Act, 1981. Nationally, in the twentieth century, Marsh Harriers returned to breed at Hickling Broad, Norfolk in 1915 (Parry & Greenwood, 2011) and the latest figures from 2009 indicate about 450 pairs nationally (Holling *et al.* 2011). In Cambridgeshire 26 paired females were recorded from 14 sites in 2010 (Clark *ed*. 2011). (The figures for 2009 were a record number and slightly higher: 28 paired females at 18 sites (Clark *ed.*, 2010)).

Observations

In 2011 the author visited the site near Cambridge much less frequently than in 2010 but made the following observations:

1. None of the Marsh Harriers overwintered (winter 2010/2011) at the site.

2. The two females: “Tatty Tail” and “Rufous Tail” returned; “Tatty Tail” still had missing tail feathers and “Rufous Tail” had her distinctive cinnamon coloured upper tail.

3. Two adult males were present; whether they were the same male birds from 2010 could not be confirmed. However, one male was younger than the other, shown by its rich rufous under wing plumage and more diffuse upper wing pattern (Hayman & Hume, 2009). It is possible they could have been the full adult male and the younger male, who had undergone full moult, both from 2010. The author had speculated that the younger male was a sibling of “Tatty Tail” (Jarman, 2011).

4. Three nests were established; two close together in the newer reed bed and one in the larger more established reed bed. Six young birds were fledged, four from the newer reed bed sites and two from the older reed bed site; all the birds were hunting over both reed beds in August 2011.

5. Another reed bed specialist, the Bearded Tit (*Panurus biarmicus*) was again present throughout the summer of 2011.

Nest sites were never out in the open reeds (*Phragmites australis*). In 2009, 2010 and 2011 the successful nests were all on the very edge of the reeds next to willow/buckthorn/alder buckthorn thicket; this may be a strategy to protect the eggs and young from predation. Underhill-Day (1998) considered Foxes (*Vulpes vulpes*) to be the commonest nest predator. Why, then, build a nest next to dry thicket that would seem to offer access to Fox predation?

Another reed bed specialist, the Bittern is believed to be an opportunist nest predator of eggs and chicks including Marsh Harriers. At Woodwalton Fen a male Marsh Harrier was seen to ‘dive bomb’ a Bittern six times on June 17th 2010 (Clark *ed.*, 2011). Bitterns were not present at the site near Cambridge from 2009 – 2011 and they have never been recorded from this site. However, it is considered that nesting on the margins of the reeds is an innate response to avoid Bittern predation. Bitterns are more likely to attack a harrier nest from the reed bed side than the willow/alder buckthorn scrub. Nesting next to damp scrub suggests that at least one approach to the nest is protected from Bittern attack.

As well as small rodents, young Wood Pigeons (*Columba palumbus*) were taken as prey in 2011. A Wood Pigeon corpse, stripped to the bone, was found beneath a harrier perch. On another occasion the older male harrier brought in a freshly killed Wood Pigeon and attempted an aerial food pass to “Rufous Tail” but she dropped it, irretrievably, into the hawthorn thicket. An adult male, female and a juvenile bird were last seen on September 6th; the juvenile was still being fed by the adults.

Migration

Do local breeding Marsh Harriers and their young overwinter in Cambridgeshire?

One of the most remarkable UK ringing recoveries was of a young Marsh Harrier ringed as a chick at Wicken Fen on 16th June 1985 and found dead, six weeks later, on 1st October 1985 at Nouakchoft, Mauritania (Milwright, 1985, Bircham, 1989); a distance of 4048km.

In 2004 the Tay Ringing Group in Dundee joined with Roy Dennis of the Highland Foundation for Wildlife to fit a satellite transmitter on a Marsh Harrier chick. This female left the Tay on August 8th 2004, arrived in Mauritania on 3rd October and spent the winter in Senegal and the Gambia (Dennis, 2011). Unfortunately the battery of the radio tag failed before the return migration (see also the footnote below). The migration of the Tayside bird in 2004 was identical to the migration of the Cambridge bird nearly 20 years earlier.

Anecdotal evidence suggests that as our winters become milder due to climate change, more and more UK breeding Marsh Harriers and their offspring over-winter (Clarke, 1995). The author saw two juveniles and an adult female Marsh Harrier at the RSPB Ouse Fen project near Over, Cambridgeshire in early November 2011. They were almost certainly from a local nest (*pers comm* RSPB).

However, Marsh Harriers do not overwinter at this site near Cambridge. At the nearby RSPB Lakenheath Fen Reserve in Suffolk 18 nests produced a total of 45 young in 2011 but only 1-2 birds were seen during September and October increasing to nine in November 2011 (White, 2011). This may suggest a departure of local birds followed by an arrival of wintering birds.

Do Marsh Harriers disperse locally or migrate south over the winter?

Some winter roosts attract large numbers such as the site at Stubb Mill in the Norfolk Broads where up to 70 Marsh Harriers can be seen. (*pers comm* Robin Cox). The compelling evidence for migration is the bird ringed at Wicken in 1985 and the satellite tagged bird from the Tay Estuary in Scotland in 2004 (see above).

Seven Marsh Harriers were seen coming into roost at the Ely Beet Pools on 2nd October 2011 (Hawkes & Poyser, 2011). These birds in Cambridgeshire and at roosts in neighbouring counties may originate from Scandinavia or the near continent to replace our local breeding birds that have migrated to West Africa.

Jarman (2011) suggested that polygyny, polyandry and incest are breeding strategies that Marsh Harriers use to build up a population rapidly. Reed beds are unstable nesting environments prone to drying out and colonisation by woody scrub. A multiple breeding strategy would enable Marsh Harriers to build up number quickly in an unstable environment.

Most of the ditches, the small mere and the main drain within this habitat near Cambridge were dry from August to the end of 2011. This may well accelerate the succession of this particular reed bed habit into thorny scrub and make it unsuitable in the near future for this specialist reed bed nesting raptor.

Discussion

The breeding colony of Marsh Harriers at the site near Cambridge continues to increase. Nest site placement on the very edge of the reed beds next to willow/alder carr may be an innate strategy to minimise the risk from Bittern predation.

Evidence from a Cambridgeshire ringing record in 1985 and satellite tagging on Tayside in 2004 supported by observations at the Cambridge site and Lakenheath RSPB Reserve, Suffolk, suggests that most of the UK breeding population migrates to West Africa in winter and is replaced by immigrants probably from northern and near-continental Europe. The breeding Marsh Harriers at the site near Cambridge probably made a successful migration to west Africa in autumn 2010 and returned to breed in 2011.

Footnote: A remarkable account of a Hobby (*Falco subbuteo*) satellite tagged in Germany and tracked over two migrations showed that it travelled 10,965km to the most southerly point of its wintering area (Meyburg et al 2011).

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The relative contributions of Chinese Water Deer (*Hydropotes inermis*) and Muntjac (*Muntiacus reevesi*) to browsing at Woodwalton Fen National Nature Reserve

Arnold Cooke

Background

Chinese Water Deer (*Hydropotes inermis*) continue to spread through eastern and southern England with the national population estimated to be 7000 in 2010 (Cooke, 2012). So far their impacts seem slight compared with those of Muntjac (*Muntiacus reevesi*). The latter is a much more widespread and numerous species which has seriously affected woodland biodiversity (e.g. Dolman *et al*., 2010). Water Deer do, however, have a potential to cause impacts on native flora and fauna, and studies are needed to determine whether this potential might be realised in some circumstances.

Woodwalton Fen National Nature Reserve is the main stronghold of the population of Water Deer in western Cambridgeshire (Cooke, 2010, 2011). They have been established on the reserve since the 1960s. Dusk surveillance, undertaken with Lynne Farrell, was started in 1976 and continues to this day. In recent years, management changes inside and outside the reserve have evidently increased the carrying capacity of the local environment, and winter density in the reserve has increased from 30-50 Water Deer per square km during the mid 1990s, to about 90 per square km in 2009/10 and to about 110 per square km in 2011/12. Numbers have been especially high in the last three years with the development of nearby Great Fen grassland and the growing of Elephant Grass (*Miscanthus* sp.) on adjacent farmland. In addition, since 1980, the reserve has held a population of Muntjac, which continued to increase until stalking started in April 2011 (only Muntjac are being shot). Muntjac density has never been studied but signs suggested that it was 50-100 per square km prior to stalking. The reserve is also within the range of a small number of Roe Deer (*Capreolus capreolus*).

With such a high density of Water Deer, the reserve provides an ideal opportunity to study whether this (and other) species of deer might impact on biodiversity. The Water Deer is a selective feeder on a range of grasses, sedges and herbs with some woody species being eaten (Cooke & Farrell, 1998). For the last five years, I have undertaken a number of studies aimed at describing these impacts. Initially, one particular difficulty was that impacts had to be attributed to either Water Deer or Muntjac on the basis of the relative numbers of deer within that part of the reserve or signs such as slots beside the grazed or browsed vegetation (Cooke, 2009). The two species are of similar size so have bites of similar size and browse lines of similar height. To help resolve the relative contributions of the two species, wildlife camera traps have recently been used to video browsing on the reserve – and results are reported in this article.

Browsing issues

Signs of browsing in mixed woodland in the south of the reserve were first noticed in the 1990s but were not considered serious until the last few years. Browse lines exist at Water Deer/Muntjac height, tree regeneration appears affected and species such as Bramble (*Rubus fruticosus* agg.) have declined considerably (unpublished observations by A. Bowley, R. Harold and A. Cooke). These changes are likely to have implications for fauna and other flora dependent on the woodland. By spring 2010, the tentative conclusion, based on signs, was that Muntjac had caused most of the impact, but Water Deer and Roe Deer were likely to have contributed (Cooke, 2009 and unpublished).

In the NNR's management plan, a diverse structure in areas in other parts of the reserve where Grey Willow (*Salix cinerea*) is dominant is considered beneficial for wildlife such as birds. To achieve this, patches of sallow are coppiced and allowed to regenerate. So far, plots have been left unprotected. If regrowth in a cut plot is occasionally destroyed by browsing, this is not of great concern and may indeed lead to greater structural diversity. However, it would be unacceptable if most coppice operations were affected in this way. In 2010, I assessed the success of plots of previously coppiced sallow in the north of the reserve where the ratio of sightings of Water Deer to Muntjac was especially high. These plots had been coppiced between 1998 and 2009 and only three out of 15 had unacceptably poor regrowth, apparently as a result of browsing. However, another plot cut during the winter of 2009/10 was severely browsed and there was concern that Water Deer (and Muntjac) density had reached a critical level as regards browsing of sallow coppice. An additional concern was that browsing within sallow carr had reduced abundance of species such as Bramble.

Methods

Browsing studies were undertaken between January 2011 and March 2012. Six five megapixel Scoutguard or Keepguard wildlife camera traps were used, set to take 10 second videos at nominal one minute intervals. They were situated in appropriate habitat roughly 3 m from examples of target vegetation. Videos were used because photographs usually failed to prove unequivocally that browsing occurred.

Bramble was considered to be a key species as it had evidently been seriously affected in mixed woodland (and in sallow carr). By January 2011, any surviving Bramble bushes had few leaves remaining below the browse line, so bushes were constructed by cutting foliated stems from above the browse line and inserting these in the ground to make a bush about 60 cm in height. Nine locations were used in woodland and three in sallow carr. Naturally-growing Bramble bushes were studied in six locations in woodland during late autumn and winter of 2011/12.

Trials involving cutting Ivy (*Hedera helix*), inserting it into the ground in a regular fashion and recording amounts taken by deer are useful indicators of browsing pressure (Cooke, 2001). All ivy-clad trees in the reserve have browse lines and any fallen ivy-clad trunks or branches are quickly defoliated. Bushes

roughly 60 cm high were constructed with cut Ivy to provide information on browsing in the woodland (four locations), sallow carr (six locations) and more open habitats (four locations).

To monitor browsing on sallow coppice regrowth, cameras were set up during May-July 2011 on target stools in five plots in the centre and north of the reserve that had been cut the previous winter.

For each video, records were kept about deer species filmed and whether browsing occurred or whether smelling vegetation was noted in the absence of browsing. Also noted were number of seconds spent browsing on each video and number of browsing sessions (videos separated by five minutes or less were treated as a single session); however, these observations did not affect conclusions and are omitted from this account. It should be appreciated that the cameras, as programmed, recorded comparatively small slices of time and in some circumstances it might be important whether or not the gaps between videos were taken up by browsing.

To indicate the relative abundance of Muntjac and Water Deer using camera traps, detectability of the two species should be as similar as possible. Deer paths in the mixed woodland are used by both species, so cameras were set beside such paths, and away from browsing opportunities, to record passing animals during the winters of 2010/11 (six locations) and 2011/12 (seven locations).

Results and observations

Only two (1.7%) of the videos of browsing on constructed Bramble bushes featured Chinese Water Deer, with the remainder (98.3%) featuring Muntjac (Table 1). This occurred despite dusk surveillance indicating that high densities of Water Deer lived in the vicinity of the sallow carr. Numbers of videos showed deer smelling the Bramble without browsing. Often the bush had already been defoliated by Muntjac, but smelling by Muntjac was sometimes a prelude to them browsing at night on a bush that still had leaves. The browsing study on natural bushes in the mixed woodland gave a similar result (Table 1) with Muntjac accounting for 96.3% of the browsing videos, Water Deer for 2.5% and Roe Deer for 1.2%.

Cameras set beside deer paths in mixed woodland recorded the following: in 2010/11, 62 photographs of Muntjac, 36 of Water Deer and 2 of Roe in 44 camera-days; in 2011/12, 282 videos and photographs of Muntjac, 100 of Water Deer and four of Roe in 164 camera-days. These ratios of Muntjac to Water Deer (1.7:1 in 2010/11 and 2.8:1 in 2011/12) were likely to be better indications of relative abundance in the woodland than the ratios from Bramble browsing (12:1 in 2010/11 and 18:1 in 2011/12). The latter ratios probably reflected the attractiveness of Bramble to Muntjac.

Table 1. Numbers of videos relating to browsing and smelling Bramble. Constructed bushes were studied January-February 2011 and natural bushes November 2011-February 2012. There was one video of Roe smelling a constructed bush and three videos of Roe beside natural bushes, including one of browsing.

Type of bush and habitat	Camera-days	Muntjac		Chinese Water Deer	
		Total number of videos	Number browsing (smelling)	Total number of videos	Number browsing (smelling)
Constructed bushes					
Sallow carr	24	128	75 (12)	14	2 (8)
Woodland	50	86	41 (7)	7	0 (2)
Overall	74	214	116 (19)	21	2 (10)
Natural bushes					
Woodland	229	270	78 (9)	15	2 (1)

Of the 228 videos of browsing on Ivy, only two (0.9%) featured Water Deer with all of the others being of Muntjac (Table 2). In the sallow carr especially, Muntjac returned time after time until the Ivy bushes were defoliated. At one location in dry sallow carr, Muntjac averaged 20.3 videos per camera-day. Not only did they eat the leaves, but they also positioned Ivy stems in the sides of their mouths, bit through them with their molars and premolars and ate them. Muntjac were involved in the only instance of browsing in reed-bed or mixed fen fields; Water Deer occurred in these habitats in large numbers but rarely came close to the Ivy and the cameras.

Table 2. Numbers of videos relating to browsing and smelling constructed Ivy bushes, February-March 2011 and March 2012. There were no videos of Roe.

Habitat	Camera-days	Muntjac		Chinese Water Deer	
		Total number of videos	Number browsing (smelling)	Total number of videos	Number browsing (smelling)
Sallow carr	29	245	170 (26)	4	0 (2)
Reed & fen	24	1	1 (0)	4	0 (1)
Woodland	24	133	55 (14)	4	2 (0)
Overall	77	379	226 (40)	12	2 (3)

In contrast to results with Bramble and Ivy, Water Deer accounted for 60.6% of the browsing videos on young sallow coppice regrowth with Muntjac accounting for 39.4% (Table 3). Examination of a sub-set of the clearest night-time videos concluded that any reaction to the infra red flash of the camera had not distorted these results. The mean number of browsing videos per camera-day ($\pm$ one standard error) for the five coppice plots was 0.41 ± 0.06 for Water Deer and 0.27 ± 0.14 for Muntjac. The difference between the means was not statistically significant.

Table 3. Numbers of videos relating to browsing and smelling regrowth on sallow coppice, May-July 2011. There were no videos of Roe.

Habitat	Camera-days	Muntjac		Chinese Water Deer	
		Total number of videos	Number browsing (smelling)	Total number of videos	Number browsing (smelling)
Sallow coppice	146	99	39 (0)	161	60 (0)

The ratio of the total number of videos of each species (1.6 Water Deer to 1 Muntjac) may provide a reasonable estimate of the relative abundance of the two species in coppice areas in summer. Both species browsed in a relaxed fashion on sallow regrowth with videos tending to show deer browsing only briefly or ignoring stools as they walked past them – contrasting with the avid feeding of muntjac on Ivy and Bramble.

The impact of the brief, but fairly frequent, episodes of browsing on the willow was often to create and maintain 'micro-lawns' of densely-packed new growth a few centimetres in height and perhaps 10 or more centimetres across. From a distance these resembled patches of moss. These fast growing young stems seemed very palatable to the deer. In the absence of browsing for a week or two, stems grew, but might then have their tips removed by deer. In all five of the coppice plots, regrowth was judged to have been unacceptably browsed during its first growing season (A. Bowley, pers. comm.). Regrowth will be monitored in 2012 to see if any recovery occurs as the stools receive some protection from the developing fen vegetation.

Discussion

Evidence presented here is consistent with earlier suspicions that Muntjac were responsible for most of the browsing impact in the mixed woodland. First, they were the dominant species of deer in the woodland. Secondly, they accounted for more than 96% of the browsing videoed in the woodland on constructed Ivy and Bramble bushes and on natural Bramble bushes. Similarly, they are likely to be responsible for the great majority of browsing in sallow carr. The extent to which they were attracted to Ivy in sallow carr was remarkable.

Frequency of browsing of Muntjac and Chinese Water Deer in young sallow coppice was approximately in proportion to their relative abundance, with the latter species featuring in just over 60% of the browsing videos. This seems to be the first published account of Water Deer having a significant impact on conservation interests in this country. The impact was associated with an unusually high density in the reserve estimated at about 100 Water Deer per square km.

Muntjac were sometimes videoed gnawing woody Ivy stems with their (pre)molars. Buck Water Deer would be prevented by their tusks from feeding in this way, and doe Water Deer have not been filmed or seen doing so either. Zhang (2000) noted that a Water Deer feeds by biting off vegetation between its

lower incisors and upper dental pad or by grasping it in the same way and tearing it off by head movement. Feeding trials in China showed that only the tender top parts of woody species were taken (Guo & Zhang, 2005). Water Deer therefore seem not to feed on the harder woody material that is taken by Muntjac. To a Water Deer, young sallow regrowth must seem like soft herbage. So far, sallow coppice has been unprotected in the reserve, but the degree of protection afforded by brashed branches left on newly-cut stumps is being monitored in 2012.

Rumen contents of eight Water Deer found dead at Woodwalton Fen in winter or spring 1977-1980 were examined by Lynne Farrell and Tony Mitchell-Jones (unpublished): three contained Bramble and one contained Ivy leaves. In view of these findings, it may appear surprising that Water Deer did not browse more on these species. These dead deer were, however, examined before Muntjac colonised the reserve and substantially reduced the abundance of these browse species. In recent years, Water Deer may have grown less accustomed to feeding on these species in winter. In addition, Water Deer smelled the Bramble and Ivy more frequently than they browsed. Often, stems had already been defoliated by Muntjac, but sometimes leaves remained. It is possible that Water Deer were in part deterred by the smell of Muntjac (or perhaps by the smell of me, although I always wore gloves when handling vegetation). It is becoming increasingly difficult for Water Deer to find sites in eastern or southern England that do not already have populations of Muntjac.

Finally, the videoing technique has shown considerable promise in helping to resolve the relative contributions of different deer species to observed browsing impacts on vegetation. It could be useful in other similar situations, including with herbivores as small as voles or mice.

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Three annotated copies of Babington's *Flora of Cambridgeshire*

C.D. Preston

Annotated copies of C.C. Babington's *Flora of Cambridgeshire* (1860) provide a remarkably rich source of vascular plant records from the county. Perring *et al.* (1964, p. 331) list nine copies from which they derived records, annotated by A.H. Evans, A. Fryer, H.N. Dixon, J.S.L. Gilmour, C.E. Moss, W.H. Mills, A. Shrubbs, W. West jun. and by Babington himself. To these can be added eight more annotated copies unearthed by Mrs G. Crompton for her monumental *Catalogue of Cambridgeshire Flora Records since 1538* (Crompton, 2001–2004). These are copies formerly owned by Babington's friend E.B. Cowell, held in Cambridge University Library, by J.E. Little, then held in Hitchin Museum, and by J. Gray, A.G. Gregor, A. Hosking, J. Blades, Mrs E.M. Barraud and W.M. Palmer, then in private hands. The purpose of this note is to provide details of three annotated floras which have recently been donated to Cambridge University Library. These are J. Gray's and A.G. Gregor's copies listed above, which I lent to Mrs Crompton when she was compiling her catalogue, and a further copy annotated by A.W. Graveson, which has recently come to light. After describing these particular floras, I have briefly discussed the reasons why so many annotated copies of Babington's *Flora* have survived.

J. Gray

In 1982 I bought a copy of Babington's *Flora* in a Cambridge bookshop which is inscribed on the flyleaf 'J. Gray. King's Coll. Camb. March 12th 1910'. This is James Gray (1891–1975), who was admitted to King's College, Cambridge in October 1909, obtained a first class in both Part I (1911) and Part II (1913) of the Natural Science Tripos and was awarded the Frank Smart Prize for Zoology in 1913 (Withers, 1929). Although he was elected to a fellowship at King's in 1914, he almost immediately joined the army and fought with distinction in France and Palestine, winning the Military Cross and the Croix de Guerre avec palme, the latter presented to him in the field by Marshal Foch. He returned to King's in 1919 to resume his zoological career. He became Professor of Zoology in 1937 and was knighted in 1954 (Swann, 2004). A wonderful portrait bust by Sir Jacob Epstein is displayed in the library of the Department of Zoology.

Some common species are simply ticked in Gray's annotated Babington but many have neat annotations in ink giving localised and (usually) dated records. None of the records are of grasses (although there are some records of sedges). All the dates are in 1910, suggesting that his interest in botany did not outlast his first summer in Cambridge. The earliest date is 25 April 1910, which is given for unlocalised records of a number of common species and a localised record from Girton. The other localised annotations include records (with dates, if given) from:

The Backs (undated)

Thetford (April, May) and Thetford Heath (May), Norfolk

Granchester (May)

Madingley (May) and Madingley Wood (undated)

Fulbourn and the Gogs ([Tuesday] 7 June)

Royston and Royston Heath, Hertfordshire ([Thursday] 7 July)

Hunstanton, Norfolk ([Sunday–Monday], 10–11 July; entries are also given for *Lactuca virosa* on 7 July and for four coastal species (all on pp. 191–193 of the annotated *Flora*) on 21 July 1910 but these dates seem unlikely to be correct in view of the numerous records from Royston Heath and Wicken Fen on these dates)

Six Miles from Nowhere Pit and Wicken Fen ([Thursday] 21 July)

Roswell Pits, Ely and Mildenhall, Suffolk ([Wednesday] 27 July)

Gamlingay ([Wednesday–Thursday] 3–4 August, including Gamlingay Station on 3 August).

Some of the records seem likely to have been made on Botany School excursions, as a search of Mrs Crompton's on-line catalogue shows that R.S. Adamson collected *Potamogeton lucens* from Wicken Lode on 21 July 1910, the same day as Gray's records from there. N.D. Simpson (then an undergraduate at Trinity) might also have been on this excursion as there are several aquatics in his herbarium (BM) collected at Wicken in 1910, but without a precise date. C.E. Moss collected *Jasione montana* and *Thymus pulegioides* at White Wood, Gamlingay, on 3 August 1910, both species recorded at Gamlingay by Gray although he dates his records 4 August 1910. This was the last time that *J. montana* was seen in the county.

A.W. Graveson

Arthur William Graveson (1893–1979) was admitted to King's College, Cambridge, in October 1911. His copy of Babington's Flora, inscribed 'AW Graveson Kings Coll Cambridge' was bought by D.A. Pearman from the bookseller who acquired Graveson's books after his death. David kindly agreed to exchange this copy with an unannotated copy so that it could be deposited in the University Library.

Graveson is an interesting figure, although he has only the very briefest of entries in Desmond's *Dictionary of British and Irish botanists and horticulturists* (1994). He came from a Quaker family. His father, William Graveson (1862–1939), was the manager of the family drapery business in Hertford and was also active in local politics (James, 2009). He was also, more pertinently, a botanist who contributed three chapters on "Alpine plants at Home" to W.P. Wright's book *Alpine flowers and rock gardens* (Graveson, 1911); in these he dealt with the ecology and native Swiss and British habitats of montane plants. He also wrote his own substantial plant book, *British wild flowers: their haunts and associations* (Graveson, 1917). Despite this, he has no entry at all in Desmond's *Dictionary*. His son attended Bootham School, York, where he started the first of a series of natural history note books and diaries. He obtained a First Class in Part I of the Natural Sciences Tripos in 1913, a Diploma in Agriculture in 1914 and an M.A. in 1920. His service as an orderly in the Friends' Ambulance Unit in the War included time spent on a hospital

ship and a hospital train. He was appointed Science Master at Beaminster Grammar School, Dorset, in 1919 and became Deputy Headmaster. “An unambitious, retiring man of private pleasures, he stayed there for forty years, devoting his leisure time to botanising locally, throughout Britain and when possible abroad” (J. Graveson, undated).

Most of the annotations in Graveson’s Babington are undated, although a few are dated 1912 and 1913. He recorded *Geum* x *intermedium*, for example, from ‘W[ater] Avens Wood near Stetchworth’ on 13 May 1913. Graveson has annotated the book with a range of writing implements including grey, blue and purple pencils and pens with red and black or blue-black ink. Although he recorded a wide range of species, the density with which some of the orchid pages are annotated contrasts with the sparsity of records of grasses and the lack of any annotations on the *Carex* pages. As with Gray’s Flora, some species are simply ticked but there are localised records from a wide range of localities. He made records at numerous sites near Cambridge and at well-known localities further afield such as Cherry Hinton, Dernford Fen, Devils Ditch, Eversden Wood, Fleam Dyke, Gamlingay (including Gamlingay Wood and White Wood), Gogmagog Hills, Hardwick Wood, Hildersham Furze Hills, Kingston Wood, Newmarket Heath, Roswell Pits, Royston Heath (Herts.) and Wicken Fen. He also noted plants (often by underlining Babington’s sites) at many more ordinary places, such as Ashwell, Brinkley, Caxton, Dullingham, Fulbourn, Grantchester, Harlton, Mepal, Odsey, Stapleford, Teversham and Wimpole.

Despite the lack of dates, most if not all his annotations were almost certainly made during the three summers he spent as an undergraduate in Cambridge, 1912, 1913 and 1914. His herbarium specimens are held by the North Hertfordshire Museums Service and have been catalogued. The 206 specimens he collected in v.c. 29 include 195 collected between 1912 and 1914; of the other eleven, two were collected in 1911, two in 1919, three in 1925, one each in 1926 and 1928 and two in 1934. The wide range of sites contrasts with the limited number of places from which Gray recorded plants and suggests that Graveson’s botanising was not restricted to class excursions. This is confirmed by his natural history diary for 1914, which shows that he made numerous forays by himself or with one of several friends, on foot or by bicycle. In January 1914, for example, he returned from Hertford to Cambridge for his penultimate term on the evening of 15th; on 16th he cycled to Cherry Hinton, on 17th to the Gogs and Roman Road and by the end of the month he had recorded natural history observations on a further seven days, visiting Cherry Hinton again and Fen Ditton & Milton, Grantchester, Hardwick & Hardwick Wood, Hildersham Furze Hills, Histon and Madingley. One or two of the plant records he made as an undergraduate were published by Evans (1913).

A.G. Gregor

Unlike Gray and Graveson, Arthur George Gregor (1867–1954) did not make his botanical records while studying at the University of Cambridge. He was a University of Durham man (B.A. 1892, M.A. 1895, B.D. 1912) who was ordained as a priest in 1893. His subsequent career in the Church of England

was scarcely high-flying. He worked as a curate in the Forest of Dean between 1892 and 1897 and from 1897 he was based in Sussex as a curate at various parishes or a licensed preacher. He eventually became Vicar of West Firle with Beddingham in 1927, and he served there until retirement in 1946. He contributed many records to A.H. Wolley Dod's *Flora of Sussex* (1937) from the Hastings area and other parts of East Sussex. He was "a modest retiring soul whose true self was only known to very few … in the country he was rarely seen without his vasculum, and Babington was his second Bible" (Pickard-Smith, 1956), Babington in this case being the *Manual of British botany*.

Gregor's *Flora of Cambridgeshire* is inscribed 'Arthur G. Gregor May 2. 13.' on the title page. I do not know the reason for his visits to Cambridgeshire, but most of the annotations are for localities in the south of the county, particularly Melbourn but also Arrington, Barrington, Croydon, Fowlmere, Foxton, Great Chishall, Harston, Haslingfield, Haydon, Meldreth, Royston Heath (Herts.), Shepreth (particularly Shepreth Moor), Thriplow and Trumpington. There are also records from Cherry Hinton, Devil's Ditch, Gogmagog Hills, Madingley and Newmarket Heath. Two annotations, both for *Orobanche elatior* (Melbourn 11 August 1910 and "above Hinton Chalk-pit" 6 July 1912) predate his acquisition of the book, but the rest are for 1913–1915 and 1919–1925. The annotations therefore cease just before Gregor was elevated from curate to vicar. Pickard-Smith (1956) says that all his holidays were spent in the Swiss Alps and "that there is hardly one of the well-worn pages of his Gremli that does not have its mouth-watering annotations of his findings with their appropriate dates". August Gremli's *Excursionsflora für die Schweiz* was first published in 1867; it was later translated into French and an English translation of the 5th German edition was published in 1889 as *Flora of Switzerland for the use of tourists and field-botanists*. Perhaps it was after 1925 that Gregor began to spend his holidays abroad, exchanging the delights of Melbourn for those of the Matterhorn.

The flourishing state of field botany in Cambridge, 1908–1914

Despite their differences, the Gray and Graveson floras illustrate the keen interest in field botany in the University's Botany School one hundred years ago. A.H. Evans (1911) reported that "our botanical expeditions have taken a new lease of life" with the encouragement of Professor A.C. Seward (although Seward was himself a palaeobotanist). Two years later, "considerable accessions to our county list" were evidence of "a further revival of the interest now taken in Field Botany" (Evans, 1913). C.E. Moss, appointed by Seward as Curator of the Herbarium, led the Botany School excursions which, as Evans (1913) reported, extended "beyond the county limits". A.G. Tansley and R.P. Gregory, the son of the violet specialist Mrs E.S. Gregory, were also on the staff as University Lecturers and R.H. Compton and A.S. Marsh held more junior posts. Other botanists associated with the Department at times during this period included R.S. Adamson, Humphrey Gilbert Carter, Marietta Pallis and A.J. Wilmott. Evans' accounts of the plants of the county (1911, 1913) were themselves symptomatic of the revival; these works included lists of

Cambridgeshire bryophytes (the first serious study of this group since Henslow's day), algae, lichens and fungi. Evans later listed "Mr Tansley of Trinity, Messrs Eve of Pembroke, Adamson of Emmanuel, Compton of Caius and Simpson of Trinity" as providing much assistance with the vascular plant section in his 'Short Flora' of 1911 (Evans, 1939). A less serious sign of the spirit of the Department was the foundation of the occasional periodical *Tea Phytologist* by Compton and Marsh in 1908; according to Compton (1977), "Marsh was responsible for a great part of the contents of that frivolous publication". Unfortunately, this remarkably talented group of botanists soon dispersed. It was inevitable that some of the junior botanists would move on to other jobs but the crucial loss was probably the departure of Moss, who left in 1917 to take up a professorship in South Africa in the aftermath of a scandalous divorce (Bunting *et al*., 1995). Compton also emigrated to South Africa in 1919 and Adamson, who had left for Manchester in 1912, followed his colleagues to South Africa in 1923 (Gunn & Codd, 1981). Wilmott took up a post in the Natural History Museum in 1911, Gilbert Carter went to India in 1913, Marsh, a much-loved figure, was shot through the heart by a sniper on the western front in 1916 and R.P. Gregory returned from the War but never really recovered from the effects of poison gas and died in Cambridge in November 1918, succumbing to influenza followed by pneumonia (Desmond, 1994; Tansley, 1916; Seward, 1918).

Why are there so many annotated copies of Babington (1860)?

Is there any other county for which annotated floras are such an important source of records? Babington's *Flora* was published at the start of a period in which increasing numbers of county floras were published (Preston, 2003) and it remained the standard work until A.H. Evans' *A Flora of Cambridgeshire* (1939), and arguably until Perring *et al*.'s flora was published in 1964. However, this long period of pre-eminence is not unusual for a county flora and it is unlikely in itself to explain the large number of annotated copies. More relevant perhaps are two further considerations, one a reflection of its size, price and availability and the other a reflection of the lack of any other means of documenting records in the county.

Babington's *Flora* has a very carefully planned format, and he managed to include numerous records in a small book with a layout which, by chance, was just spacious enough to allow room for annotations. The modest size of the book was presumably reflected in a modest price. This would have made it available to people arriving in Cambridge as undergraduates and taking up an interest in botany, as well as to those botanists who were resident for longer periods. It would be interesting to know how long it remained in print – the copies discussed above suggest that it could be bought without undue difficulty until the First World War. Graveson's copy is second-hand (it had belonged to Cavendish College Library, Cambridge) but the other copies show no indication of a previous owner.

Many of those who annotated copies of their floras probably did so for essentially personal reasons. The annotation served as the equivalent of a

modern ‘tick list’ or personal record of plants seen in the county. Indeed, some annotators (including the three discussed in this article) did sometimes simply tick the names of some species, especially if they were common plants. Nevertheless, the annotated floras can be a valuable source of localised records of common species, often noted by botanists just beginning to learn their plants (Preston, 2003). Despite the personal motivation for annotating floras, it might also be that botanists continued to annotate their copies of the *Flora* and retained them as a permanent record because there was no way of reporting their finds to others. It was not until Cambridge Natural History Society card index was started as a co-operative venture in the 1930s that there was any central register of county records. Even more remarkably, there was no local journal in which records could be published until *Nature in Cambridgeshire* was launched by the newly founded Cambridgeshire and Isle of Ely Naturalists’ Trust (CAMBIENT) in 1957. In the absence of a county journal, few local botanists published their records, the main exception being Alfred Fryer, whose long series of notes on the county’s flora in *Journal of Botany* are listed in the bibliography of Perring *et al*. (1964). Preservation of some annotated floras was doubtless facilitated by the presence, in the library of the Botany School of an obvious place in which they could be deposited alongside Babington’s own library and records.

Are there any further annotated copies of Babington’s *Flora*?

Do readers of Nature in Cambridgeshire know of any other annotated copies of Babington’s *Flora*? If so, I would be interested to hear of them. My address is CEH, Maclean Building, Benson Lane, Crowmarsh Gifford, Wallingford, Oxon, OX10 8BB (cdpr@ceh.ac.uk).

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The Dingy Skipper (*Erynnis tages*) on Devil's Dyke

Hilary Conlan

With Dingy Skipper as a name, this little butterfly is hardly likely to compete with the general public's recognition of the Peacock or Brimstone or have the attraction and following of the Swallowtail. However its habit of flying early in the season and resting on knapweed heads should make it a butterfly to look out for and enjoy its subtle brown, grey patterning.

While the Dingy Skipper is a very widely distributed species, the population is experiencing a serious decline, such that it is now recognised as a Biodiversity Action Plan species, which means there is a plan set up with the aim of halting or reducing the decline. Recent records indicate they have disappeared from 40% of the 10km squares in which they were recorded in 1970-1982.

Since 1987, the Cambridgeshire and Essex branch of Butterfly Conservation have managed annually a section of the Devil's Dyke in Newmarket, with the aid of a group of volunteers in two winter work parties. The management of the steeply sloping banks has been scrub clearance, grass cutting and vegetation removal, to ensure this historical feature remains as good grass chalkland habitat. While there has been a huge success with the dramatic increase in the Chalkhill Blue butterfly population, with numbers on the transect peaking at over 1000 in the height of the season, the Dingy Skipper population has not had similar success. The annual index of the Dingy Skipper on Devil's Dyke is 40-60. The local branch of Butterfly Conservation set out to determine what limits Dingy Skippers and what steps could be taken to assist in increasing the population.

Initially the differences in behaviour between the Chalkhill Blue and Dingy Skipper were compared and the different species' requirements noted. The Dingy Skipper flies in late April – May when the weather is more likely to be quite variable than in high summer when the Chalkhill Blue flies. The Dingy Skipper does not fly far and needs a mosaic of varied habitat components to meet its needs. The food plants for the caterpillar are Horseshoe Vetch (*Hippocrepis comosa*) and Birdsfoot Trefoil (*Lotus corniculatus*). Also required are patches of bare ground to maximise basking in the weak spring sunshine. Long grass and light scrub allow shelter from cooling and gusty wind. As well as needing a greater degree of shelter than the Chalkhill Blue, it is the difference in how the Dingy Skipper and Chalkhill Blue overwinter that creates a need to have different management styles of the conservation land. The Chalkhill Blue overwinters as an egg lying at ground level whereas the Dingy Skipper caterpillar creates a tent by spinning the leaves of its food plant together. Within this security the caterpillar is able to feed throughout the summer. As autumn approaches it spins a larger leaf structure known as a hibernaculum in which to overwinter. Pupation occurs in the hibernaculum and the butterfly emerges from it in mid April – May. Concern that the bush and grass cutting followed by the subsequent raking may be damaging the hibernacula, meant that the Cambridge and Essex Butterfly group wished to assess at what height the hibernacula were formed and how robust they were.

A project was developed to study the two aspects of Dingy Skipper requirements. Firstly there was a change in management of the Jockey Club section of the Devil's Dyke. By experimenting with the amount of grass and scrub clearance undertaken it was hoped to find the optimal amount of shelter belts for the Dingy Skipper. Whereas areas managed only for the Chalkhill Blue had been cut in 100 m straight sections, bringing all vegetation down to a height of a few centimetres, the 100 m sections set for Dingy Skipper management were cut in randomised circular areas leaving approximately 25% scrub. The

aim was to create pockets of short vegetation and bare soil with a light protective wall of taller vegetation. As there has been a long running transect monitoring all butterfly movement on this section of the Dyke, it is hoped that we will be able to assess the success of the different management styles from comparison of numbers of Dingy Skippers in the different sections pre and post change.

Additionally, finding the exact heights of the hibernacula, not only in relation to the ground level but also in relation to the slope of the bank, was required. There is a considerable difference in the wind strength at the top of the bank than at the bottom, which may have a bearing on egg laying choices. As the change in management was in its infancy and the full length of the Jockey Club section had been managed in a four year rotation, there were areas of very differing levels of vegetation growth. It was possible to mark three 50 m sections that ranged from having been

1) fully strimmed two years earlier
2) sporadic scrub
3) an area with hawthorn, silver birch and dog rose over 50cm high.

Each 50 m section was surveyed with every Dingy skipper egg position in relation to slope height being recorded and centred on the egg a surrounding 1m quadrat vegetation survey made.

The Dingy Skipper eggs are a bright orange and shaped like little Christmas puddings and laid on the top surface of a leaf. This made the egg hunt far easier. As the count was done in the middle of the egg laying period some individual butterflies were followed and the points where they stopped to lay were noted and compared with areas that they appeared to be closely scrutinising but not laying.

The food plant Horseshoe Vetch is fairly evenly distributed over the entire section of the Devil's Dyke. However there was a significant difference in the number of flowering heads each plant had with the most recently cut site having smaller plants with fewer flowers. The height of the sward and the mean percentage of food plant cover in each quadrant were recorded. The third section with scrub over 50 cm had noticeably higher sward and the highest mean percentage of Horseshoe Vetch.

The first section which had been strimmed most recently had less than half the number of eggs as either of the other sections. However there was a very clear difference in the height of the slope the eggs were found in each section. The most scrubbed area had the majority of eggs laid at the top third of the slope which received least shading from the scrub. The sporadic scrub section had most eggs laid in the middle third of the slope benefiting from both full sun and some degree of wind shelter. Only two eggs were found in the bottom third of the slope which was in shade earlier in the afternoon. Overall then the choice of position of egg laying appears to be firstly dictated by shelter from wind and secondly by the level of sunshine received. Although it was not possible to quantify the findings, all three of the egg hunters were left with the general impression that the eggs were always found in a dip the size of a cupped hand formed by the gaps in vegetation, ant hills and erosion.

Each egg position was noted using GPS and a large number of return trips were made to assess how quickly the caterpillars created their first Horseshoe Vetch tent and how far they moved. At least this was the aim. The first return trip started with a flourish with a Dingy Skipper caterpillar being found within the first hour. The caterpillar is a striking fellow with an apple green body and black head. However, there the project stalled. For despite numerous visits and the willing assistance of volunteers and students only one more caterpillar was found. The leaf tent structures and hibernacula have yet to be found.

During walks to assess the habitat on the Dyke, the volunteers noted how well the cryptic camouflage concealed the Dingy Skippers as they sat on the seed heads of the previous year's Knapweed. Their wings fold in moth-like fashion and curve with the seed head shape.

From this preliminary work, it has been decided to continue to manage the Jockey Club section with the need to create some sheltered sunny pockets specifically for the Dingy Skipper and ensure that stands of the previous year's Knapweed are retained. Further work on trying to find the hibernacula needs to be undertaken in August and September.

On a cool, dull day when few butterflies are flying a check of the Knapweed would be an enjoyable challenge and might produce a satisfying result. Although they are Dingy by name and perhaps by colour, these little butterflies can be enjoyed and hopefully the population on Devil's Dyke will increase.

How many plant species did John Ray record in Cambridgeshire?

C.D. Preston and P.H. Oswald

John Ray (1627–1705) was perhaps Britain's greatest natural historian, Darwin excepted. He taught himself botany while he was a Fellow of Trinity College, Cambridge, in the 1650s. After nine years' study he completed his first book, *Catalogus plantarum circa Cantabrigiam nascentium* (1660), a catalogue of the plants of Cambridgeshire. This was followed by a brief appendix in 1663. By this time Ray had left Cambridge, as he refused to subscribe to the Act of Uniformity in 1662 and therefore had to leave his academic appointments. The purpose of this note is to calculate the number of vascular plant species which were reported from Cambridgeshire (v.c. 29) in the *Catalogus* and the 1663 appendix and which can therefore be assumed to have been seen in the county by Ray. He paid no direct part in the preparation of a second edition of the appendix, published in 1685, although much of it was based on his published work. We go on to consider which groups Ray recorded relatively well and which were recorded less successfully. We base our assessment on the taxonomy in Stace's *New flora of the British Isles* (2010) and on the attribution of Ray's taxa to Stace's species set out in our recent translation of Ray's

Cambridgeshire works (Oswald & Preston, 2011). We follow Preston *et al.* (2002) and Hill *et al.* (2004) for the native status of species in the British Isles.

Vascular and non-vascular plants in the *Catalogus*

The alphabetical list of plants in the *Catalogus* includes 630 entries, but Ray recognised that the entry for *Tithymalus helioscopius* included two species, which are clearly the modern *Euphorbia helioscopia* and *E. peplus*. We therefore take the number of taxa reported by Ray as 631. This excludes a few taxa which are not given their own entry in the main catalogue but are mentioned elsewhere in the book, of which the most notable is perhaps the Jew's Ear (*Auricularia auricula-judae*), a fungus mentioned by Ray in a note following Elder (*Sambucus nigra)*.

Of the 631 taxa, seven were vascular plants which were not seen by Ray but which were included in the *Catalogus* because there was an earlier record from the county. Two of these entries were for variants of *Artemisia campestris* which How (1650) had recorded, but Ray eventually concluded, after searching for them diligently, that "*neither of them is to be found on Newmarket heath, at least that part of which is in Cambridge-shire*" (Ray, 1663). Similarly *Galega officinalis* had been reported by Parkinson (1640) from "*meadows about Linton*", but "*we could not find it there, and do suspect that it is not there to be found*". Ray also suspected that How's (1650) report of *Portulaca oleracea* from near Ramsey Mere was an error, as it almost certainly was (but he did not realise that the site was actually in Huntingdonshire). He was also unable to refind *Staphylea pinnata*, reported by Parkinson (1640) from Milton, an unidentifiable crucifer reported as "*Turritis*" by Gerarde (1597) from flax fields about Cambridge and a teratological variant of *Plantago major*, "*Plantain with spokie tufts*", found at Cherry Hinton by Dr Robert Strachey.

One further species has to be excluded. *Silene otites* was reported by Ray (1660) from a site north of Newmarket. He later realised that this site might have been in Suffolk, as indeed it is, but authors of later floras have apparently failed to notice this and have included the record as if it was in Cambridgeshire. (Babington's *Flora of Cambridgeshire* (1860) includes the record under *Silene anglica* because of the accidental omission of several lines of text including the title of the *Silene otites* entry.)

The remaining 623 taxa recorded by Ray himself fall into the following main groups: Fungi 4; Lichens 3; Algae 2; Bryophytes 5; Vascular plants 609.

It is obvious from the low number of non-vascular plants that Ray provided only token coverage of these groups. His fungi include entries for puff-balls and bracket fungi, as well as one for a morel, perhaps *Morchella esculenta*, and one covering rust and smut infection of cereals. One of the entries for lichens clearly refers to *Cladonia* spp. whereas the other two are probably best interpreted as general entries, one covering foliose and the other fruticose lichens. The only algal entries are for a charophyte, clearly one or more species of *Chara*, and "Hairie River-weed" which Ray calls *Conferva Plinii*. Belcher *et al.* (2011), in an article published after our translation of the *Catalogus* went to press, suggest that this plant was probably *Cladophora glomerata*. One of the bryophytes is

identifiable to species, the large moss *Polytrichum commune*; another was probably the thallose liverwort *Marchantia polymorpha* (which was more clearly described in the 1663 appendix). The remaining three are mosses which cannot be identified even to genus.

Vascular and non-vascular plants in the 1663 appendix

There are 42 taxa listed in the 1663 appendix, 38 vascular plants and four bryophytes. The bryophytes are the male and female plants of *Marchantia polymorpha*, which have separate entries, and two of the county's most distinctive mosses, *Fontinalis antipyretica* and *Thuidium tamariscinum*.

How many species did Ray record?

Of the 609 vascular plants in the *Catalogus*, 574 can be identified as modern species recognised by Stace (2010). Some of these identifications can be made without a shadow of a doubt but other species can be named only on the balance of probability. The total of 574 includes a plant which we identify only tentatively as *Senecio sylvaticus* (Oswald & Preston, 2011). An additional 28 plants can be identified as aggregates of two or more congeneric species, such as *Crataegus laevigata/monogyna*, *Euphrasia officinalis* agg. and *Polypodium vulgare* agg. The remaining seven species can be identified only to genus; one of these is a genus (*Callitriche*) that does not appear elsewhere in the main catalogue but the remaining six are for genera (*Carex*, *Equisetum*, *Rumex* and *Salix*) which are also represented in the main catalogue by taxa which can be identified more precisely. We therefore treat *Callitriche* as a further aggregate (as indeed it is often treated by recorders today).

Of these 574 species and 29 aggregates, 35 (33 species and two aggregates) are duplicates. This is because Ray has separate entries for plants which are now recognised as variants of modern species, such as white- and red-flowered *Achillea millefolium*, *Lactuca serriola* with unlobed (forma *integrifolia*) and pinnatifid (forma *serriola*) leaves and both ordinary and *flore pleno* variants of *Hydrocharis morsus-ranae*. This gives a total of 541 modern species and 27 aggregates (568 taxa) in the main catalogue.

A similar analysis of the 38 vascular plants in the 1663 appendix gives 34 species, one hybrid, one aggregate, one plant identifiable only to a genus (*Thymus*) for which there is a precisely identified species in the main catalogue and one unidentifiable fern. Four of the species had already been reported by Ray in the *Catalogus* (1660), so there are 32 additional taxa – 30 modern species, one hybrid and one aggregate – in the 1663 appendix.

Ray therefore recorded 571 species, one hybrid and 28 aggregate species from Cambridgeshire, giving a total of 600 taxa. These are explored in more detail below.

Calculating the proportion of the Cambridgeshire flora recorded by Ray

Native plants are those occurring naturally in the county; 'native or alien' plants are those which are doubtfully native in the British Isles as a whole. Archaeophytes are introduced species which are believed to have been

established in Britain before 1500. We can calculate the proportion of the flora of the county in these groups recorded by Ray if we assume that all such species that have been recorded from the county were present in 1660. Our list of recorded Cambridgeshire species includes all British native, native or alien and archaeophyte species present in the county unless the status of species in Cambridgeshire clearly differs from that in the British Isles. We have excluded from the Cambridgeshire totals, for example, the native British species *Fagus sylvatica*, *Hypericum androsaemum* and *Cochlearia danica* (now widespread on salted road verges) as they are clearly introductions in the county. Our estimate of the proportion of species seen by Ray can only be approximate, as there are exceptions to our assumption that all recorded species will have been present in the county in 1660. Some native plants are almost certainly later colonists; *Cephalanthera damasonium*, for example, has probably spread naturally since 1660 into planted woodland. On the other hand, some species were probably present in 1660 but became extinct before they could be recorded.

Ray reported 61% of the recorded flora (Table 1), with a slightly higher percentage of archaeophytes than native species.

Cambs native status	Species recorded by Ray (1660+1663)	Aggregates recorded by Ray (1660+1663)	Ray's total	Total species recorded in Cambs	Ray's total as % of Cambs species
Native species	411+28	26+1	466	782	60
Native or alien species	14+1	0+0	15	21	71
Archaeophyte species	91+1	0+0	92	141	65
Total above	**516+30**	**26+1**	**573**	**944**	**61**
Native hybrids	0+1	0+0	1	-	-
Neophyte species	10+0	1*+0	11	-	-
Crop species	15+0	0+0	15	-	-
Grand total	**541+31**	**27+1**	**600**	-	-

Table 1. The number of modern species and aggregates recorded by Ray. In calculating these totals as a percentage of the recorded flora, each aggregate is counted as a single species. The asterisked aggregate (*Populus alba* or *P. alba* × *tremula*) includes a native/neophyte hybrid.

Which groups did Ray record particularly well?

The 61% of the recorded flora reported by Ray conceals very considerable variation between plant families. He found at least 80% of the Asteraceae, Fabaceae, Lamiaceae and Ranunculaceae (Table 2), but less than a third of the

grasses (Poaceae) and sedges (Cyperaceae). In later years Ray tried hard to remedy his neglect of "grasses" (which might also have included sedges, then also given the name *Gramen*). In 1667 he urged his Cambridge friend Martin Lister to "take a little pains this summer about grasses, that so we might compare notes, for I would fain clear and complete their history" (Gunther, 1928).

Family	Species recorded by Ray (1660+1663)	Aggregates recorded by Ray (1660+1663)	Ray's total	Total species recorded in Cambs	Ray's total as % of Cambs species
Fabaceae	36+2	0+0	38	47	85
Asteraceae	64+5	3+1	73	87	84
Lamiaceae	27+1	1+0	29	36	81
Ranunculaceae	20+4	0+0	24	30	80
Apiaceae	27+2	1+0	30	44	68
Caryophyllaceae	18+2	2+0	22	40	55
Brassicaceae	19+1	2+0	22	41	54
Rosaceae	16+0	3+0	19	41	46
Poaceae	24+0	1+0	25	85	29
Cyperaceae	11+2	1+0	14	57	25

Table 2. The number of modern species and aggregates recorded by Ray in the ten largest plant families in the county.

There are 35 families with only one representative in Cambridgeshire, and the members of these families can be expected to be amongst the most distinctive plants in the county. Ray reported 24 of these species (69%) in 1660 and a further two in 1663, giving a total of 26 (74%). He did not record three species that were added to the county list from Gamlingay in the 1685 Appendix, *Athyrium filix-femina* (Woodsiaceae), *Narthecium ossifragum* (Nartheciaceae) and *Osmunda regalis* (Osmundaceae), three coastal species which have been recorded only near Wisbech, *Frankenia laevis* (Frankeniaceae), *Ruppia cirrhosa* (Ruppiaceae) and *Zostera marina* (Zosteraceae), and three plants which are doubtfully native in the county and may have been introduced after 1660, *Colchicum autumnale* (Colchicaceae), *Fritillaria meleagris* (Liliaceae) and *Ribes rubrum* (Grossulariaceae).

The proportions of species found by Ray in the county's ten largest genera (Table 3) show a similar variation in his hit rate. He was outstandingly successful in detecting *Veronica* species; his only omission is in recording *Veronica anagallis-aquatica* agg. rather than the two species which were later separated as *V. anagallis-aquatica* and *V. catenata*. It is even possible that he recorded these segregates, as he listed two species in 1660 but withdrew one of them in 1663, claiming then that he had never been able to see the difference between them and blaming his late friend, John Nidd, for their inclusion. There is more evidence that Ray took a personal interest in *Trifolium* than in *Veronica*:

his records of *T. dubium*, *T. medium*, *T. ochroleucon* and *T. striatum* are regarded by Clarke (1900) as the first British records and he provided detailed

Genus (Family)	Species recorded by Ray (1660+1663)	Aggregates recorded by Ray (1660+1663)	Ray's total	Total species recorded in Cambs	Ray's total as % of Cambs species
Veronica (Veronicaceae)	9+1	1+0	11	12	92
Trifolium (Fabaceae)	9+1	0+0	10	13	77
Ranunculus (Ranunculaceae)	10+3	0+0	13	18	72
Salix (Salicaceae)	7+0	0+0	7	10	70
Chenopodium (Amaranthaceae)	6+0	0+0	6	10	60
Juncus (Juncaceae)	6+0	1+0	7	12	58
Rumex (Polygonacaeae)	5+0	0+0	5	10	50
Potamogeton (Potamogetonaceae)	6+0	1+0	7	15	47
Carex (Cyperaceae)	5+2	1+0	8	40	20

Table 3. The number of modern species and aggregates recorded by Ray in the ten largest plant genera in the county.

descriptions of *T. ochroleucon* and *T. striatum*. He did not record *Trifolium glomeratum* (not detected in Cambridgeshire until 2004, on the Breckland fringe), *T. micranthum* and *T. scabrum*; he presumably overlooked these or mistook them for species that he did record. Ray also paid particular attention to the genus *Salix*, as he found the existing accounts so confusing that he set out his own taxonomy of the group, starting from scratch. He missed *S. aurita*, *S. myrsinifolia* and, more surprisingly, *S. repens* (which was reported from Gamlingay in the 1685 appendix, growing with *Narthecium ossifragum*). The low proportion of *Potamogeton* species does not do justice to the progress Ray made with this and other aquatic genera. He made the first British records of *P. compressus* and *P. pectinatus* (as well as *Zannichellia palustris*) but many species of *Potamogeton* were not distinguished until the late 18th or the 19th century. However, Ray's low total for *Carex* is a fair reflection of his neglect of the sedges, mentioned under Cyperaceae above.

Which common species did Ray overlook?

In their checklist of the Cambridgeshire flora, Crompton & Whitehouse (1983) listed 103 vascular plants which they knew from at least 38 of the 40 10km squares which include land in the county. (Three squares are disregarded as they include only an exceedingly small area of Cambridgeshire.) It is probable that, to be recorded in almost all the county's 10km squares, species need not only to occur throughout the county but also to be at least moderately conspicuous and distinctive; these are probably species which combine high

frequency with high apparency. Ray recorded 92 of these 103 species, although in some cases his records can be attributed to modern aggregates. He probably overlooked seven species – four grasses (*Agrostis stolonifera*, *Arrenatherum elatius*, *Festuca rubra* and *Poa trivialis*) and three members of other families (*Rumex crispus*, *Senecio erucifolius* and *Tripleurospermum inodorum*). We have already noted Ray's poor knowledge of grasses; he also realised later that he needed to improve his knowledge of the docks (*Rumex* spp.). The other four species that he did not record were the planted tree *Aesculus hippocastanum* (first cultivated in Britain in the early 17th century and first recorded in Cambridgeshire in about 1727) and the weeds *Veronica persica* (first recorded from Britain and Cambridgeshire in the 1820s), *Chamerion angustifolium* (which appears to have spread into the county in the late 19th century) and *Matricaria discoidea* (not recorded in Britain until 1871 and first seen in Cambridgeshire in 1908).

There are 200 Cambridgeshire species in the four families which Ray knew so well that he recorded at least 80% of their Cambridgeshire representatives (Table 2). The average number of 10km squares listed by Crompton & Whitehouse (1983) for the 165 taxa recorded by Ray in these families is 21.6 and the median number 21. By contrast, the average number for the 35 species which he did not record is 10.4 and the median number six. A few common species that were not recorded by Ray push the average above the median; the most frequent of these are *Tripleurospermum inodorum* (40 squares), *Senecio erucifolius* (39), *Matricaria chamomilla* (30), *Lamium hybridum* (25), *Ranunculus circinatus* (26) and *Galeopsis speciosa* (24). The fact that half the species that Ray failed to record in these well-understood families are known from six or fewer 10km squares indicates, not unexpectedly, a tendency for him to miss the rarer species. The rare species which he did not record include distinctive plants such as *Artemisia maritima*, *Lathyrus palustris* and *Sonchus palustris* and the much less distinctive *Filago lutescens*, *Hypochaeris glabra* and *Vicia lathyroides*. *Lamium hybridum*, *Leontodon saxatilis* and *Lotus tenuis* are commoner plants which he omitted, presumably because he confused them with *Lamium purpureum*, *Leontodon hispidus* and *Lotus corniculatus*. Three of his omissions concern segregates which are covered by entries for a single aggregate species (*Arctium lappa/minus*, *Centaurea debeauxii/nigra* and *Galeopsis bifida/tetrahit*). He also failed to report several Batrachian Ranunculi in addition to *Ranunculus circinatus – R. baudotii*, *R. fluitans*, *R. peltatus* and *R. penicillatus*. It is perhaps surprising that he did not include an entry covering the large riparian species, but otherwise his omissions of these species are quite understandable as the distinctions between them are often unclear even to modern botanists.

Summary

Ray's coverage of the vascular plants of Cambridgeshire contrasts with his almost token coverage of bryophytes, algae and fungi. We estimate that he recorded 61% of the vascular plant species present in Cambridgeshire in his day. These included 92 of the 103 plants which are now the county's most frequent species. (He appears to have overlooked only seven, as four are more recent

colonists.) His knowledge of the flora was, however, very uneven. He was most successful in finding species with conspicuous flowers, notably members of the Asteraceae, Fabaceae, Lamiaceae and Ranunculaceae. However, he was moderately successful with the umbellifers (Apiaceae), a group which beginners often find difficult because of the similarity of their inflorescences but one which includes many species which are known for their culinary uses. He also tackled the willows, a difficult group, and distinguished all the frequent species. However, he was much less successful with the traditional bugbears, the wind-pollinated grasses, sedges and rushes. He recorded very few grasses and sedges, although he was more successful with the rushes (*Juncus* species).

One of the reasons that Ray recorded as many plants as he did was that the sites he visited included good examples of most of the county's habitats. The concise but accurate descriptions of the habitats of many species in the *Catalogus* show that he was aware of the importance of habitat in influencing plant distributions and suggest that he was almost certainly conscious of the need to visit as wide a range of habitats as possible. The sites he knew included several of the county's 'hotspots' for rare species, such as Cherry Hinton, Gamlingay and the Devil's Ditch. It would be fascinating to know whether he discovered these sites for himself or whether they were already known to other members of the university with an interest in plants. This, alas, is a question we are unable to answer.

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Sulphur Clover *Trifolium ochroleucon*: its decline in Cambridgeshire (v.c. 29)

C. James Cadbury

Abstract

A survey of Sulphur Clover (*Trifolium ochroleucon*) (Nationally Scarce and Near Threatened) was undertaken in 'old' Cambridgeshire (v.c. 29) between early July and early November 2011. In that year it was recorded at 18 sites by the author and three more by other naturalists, in eight 10km squares. A further 24 former sites were visited where Sulphur Clover could not be found. Records up to 1963 were collated by Bourne (1964) and those up to 2000 by Crompton (2001). Of the 91 historically recorded sites in the county it appears to have been lost from 69 (75.8%) sites; 50.0% of 44 sites recorded since 1987 apparently no longer have this clover. The species has been in decline since the 19th century and Sulphur Clover is now largely restricted to road verges on boulder-clay and a few sites on chalk. It has been lost from most sites on disused railway banks and non-verge grasslands. Sulphur Clover is a poor competitor. The development of rank vegetation on uncut road verges, scrub encroachment on disused railways and destruction by agriculture (damage to verges by ploughing, herbicides and enrichment by fertilisers) have led to its demise. Most of the existing populations are small and therefore vulnerable. Protected Road Verges have shown encouraging signs in helping to conserve these, but even more concerted action is needed to halt and reverse the progressive decline. Comparisons are made with a complementary survey in Huntingdonshire (v.c. 31) in 2007.

Introduction

A paper on the status of Sulphur Clover in Huntingdonshire in 2007, published in *Nature in Cambridgeshire* (Walker & Pinches, 2009), prompted an assessment of the situation in neighbouring Cambridgeshire. As a native plant, Sulphur Clover is restricted to calcareous boulder-clay and chalk in nine vice-counties in East Anglia and the East Midlands, from South Essex to Northamptonshire. It is Nationally Scarce, having been recorded in 76 10km squares for the *New Atlas* (Preston *et al.*, 2002). It is classified as being Near Threatened on account of a considerable national decline (Cheffings & Farrell, 2005).

Methods

An intensive survey was undertaken in Cambridgeshire by the author between early July and early November 2011, mostly in July. The website database compiled by Gigi Crompton listing all known historical records of Sulphur Clover from John Ray in 1660 up to 2000 (Crompton, 2001) provided an invaluable source of information. This database includes all but two of the sites listed in a previous paper on Sulphur Clover in Cambridgeshire (Bourne, 1964). Additional sites were supplied from the records of the Cambridgeshire

Flora Group and County Wildlife Sites and by Paul and Philippa Harding, Alan Leslie and Jonathan Shanklin. These enabled me to visit 44 sites from which the plant had been recorded in more recent times, mostly since 1990.

Bourne (1964) listed 55 1km squares with records up to 1963, but most are from before 1900 – including Babington's (1860: 34 sites, of which 16 have no later date) – and from 1900 to 1959 (28 sites), with only two for 1963 (plus one just in Bedfordshire). These include John Ray's (1660) record "*About Cherry-Hinton in many pasture closes*", seemingly the first British record of the species (Clarke, 1900) in a site for which Bourne (1964) and Crompton (2001) cite a last record of 1894. Bourne admitted the problem of pinpointing many of the older records to a 1km square and consequently chose that of the village named (in at least 13 instances). There are some squares that are clearly misplaced (e.g. Papworth St Agnes). It is unfortunate that Bourne seems rarely to have checked sites with field visits, though in a number of instances later botanists have done so. Bourne attempted to relate the distribution of Sulphur Clover in Cambridgeshire to soils, using a map in *The Geology and Soils of Cambridgeshire* (Hey & Perrin, 1960). Useful though this investigation was, it suffered from the lack of precise locations and apparently few field visits.

Though the flowering of Sulphur Clover is mainly in June, when the creamy inflorescences are conspicuous, there are distinctive features which enable detection later in the summer and autumn. It is a more pubescent plant than the local variants of Red Clover (*T. pratense*); the oblong-elliptical leaves are grey-green in colour and have no pale markings, the stipules have a prominent bristle-like tip, even longer than that of Red Clover, and the brown fruiting heads tend to be larger and have a more 'spiky' appearance. Sulphur Clover generally flowers earlier and has a shorter flowering season than Red Clover. The low-growing rosettes are winter-green, as shown at three sites after a cold spell in February 2012.

At each site the presence or absence of Sulphur Clover was recorded together with an 8-figure grid reference where known, the number of plants or extent of populations, associated vascular plant species within one metre of the clover, habitat features and, in the case of sites where no Sulphur Clover could be found, possible reasons for its absence. The summer was a particularly dry one in Cambridgeshire.

The Crompton database enabled a chronological analysis of the last records from each of the Sulphur Clover sites over the years (Table 1) and 1987, being the start year for the *New Atlas* (Preston *et al.*, 2002), was taken as one of the reference points for this analysis.

Results

In all, 91 sites have been recorded historically for Sulphur Clover in Cambridgeshire (Crompton, 2001, plus 11 added subsequently). It has been seen at 44 since 1987 but could be found at only 21 in 2011 (excluding the Barrington chalk quarry, to which access was difficult but where it may still occur). Overall, there has thus been a loss of 69 sites (75.8%) and 50.0% of 44 sites recorded since 1987. Historically there are records for 15 10km squares in v.c. 29, but in one of these, TL15, it was considered a probable introduction.

Since 1987 Sulphur Clover has been recorded in nine and in 2011 it was seen in eight (Tables 1 and 2).

Table 1. Distribution of and last records for sites of *Trifolium ochroleucon* in 'old' Cambridgeshire (v.c. 29).

10km square	Pre-1900	1900–59	1960–86	1987–99	2000–10	2011	Total
TL15				1 casual			1
24						1	1
25		3	4	4	1	2	14
26		1				2	3
34		1		1		1	3
35		3	5	8	3	6 + 1*	26
36	2		1	2		4	9
45	5	3	1				9
46		1					1
54	1	1	1				3
55	2	2	1				5
56	2						2
57		1 casual	1				2
64		1		2		4	7
65	1		3			1	5
Total	**13**	**17**	**17**	**18**	**4**	**22**	**91**

* Barrington chalk quarry (now difficult to visit)
69 (75.8%) apparently lost of total 91 recorded sites; 22 (50.0%) lost of 44 sites recorded since 1987.

The main centres of distribution were:

TL 35 Longstowe, Bourn, Eversden, Hardwick, Kingston and Orwell (6 or 7 extant)
25 The Hatleys, Gamlingay and the Gransdens (2 extant)
36 Elsworth and Knapwell (4 extant)
45 Madingley, Barton, Cherry Hinton and Haslingfield (last record 1963)
64 Castle Camps, Shudy Camps and Horsefield (4 extant)

The distribution is currently restricted to south-west and south-east Cambridgeshire (Figure 1). Since 1987 the species has occurred mainly in TL35 (18 sites – Longstowe, Bourn, Kingston, Caldecote, Hardwick and the Eversdens), TL25 (7 sites – Gamlingay, the Gransdens and Hatleys), TL36 (6 sites – Elsworth and Knapwell) and TL64 (6 sites – Castle Camps, Shudy Camps and Horseheath). It was last seen in TL45 (9 sites – Grantchester, Cherry Hinton, Coton and Haslingfield) in 1963 and in TL54 (3 sites – Hildersham and Linton) in 1965. Outlying sites where Sulphur Clover still occurs are in the west of the county near Tadlow (TL24) and Graveley (TL26). In the east, close to the Cambridgeshire–West Suffolk border, it occurs near Kirtling (TL65) (Tables 1 and 2).

Table 2. Extant sites of *Trifolium ochroleucon* in 'old' Cambridgeshire (v.c. 29) in 2011 (22 sites including Barrington chalk quarry) (* Protected Road Verges)

Grid reference	Site	Habitat	Population size in 2011	First record
TL278481	Tadlow	Farm road verge	1 patch, 1 m	2011
261529; 262524	E. of Gamlingay	Road verge (E.)*	2 patches, 2 m; 1 plant	1992; 1980
296586	Caxton Moats	Chalk grassland	2 plants	2011
258636	Graveley	Farm track verge (S.)	30 plants, 32 m	2008
297641	Rogue's Lane, Elsworth	Road verge (S.)*	9 plants	2004
308493	Croydon Hill	Chalk grassland	12 × 5 m	1950
311542; 312543	Longstowe, W. of A14	Disused railway (N.W.)	21 × 7 m; 2 plants	1915
323518	A14 N. of Arrington	Road verge (E.)*	63 plants, 39 m	2008
334521	W. of Wimpole folly	Chalk bank	10 × 3 m, 5 × 1 m	2007
342554	Kingston	Road verge (N.E.)*	20 m	1992
350581	Clare Farm, Caldecote	Ancient meadow S.S.S.I.	Several plants	1979
367513; 369514	Foxhill, Orwell	S.E. road verge (2 subsites)*	4–5 plants; 4 patches, 20 m	1932
c. 390514	Barrington	Chalk quarry (N.W.)	Probably survives	2002
319627	Brockley End Meadow, Elsworth	Pasture (chalky boulder-clay)	*c.* 32 plants	2005
319645; 320644	Elsworth reservoir	S. slope of N. bank; Outer E. slope of N.E. corner	1 plant; 3 or 4 plants	2002
332613; 333615	Near Whale Barn, Knapwell	Road verge (W.)*; Road verge (E.)*	Present; 15 plants, 14 m	*c.* 2004
333617	Glebe Farm, Knapwell	Road verge (W.)*	37 plants, 23 m	1986
606433	Whitensmere Hill, Castle Camps	Road verge (S.)*	3 patches, 10 m	1981
618425 –619425	Camp's End, Castle Camps	Road verge (E.)*	86 m	1978
629465	Cardinal's Green, Horseheath	Disused railway (chalk)	*c.* 70 plants, 11 × 4 m	1992
630428	Moat Farm, Castle Camps	Footpath	2 patches, each 1 m	1992
675557	Kirtling	Road verge (E. & W.)*	46 plants	1991

Recorded at Caxton Moats and Clare Farm, Caldecote, by Jonathan Shanklin, who also discovered the Graveley site.
Recorded at the second Elsworth reservoir subsite and on the verges near Whale Barn, Knapwell, by Paul and Philippa Harding.

Access to the Barrington quarry site is now difficult, so it was not visited in 2011, but the steep grassland slope in N.W. corner appears still suitable.

The main population at the roadside E. of Gamlingay is just outside the Protected Road Verge.

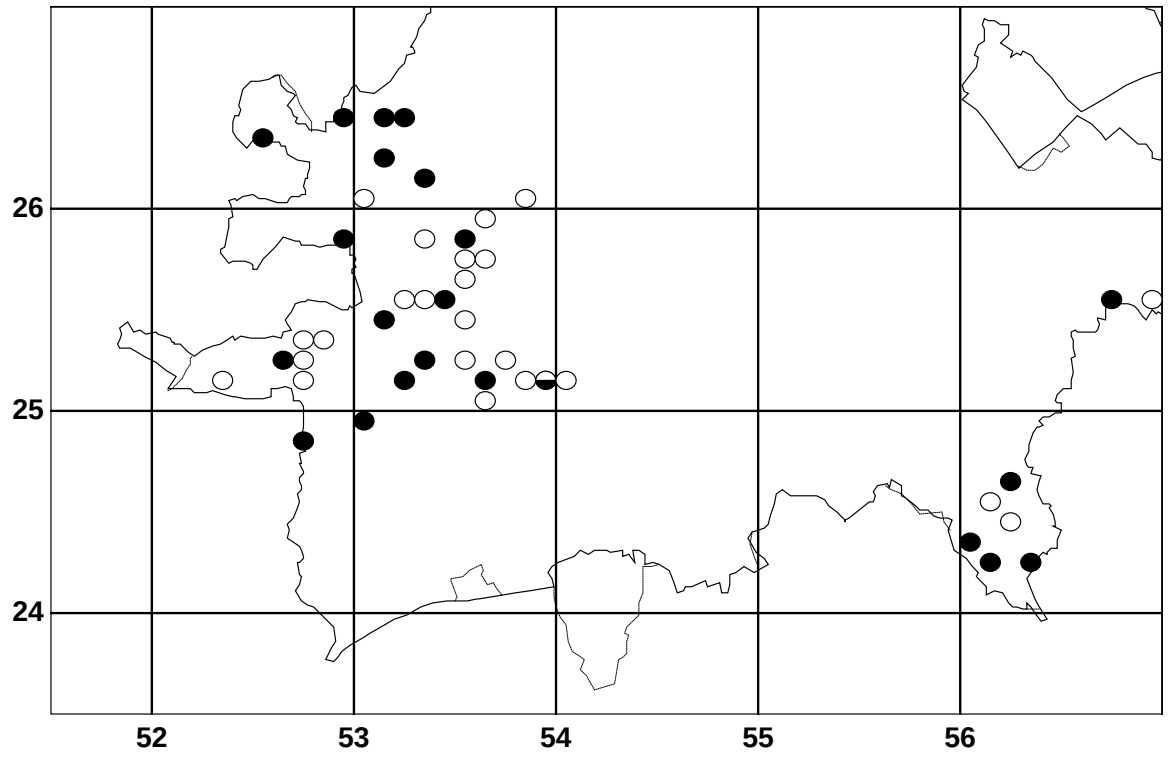

Figure 1. Map of the southern part of Cambridgeshire (v.c. 29) showing the 1-km squares containing sites where *Trifolium ochroleucon* has been recorded since 1950 which were visited in 2011.
● Squares containing sites where *T. ochroleucon* was found in 2011.
○ Squares containing sites where *T. ochroleucon* was not found in 2011.

The black and white symbol indicates a square containing a site (Barrington chalk quarry) not visited in 2011 where *T. ochroleucon* may still occur.

Population size

The largest existing site in Cambridgeshire is a roadside verge near Castle Camps, where Sulphur Clover was frequent over 86 m. On a roadside verge at the summit of Foxhill, Orwell, there were five patches extending over a total of 20.5 m. There was a patch extending over 21 × 7 m at the west end of a disused railway cutting near Longstowe. The populations beside A14 north of Arrington, near the Wimpole folly and at Cardinal's Green were also relatively large. There were six populations of 30–50 plants at Graveley, Croydon Hill, Kingston, Brockley End Meadow, Glebe Farm (Knapwell) and Kirtling. The remaining nine sites (five of them consisting of two discrete subsites) were small, each comprising no more than 20 plants and most only a few (Table 2).

Habitat

In Cambridgeshire Sulphur Clover is mainly a plant of chalky boulder-clay. However, five of the extant sites are on chalk – Caxton Moats, Croydon Hill,

Foxhill (Orwell), Wimpole and Barrington, if it still exists. The site in the old quarry at Haslingfield was also on chalk.

Of the 21 existing Sulphur Clover sites 10 were on road verges, two on farm track verges (Tadlow and Graveley), one on a footpath verge (Castle Camps), two on the banks of a disused railway (Longstowe and Cardinal's Green), one on the banks of a reservoir (Elsworth), four in calcareous grassland (Caxton Moats, Croydon Hill, Wimpole and Brockley End Meadow, Elsworth) and one in an ancient meadow (Caldecote). The Barrington site is on the grassy slope of a chalk quarry. All 10 of the road verge sites are designated as being 'protected' by the County Council, though part of one is just outside the 'protected' stretch of verge (east of Gamlingay). The Clare Farm meadow at Caldecote is an S.S.S.I. on account of its herb-rich flora (Table 2).

The habitat for 24 post-1950 sites where Sulphur Clover could not be found in 2011 is also known (Table 3; Crompton, 2001). Eight were road verges and four of these had lost the plant since 1987. Seven were the verges of tracks or footpaths and five of these had lost the plant since 1987. Five were disused railways, four of which had lost the plant since 1987. Sulphur Clover formerly grew in grassland at Madingley until destroyed by sowing of a ley and intensive grazing. The Hatley Park grassland site was ploughed. Sulphur Clover has not been seen in the old chalk-pit at Haslingfield since 1963 or in Orwell clunch-pit since 1972, though the grassland is presently in a suitable state.

Plant associations

These were recorded at 18 extant sites: 15 were on boulder-clay and three on chalk. Of 79 associated species, 27 occurred on both clay and chalk, 31 on clay only and 21 on chalk only. The most frequent ones are listed in Table 4. Many of the associated species have an affinity with base-rich soils. The associates included Crested Cow-wheat (*Melampyrum cristatum*) (Nationally Scarce, Vulnerable) at Whitensmere Hill, Castle Camps, Greater Burnet-saxifrage (*Pimpinella major*) near Kirtling and Woolly Thistle (*Cirsium eriophorum*) at Croydon Hill and Caxton Moats.

Reasons for losses

Sulphur Clover in Cambridgeshire has become restricted mainly to narrow linear habitats. It is vulnerable to three threats in particular:

a) shading by rank vegetation, particularly the development of swards of False Oat-grass (*Arrhenatherum elatius*) on road verges owing to a lack of mowing;
b) scrub encroachment on disused railway banks;
c) damaging encroachment by intensive arable farming owing to field verge margins being ploughed, drift from herbicide sprays and enrichment from fertilisers used on crops. Such damage accounted for the loss of at least six sites. The University Farm's improved pasture at Madingley totally destroyed the suitability of one site, as did ploughing in Hatley Park (Table 3).

Table 3. Former sites which have apparently lost *Trifolium ochroleucon* in 'old' Cambridgeshire (v.c. 29), with suspected reasons for loss (all 24 sites visited in 2011).

Road verges (8)

Site	Grid reference	Last record	Reasons for loss
Moat Farm, Little Gransden	TL274538	1980	Uncut, rank vegetation
Gransden Lodge	286536	1986	Uncut, rank vegetation
Kingston	350548	1992	Uncut, rank vegetation
Miller's Way, Toft (farm road)	356564	1981	Uncut, rank vegetation; arable
Harlton – Little Eversden	378525	1992	Cut; still suitable
Common Farm, Brockley Road, Elsworth	305608	1987	Uncut, rank vegetation; perhaps road layout changes
Shudy Camps	620442	1995	Cut; still suitable
Kirtling – Cowlinge	697553	1981	Cut; vehicle damage

Track verges (7)

Harlton	TL388517	1992	Arable encroachment
Hardwick Wood (N.)	355582	1953	Arable & horse paddocks
Hardwick Wood (E.) (Wood Farm)	362573	1999	Arable encroachment
Hardwick Wood (S.W. corner)	351572	1963	Rank vegetation
Hardwick	366595	2010	Rank vegetation & scrub
Bourn – Highfields	339580	2009	Bridleway widening; arable
Great Eversden	353526 –359529	1993	Bridleway widening; arable

Disused railway (5)

Gamlingay	TL237517	*c.* 1976	Site destroyed
Between Gamlingay and Hayley Wood	2752	1990s	Parts still suitable
Bourn E. of A14	330553	2008	Scrub & building
Kingston	329552 –338559	1991	Scrub
Shudy Camps	614454	1992	Scrub

Grasslands (4)

Hatley Park grassland	TL274518	2007	Ploughed
University Farm, Madingley	388605	1990	Grass ley & intensive grazing
Haslingfield old chalk-pit	406517	1963	Chalk grass, presently suitable
Orwell clunch-pit	364506	1972	Chalk grass, presently suitable

There is a record from Great Wilbraham Common (TL5337) in 1982 (English Nature files per J. Graham). This presumably grassland site was not visited in 2011, but it could still be suitable.

Table 4. The main vascular plants associated with *Trifolium ochroleucon* in 'old' Cambridgeshire (v.c. 29) in 2011.

Plant species	**Boulder-clay (n = 15)**	**Chalk (n = 3)**	**Total (n = 18)**
Centaurea nigra agg.	12	3	15
Festuca rubra	11	4	15
Trisetum flavescens	7	2	9
Daucus carota	6	2	8
Trifolium pratense	5	2	7
Plantago lanceolata	5	2	7
Arrhenatherum elatius	5	1	6
Primula veris	1	4	5
Linum catharticum	2	3	5
Brachypodium sylvaticum	1	3	4
Galium mollugo	3	1	4
Lathyrus pratensis	4	–	4
Medicago lupulina	2	2	4
Plantago media	1	3	4
Rubus fruticosus agg.	4	–	4

Rabbit-grazing may be beneficial to a degree to Sulphur Clover, but with selective nibbling at an intensive level plants may not survive. Such grazing has probably been a negative factor on the south-west side of Foxhill, Orwell, at Caxton Moats and possibly on the disused railway at Kingston and the Elsworth reservoir banks.

The habitat at five former sites where Sulphur Clover could not be relocated still appeared suitable – road verges at the Harlton–Little Eversden cross-roads on A603 and at Shudy Camps, the disused railway between Gamlingay and Hayley Wood, and grassland in the old chalk-pit at Haslingfield and at Orwell clunch-pit. At these sites there was a herb-rich sward of less than 30–40 cm in height in late summer.

Comparisons with Huntingdonshire

The 2007 survey of Sulphur Clover in v.c. 31 revealed 13 extant sites and another 17 where it had probably become extinct. This represents a 56.7% loss since the 1960s (Walker & Pinches, 2009). In Cambridgeshire, over the same period, 39 (63.9%) of 61 sites were apparently lost.

In Huntingdonshire there is a huge population, estimated to be about 10,000 plants, on over 20 ha of ancient ridge and furrow grassland at Huntingdon race course. Two other populations had 120 and 85 plants respectively; another nine

had from two to 31 plants. Seven of the existing sites in Cambridgeshire had small populations of this size range. There was none comparable to the race course population.

In Huntingdonshire, of eight extant road verge sites all but one were mown, while of the two that had lost the clover one had become overgrown and the other had been destroyed. In Cambridgeshire, all eight extant road verge sites were mown. Of the eight road verge sites that had lost Sulphur Clover five had become rank through lack of cutting. The one railway embankment site visited in Huntingdonshire had lost Sulphur Clover through ploughing, while in Cambridgeshire three such sites had lost the clover as the result of scrub invasion. Two of the 'lost' sites in Huntingdonshire were green lanes. Of the 10 track and footpath verge sites in Cambridgeshire only three were extant.

Discussion

The survey revealed that the status of Sulphur Clover in Cambridgeshire is in an unhealthy state with a distributional contraction and population decline. This has proceeded since before 1900 and continues until the present. Initially meadow and pasture sites were lost to arable agriculture and the plant became largely restricted to road and track verges and the embankments of disused railways, but even the suitability of these linear habitats has been threatened. Sulphur Clover is not a good competitor. The vegetation of verges has tended to become rank as a result of a lack of mowing and of nutrient enrichment. Scrub and even woodland have developed on the banks of railways once they went out of use. An encouraging sign has been the designation of most of the remaining road verge sites for the clover as Protected Road Verges (PRVs) by Cambridgeshire County Council, with advice and survey results from the Wildlife Trust for Bedfordshire, Cambridgeshire, Northamptonshire and Peterborough. However, the cutting regimes proposed by the Wildlife Trust for some of the PRVs were not implemented by the County Council's Highways Department and, as a result of insufficient mowing at appropriate seasons, the floral diversity of verges has declined measurably (Paul and Philippa Harding, pers. comm.). Moreover the County Council has recently notified Parish Councils that it will stop mowing PRVs except as part of routine sightline management.

Perhaps conservationists have been too complacent about the well-being of Sulphur Clover, at least in Cambridgeshire. It is not protected by reserves. We need to be more vigorous about seeing that existing sites are identified, monitored and, in particular, suitably managed. This largely means ensuring that those verges still supporting Sulphur Clover are mown at least twice a year, ideally in April and again between late August and late September, and are not subject to encroachment by road and bridleway widening, scrub invasion or agricultural damage. Some of the best surviving verge sites for Sulphur Clover are close to the entrances of farm drives (such as those of Whale Barn and Glebe Farm, Knapwell) where mowing is frequent. The mowings should be removed to avoid an accumulation of mulch. Wide verges, which may include conservation strips on arable field margins, can reduce the impact of herbicide

sprays and fertilisers on adjacent agricultural land. Conservation of Sulphur Clover sites could help to preserve attractive herb-rich verges that may support nationally or locally scarce species such as Crested Cow-wheat, Greater Burnet-saxifrage and Meadow Crane's-bill (*Geranium pratense*).

Acknowledgments

My particular thanks go to Gigi Crompton for allowing me to have the benefit of her Cambridgeshire Flora website, which formed an invaluable basis for the survey. Nick Millar kindly provided records from the Cambridgeshire Flora Group and County Wildlife Sites. I am very grateful to Jonathan Shanklin for information on the most recently discovered sites. I welcomed several records from English Nature files supplied by Jonathan Graham and further additions from Alan Leslie, who made some useful comments on an earlier draft. I am also indebted to Chris Preston for his perceptive suggestions and for creating the map and to Paul and Philippa Harding, who made some helpful comments, particularly with respect to Protected Road Verges, and added a site. Dr Ruth Bibby kindly showed me round her S.S.S.I. meadows at Caldecote. Philip Oswald most kindly edited the final text.

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Land and freshwater molluscs in the Cambridge Botanic Garden

Richard C. Preece and Tom S. White

On July 23rd 2011 the second local Bioblitz took place in the Cambridge Botanic Garden (TL 455572). As with the first such event, held in 2010 and based on Coe Fen, the idea was to involve members of the public in a general

survey of local fauna and flora over a period of 24 hours. A range of specialists was on hand throughout the day to identify species and coordinate the recording. Here we present lists of the land and freshwater molluscs that were found (Table 1), together with some comments on species of interest.

	Cambridge Botanic Garden		Benet House, Brooklands Avenue
	Bioblitz (2011)	**Watson (1929)**	**(Watson, 1929)**
Aquatic species			
Bithynia tentaculata (L.)	+		
Bithynia leachii (Sheppard)	+		
Physella acuta (Draparnaud)*	+		
Lymnaea stagnalis (L.)	+		
Radix balthica (Müller) (=*Lymnaea peregra* Müller)	+		
Planorbis planorbis (L.)	+		
Planorbis carinatus (Müller)	+		
Anisus vortex (L.)	+		
Gyraulus albus (Müller)	+		
Hippeutis complanatus (L.)	+		
Planorbarius corneus (L.)	+		
Ferrissia wautieri (Mirolli)	+		
Acroloxus lacustris (L.)	+		
Pisidium milium Held	+		
Pisidium nitidum Jenyns	+		
Pisidium henslowanum (Sheppard)	+		
Terrestrial species			
Cochlicopa lubrica (Müller)	+		+
Merdigera obscura (Müller)		+	
Pyramidula pusilla (Vallot)	+		
Lauria cylindracea (da Costa)	+		+
Vallonia costata (Müller)	+		+
Vallonia excentrica Sterki	+		+
Discus rotundatus (Müller)*	+	+	
Arion ater (L.)	+		
Arion circumscriptus agg.			+
Arion hortensis (Férrusac) agg.	+		+
Vitrina pellucida (Müller)	+		+
Vitrea crystallina (Müller) agg. (possibly *V. contracta*)		+	
Vitrea contracta (Westerlund)	+		
Aegopinella nitidula (Draparnaud)	+		+
Oxychilus draparnaudi (Beck) (= *Vitrea lucida* (Draparnaud))*	+	+	
Oxychilus cellarius (Müller)	+		+
Oxychilus alliarius (Miller)	+		+
Tandonia sowerbyi (Férrusac)	+		+
Limax maximus (L.)	+		+
Limacus maculatus (Kaleniczenko)	+		
Limacus flavus (L.)			+
Milax gagates (Draparnaud)			+
Deroceras reticulatum (L.)	+		+

Deroceras panormitanum (Lessona & Pollonera)	+		
Cecilioides acicula (Müller)	+		+
Clausilia bidentata Strom			+
Testacella haliotidea Draparnaud*	+	+	
Candidula intersecta (Poiret)	+		
Monacha cantiana (Montagu)	+		
Trochulus striolatus (Pfeiffer)	+		+
Trochulus hispidus (L.)	+	+	
Cernuella virgata (da Costa)			+
Cepaea nemoralis (L.)	+	+	
Cornu aspersum (Müller) (= *Helix aspersa* Müller)	+		+
Alien species in hothouses			
Allopeas gracile (Hutton)	+		
Subulina octona (Bruguière)	+		
Opeas pumilum (Pfeiffer) (= *O. goodalli* Miller)*		+	
Lamellaxis clavulinus (Potiez & Michaud) (= *O. urichi* (Smith))*		+	
Gulella io Verdcourt	+		
Helicodiscus parallelus (Say)		+	
Hawaiia minuscula (Binney)	+	+	
Zonitoides arboreus (Say)	+	+	

Table 1. Land and freshwater molluscs recorded from the Cambridge Botanic Garden during the Bioblitz (2011) and by Watson (1929), together with records from a neighbouring garden at Benet House, Brooklands Avenue, Cambridge.
* species recorded from the Botanic Garden by Marr & Shipley (1904).

Watson (1929) published a list of the twenty species of land molluscs he had found in a garden (Benet House, formerly Bracondale) in Brooklands Avenue, Cambridge, in close proximity to the Botanic Garden itself. This list was the result of collecting over several years and was considered 'nearly complete'. With the exception of *Milax gagates* and *Cernuella virgata* (= *Helicella virgata*), recorded only as dead shells, all of the species listed by Watson from Benet House were found in the Botanic Garden during the Bioblitz survey. Watson (1929) listed an additional seven species from the Botanic Garden not recorded at Benet House. With the exception of *Merdigera obscura* these species were re-discovered in the Botanic Garden in 2012. Especially noteworthy was *Testacella haliotidea*, four shells of which were found in flower beds just to the south of Lynch Walk. This species was first recorded from the Botanic Garden by Mrs McKenny Hughes at the beginning of the 20th century (Marr & Shipley, 1904). It was subsequently recorded there by Hugh Watson in or before 1920 and by Charles Goodhart from Chaucer Road in 1960; a living specimen was discovered recently at Wandlebury (Naggs e*t al.*, 2008).

The Bioblitz survey led to the discovery of several species that had not been reported from the Botanic Garden before. These include an introduced freshwater limpet *Ferrissia wautieri*, found together with the native lake limpet *Acroloxus lacustris* in ponds fed by the Hobson's Conduit on the western side of the Garden. *Physella acuta*, another introduced aquatic species first recorded

here by Marr & Shipley (1904), still occurred in ponds in the eastern part of the Garden. Two slugs (*Deroceras panormitanum* and *Limacus maculatus*) also appear to be recent introductions to the county. The final noteworthy species is *Pyramidula pusilla*, a species recently shown to be distinct from *P. rupestris*, to which name all British records had been assigned. *Pyramidula* has not been recorded from Cambridgeshire since 1880 (Kerney, 1999). However, the population in the Cambridge Botanic Garden was almost certainly introduced with blocks of Carboniferous Limestone that were brought in to make the Limestone Rock Garden, constructed between 1954 and 1958.

Watson (1929) also listed five species of exotic land snail that he found only in the hot-houses. Two of these were subulinids, *Opeas goodalli* (= *Opeas pumilum*), and *Opeas urichi* (=*Allopeas clavulinum*). We found no trace of these but did find two different subulinid species, namely *Subulina octona* and *Allopeas gracile*. We were also able to find two other alien species listed by Watson (*Zonitodes arboreus* and *Hawaiia minuscula*), but failed to rediscover *Helicodiscus parallelus*. However, we did find a fresh shell of the streptaxid *Gulella io*, a native of tropical Africa that was originally described from hot-houses at Kew Gardens and elsewhere (Verdcourt, 1974, 1979). Dissection of a live-collected specimen from the Tropical Fern House at the Cambridge Botanic Garden demonstrated that *G. io* is conspecific with *G. devia* described from Liberia, although the name *io* still has precedence (Verdcourt, 1979). This suite of exotic species occurs widely in European hot-houses.

We thank Fred Naggs for help in identifying the subulinids and Brian Eversham for confirming the identity of *L. maculatus*.

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The lichens of Cambridge walls

Mark Powell and the Cambridge Lichen Group

A paper by Brightman in 1965 presented a survey of the lichens found on walls in Cambridge. A comparison of Brightman's findings with the records made by the Cambridge Lichen Group in 2011 show some interesting changes.

Brightman was well aware of the factors which limited the growth of lichens in the 1960s and the following is an extract from his paper:

Drought and atmospheric pollution are inimical to lichens. The climate of Cambridge may be said to be continental, at least by British standards; the average annual rainfall is 552 mm., and the Meyer precipitation/saturation deficit ratio is 105, the lowest in the British Isles. This no doubt accounts for the absence of the larger foliose and fruticose lichens whose distribution in Britain is restricted to the north west and west. However contrary to the consensus of local opinion, atmospheric pollution in the city is not negligible. The main source of pollution appears to be domestic heating appliances which discharge into the air considerable quantities of soot and also sulphur dioxide.

Brightman's assertion that Cambridge suffered from significant atmospheric pollution was backed up by the readings of lead peroxide gauges which had been published in 1963. Atmospheric sulphur dioxide levels have now fallen below the level where they form a limiting factor for most lichens.

It is particularly interesting that Brightman describes the exact communities present on two named bridge parapets which are still extant and were revisited. The parapets of Silver Street bridge were described by Brightman as follows:

The pioneer species (of limestone walls) *have a crustose habit…* Verrucaria viridula *(brownish green, clear green when wet) is a good example of this; it is, for instance, the most abundant species on Silver Street bridge. Here, together with the only other two species present* – V. nigrescens *(brownish black) and* Candelariella vitellina *(orange yellow) – it covers rather less than fifty percent of the surface of the stone.*

In February 2011 the lichen cover on the same parapets was estimated to be approximately ninety percent and at least twenty three species were present. The following list gives a visual estimation of abundance for each species recorded on the limestone parapets of Silver Street bridge where (r) signifies that the particular species was considered rare, (o) occasional, (f) frequent and (a) abundant.

Caloplaca decipiens (r), *C. dichroa* (a), *C. flavescens* (r), *C. oasis* (o), *C. teicholyta* (o-f), *C. variabilis* (r), *Candelariella aurella* (r), *C. medians* (f), *Lecania erysibe* (r), *Lecanora albescens* (a), *L. dispersa* (r), *L. semipallida* (r), *Lecidella stigmatea* (r), *Phaeophyscia orbicularis* (r), *Physconia grisea* (r), *Rinodina teichophila* (o), *Verrucaria* cf. *baldensis* (r), *V. fuscella* (f), *V.* cf. *hochstetteri* (f), *V. nigrescens* (a), *V. n.* f. *tectorum* (r), *V. viridula* (r), *Xanthoria parietina* (r).

Verrucaria viridula is reduced to three small individuals, *V. nigrescens* is abundant while *Candelariella vitellina* is no longer present. *Caloplaca dichroa* is a recently described (Arup, 2006) member of the *C. citrina* group with distinctive thick-walled spores. *Caloplaca oasis* is a recently described (Arup, 2009) member of the *C. holocarpa* group; it is that member of the aggregate which is most common on limestone and cement with small, tightly clustered orange fruits. The larger foliose lichen species were concentrated beneath overhanging *Salix* branches. *Lecanora semipallida* is a member of the *L. dispersa* group which has bright white or yellowish margins which contrast starkly with the dark thallus and which display a bright orange fluorescence in ultraviolet light.

An extension to the north parapet of Silver Street bridge is built of brick and this was not described by Brightman. Additional species recorded here are *Caloplaca arcis*, *Lecanora campestris*, *L. muralis*, *Lecidella carpathica*, *L. scabra* and *Rinodina oleae*. *L. carpathica* is considered uncommon but it is probably much overlooked.

A similar significant increase in lichen species is demonstrated on the parapets of King's bridge which was described by Brightman as follows:

The sandstone parapet of King's bridge is colonised by only one lichen, the yellowish green crustose species Lecanora conizaeoides.

In February 2011 eighteen species were recorded on the parapets of King's bridge:

Aspicilia contorta, Caloplaca citrina, C. holocarpa, Candelariella aurella, C. vitellina, Lecania erysibe, Lecanora campestris, L. dispersa, L. muralis, Lecidella scabra, Phaeophyscia orbicularis, Physcia adscendens, P. caesia, Porpidia soredizodes, Rinodina oleae, R. teichophila, Verrucaria nigrescens f. *tectorum* and *Xanthoria parietina*.

The autumn 1974 field meeting of the British Lichen Society was centred on Cambridge and a report was published by Brightman & Lambley (1978). An extract from the report gives an interesting picture of lichens in Cambridge city nearly a decade after Brightman's original paper:

The walls of the city were examined and yielded 50 species. It was of interest to see if any change had occurred since the lichen flora in the city was reported by Brightman (1965). No loss or serious diminution of species was noted; for instance, the repairs to Clare Bridge have not disrupted its interest as a "garden" of calcicole species. Lecanora muralis *has increased considerably as it appears to be doing generally in towns in lowland England; it is particularly well-developed on the low brick wall in front of Queen's College, and also grows on worked timber beside the river which it was not doing 10 years ago. Lichens have increased on Silver Street bridge, though they are still mainly species of* Verrucaria. Lempholemma chalazanellum *was of particular interest growing on mosses at the base of the parapet. A noteworthy find on Kings Bridge was* Acarospora fusca, *a species which resembles a depauperate form of* A. fuscata. *Other species associated with it on this sandstone bridge were* Lecanora conizaeoides, Bacidia umbrina *and* Candelariella vitellina.

The dramatic decline of *Lecanora conizaeoides* in Cambridgeshire has been reported in respect to corticolous communities at Wicken Fen (Powell, 2010) and at Chippenham Fen (Powell, 2011). This species is still sometimes found on weathered lignum, acidic bark and acidic stone but no trace of it could be found surviving on the sandstone blocks of King's bridge. Brightman states that this species was ubiquitous in Cambridge in the 1960s, on sufficiently moist and acid substrata, on walls, roofs and the barks of trees. *L. conizaeoides* was not found on any walls during the 2011 surveys.

An old brick wall beside Silver Street, forming the north boundary of Darwin College, shows a difference in the lichens present on the bricks compared with those on the mortar. The bricks have *Caloplaca flavocitrina*, *Lecanora antiqua*, *L. dispersa*, *Psilolechia lucida* and *Rinodina oleae* while the mortar supports *Candelariella aurella*, *Lecanora albescens*, *Verrucaria nigrescens* and the common blastidiate yellow lichen commonly recorded as *Caloplaca citrina*. Recent genetic work (Powell & Vondrák, 2011) has shown that two taxa are

involved both of which appear to be present on this wall. The paler form with slightly larger blastidia is *C. limonia* while the darker, finer form falls into an unknown clade (*C.* aff. *austrocitrina*) and requires further study.

The low walls in front of the Cambridge University Library are capped by calcareous coping blocks which support: *Amandinea punctata*, *Caloplaca decipiens*, *C. flavocitrina*, *C. oasis*, *C. teicholyta*, *Lecanora albescens*, *L. campestris*, *L. dispersa*, *L. muralis*, *Protoblastenia rupestris*, *Verrucaria fuscella*, *V.* cf. *hochstetteri*, *V. nigrescens* and *Xanthoria calcicola*. The shady side of the wall has large colonies of moss and extensive areas of these are covered with *Bilimbia sabuletorum* along with smaller patches of *Agonimia tristicula*.

A further example of calcareous coping stones are the limestone blocks that top the wall bounding the church of Our Lady and the English Martyrs. Species present here are *Caloplaca arcis*, *C. flavescens*, *C. teicholyta*, *Candelariella aurella*, *C. medians*, *Lecanora albescens*, *L. dispersa*, *Lecidella stigmatea*, *Phaeophyscia orbicularis*, *Protoblastenia rupestris*, *Rinodina oleae*, *Verrucaria macrostoma* f. *furfuracea* and *V. nigrescens*.

Concrete coping stones have similar lichen communities to those of limestone but *Caloplaca decipiens* and *C. saxicola* appear to be especially common on concrete. *Sarcogyne regularis* is an inconspicuous species that has black apothecia which are partially immersed in the substratum. It is occasional on mortar and cement and it also colonises concrete where it shows a preference for chalk pebbles within the aggregate.

Some low boundary marker walls are built of, or capped with, blue-black engineering bricks. Even when only a few years old these begin to develop a distinctive community in which *Amandinea punctata*, *Buellia aethalea*, *Caloplaca holocarpa*, *Candelariella vitellina*, *Catillaria chalybeia* and *Lecanora dispersa* are particularly common.

Lecania inundata is an overlooked lichen species. Many British field lichenologists seem to have been unsure of this taxon and have clumped it together with *L. erysibe* into an informal *L. erysibe* sens. lat. grouping. In fact the two species can be separated in the field using the morphological form of the thallus, specifically the presence of verrucae (nodules) in *L. inundata* and of blastidia in *L. erysibe*. The shaded walls of Queen's College which are otherwise of limited interest for lichens, provide a useful comparison of these two species as they grow there in close proximity.

The recent study of Cambridge walls has been far from comprehensive but the results illustrate a couple of important points. The presence of named and easily re-located structures within an urban environment can facilitate useful comparisons over time. The taxonomy of some of the commonest urban lichens is still incompletely understood and repeated observations in convenient locations can provide the experience necessary to question the current understanding of these taxa. Such studies can highlight the likely problems and inform the collection of appropriate specimens for genetic analysis.

To conclude this paper, and hopefully to stimulate further observations, mention should be made of a particular type of brick which was found by Brightman to support an interesting community. His description is as follows:
The most favourable brick for lichens is a sand-faced red brick with a pH of 5.8 and a water absorbing power of 12%. Calcicole species are excluded, but the water content and surface texture encourage the growth of the larger species such as Cladonia fimbriata *and the various* Physcia *species. The crustose species* Lecanora sulphurea *(greenish grey) and* Ochrolechia parella *(grey, ridged, rough and granular) may also be found here.*

None of the three lichens specifically mentioned in the above extract was found during the 2011 survey of walls but these and many others may await discovery.

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The Establishment of 800 Wood at Madingley

Karen Russell, Rachel Buckingham Howard and Justin Mumford

Introduction

In 2009, the University of Cambridge celebrated its 800th anniversary. To mark this event, the University's Rural Estate department wished to create a significant new woodland, named Octo Centenary Wood (shortened to 800 Wood), to further its existing notable ecological resources which include two SSSI's, two County Wildlife Sites, parkland registered on English Heritage's Register of Parks and Gardens of Special Historic Interest, two lakes, brickpits, water meadows and a wet woodland site, as well as to diversify its predominately arable and grassland landholding.

Madingley, just to the west of Cambridge, is referred to in the Domesday Book and was an open field village until 1520 when the Hynde family bought the land and built the Hall. It is the location of the Rural Estate's main land holding, the Madingley Estate, purchased in 1948. The Madingley Estate comprises 502 ha including 304 ha of arable land, 93 ha of grassland and 54 ha of woodland along with Madingley Hall, a Grade 1 listed Mansion House surrounded by registered parkland and gardens, plus houses and cottages in the village.

When the University purchased the Madingley Estate, it approached various Faculty Boards and Departments to ascertain whether and to what extent they were interested in having facilities on the Estate for teaching and research. As a result, Madingley Hall was established as a centre for Continuing Education. The farmland was and is predominantly occupied by the University Farm to provide animals for the Vet School to use for practical experience. Nearly a third of the total woodland area was allocated to the Department of Botany and Zoology for ecological research with the majority comprising Madingley Wood, an SSSI woodland of 15 ha. Some 0.6 ha of Burnt Farm Plantation was allocated to the Department of Zoology to form part of the Ornithological Field Station which is now the Sub-Department of Animal Behaviour.

Site selection

In 1981, Madingley Wood (Grid ref TL393405) a NVC 8 woodland type (Ash – Maple) characteristic of the boulder clays of Eastern England was designated a Site of Special Scientific Interest. It is the nearest ancient wood to Cambridge and is referenced as a wood field in documents from 1210 onwards. Thus it is highly probable that the ancient wood was in existence when the University was founded 800 years ago.

With over 340 years of ecological research studies, Madingley Wood has one of the longest botanical records of any wood in Europe. As such it is considered the Cambridge equivalent of Wytham Woods near Oxford (Rackham & Coombe 1996). John Ray in 1660 records 224 plant species whilst records since the 1950s list about 185 species of flowering plants and ferns. As well as its rich flora, Madingley Wood supports a wide range of wildlife including several declining Biodiversity Action Plan invertebrate species e.g. Grizzled Skipper butterfly, Grey Dagger moth and the rare Barbastelle bat. There are a number of on-going research projects taking place in the wood and it is used for teaching. These are reconciled with the management of the woodland.

In 2006, a chance arose to swap the 10 ha tenanted field immediately adjacent to Madingley Wood with land elsewhere on the Estate. This provided the opportunity to plant the new wood next to Madingley Wood thus extending and buffering this core woodland. It also provided an ideal project with which both to commemorate the University's 800th anniversary and to provide a comparison site for future research. In addition, there were considerable landscape benefits as both woods form a key component of a green corridor which links the western edge of Cambridge with the Chatteris to Somersham Biodiversity and Access Corridor which crosses the county from east to west.

800 Wood's objective

The overall objective of the woodland was to create a native NVC 8 woodland that was genuinely multipurpose, providing clear ecological and public benefits from the outset as well as having the potential to become a productive and commercially viable woodland in its own right in time.

800 Wood's design

The woodland design had to incorporate a number of existing features including the creation of a vista to maintain the view north to Ely cathedral; a Late Iron Age settlement towards the eastern boundary; a mains water pipe cutting diagonally across the site requiring a 6 m wayleave and an existing ditch line cutting north-south through the site. These were incorporated by careful allocation of open space and rides totalling 22% of the total area.

Key to the design was the linkage of Madingley Wood with the new 10 ha planting of 800 Wood by incorporating a continuous 30 m natural regeneration zone along the length of the shared boundary, totalling 0.94 ha. A 20 m width of this transitional zone was ring fenced to protect seedling colonisation from browsing but incorporated badger gates to enable their access. The 10 m strip nearest Madingley Wood is mown annually and acts as a permanent feature to distinguish the new wood from the ancient wood.

Other new design features included a giant figure of '8' to echo the 800 years since the University's establishment, a timber stacking and turning T at the entrance to aid future timber harvesting, the inclusion of bicycle racks and an information board at the entrance, a wetland scrape, two elm translocation areas, a new hedgerow along the road edge and steps to link the site to existing public rights of way and the American Cemetery.

Five woodland types were included in the planting design: oak and ash (accounting for nearly two thirds of the total woodland area); birch and willow (located in wetter areas); a native colour mix formed from wild fruit species and holly along the northern boundary (to add colour and diversity); hazel with oak (to establish new coppice with standards areas); and finally two elm translocation areas at the southern extremes of the site. The planting was undertaken in the winter of 2007/08. The overall design and arrangement of planting types can be seen in Plate 1. (See inside front cover).

Species choice and best practice

The major tree species are Ash (43%), Pedunculate Oak (26%) and Field Maple (7%). Minor tree species comprise 12% of the planting include Downy Birch, Silver Birch, Wild Cherry, Holly, Rowan, willows, Black Poplar, Alder, Whitebeam, Hornbeam, Yew and Crab Apple. The shrubs comprise 12% overall include Hazel (4%) and Hawthorn (3%) with other minor shrubs (Blackthorn, Guelder Rose, Dogwood, Spindle, Purging Buckthorn and Wayfaring Tree) making up the remainder.

The majority of plants were planted at 45-60 cms, 1+1 transplants – the exceptions being the willows and Black Poplar which were 90-180 cms rooted

cuttings. As the threat from deer was low at the time, the tree species were protected with 75 cm spiral guards with the exception of the willows, Black Poplar, Yew and Holly which along with the shrubs were protected with 75 cm tree shelters.

The planting scheme followed best practice for the creation of new native woodland (Rodwell. & Patterson, 1994) of lowland mixed woodland type, NVC 8. The site was ripped to a depth of 600 mm at 1.5 m centres prior to planting to disrupt any plough pan and sown with a low maintenance grass seed mixture of 75% fescue and 25% rye grass.

The net woodland planting area was 6.81 ha. This was planted at a stocking rate of 2,250 stems per hectare leading to the establishment of some 15,300 trees and shrubs. The planting was along curvilinear lines with 2 m between rows and at an average spacing of 2.1 m within rows for ease of maintenance, and so to create some areas of more varied and natural character with a patchwork of open ground and drifts/clumps. Woody shrubs were planted along the woodland and rides edges with some small groups of three to nine plants being randomly placed within the larger single tree species drifts of 20 to 40 trees. Where field boundaries bordered planting areas, no planting was undertaken within four metres of the outer edge of the hedge to enable access for maintenance.

Public access and engagement

On 20th April 2009 the woodland, christened `800 Wood', was officially opened to the public by the Chancellor of Cambridge University, HRH the Duke of Edinburgh. 800 Wood was and is unusual for the University as public access is actively encouraged, where usually access to University property is limited due for example to research constraints or commercial activities. The new woodland provides open access to local community and the general public during daylight hours and it is well used for informal recreation and relaxation. Around the ride network, a number of commemorative trees have been planted and are easily identified by their named plaques.

Education and research

Children from St John's College School and Madingley Pre-Preparatory School helped to plant some of the trees and provided illustrations for a site information board marking their planting event. Volunteers from the Cambridgeshire & Essex Branch of Butterfly Conservation provided and assisted with the translocation planting of the elms to improve the habitat for the White Spotted Pinion moth and will be monitoring this species along with others in the future. Root development in the young trees is being studied by Anglia Ruskin University. During 2011, the University of Cambridge hosted meetings of the Royal Forestry Society and the Cambridge Conservation Forum at 800 Wood. On both occasions, how 800 Wood contributes to the wider Estate and woodland management strategy was explained.

800 Wood's development

Whilst not being formally researched, the occurrence of naturally regenerating species in the transitional zone was recorded in the spring of 2011 and included Ash, Field Maple, Hawthorn and Oak in order of decreasing abundance. Interestingly, natural regeneration levels were markedly higher at the eastern extent of the natural regeneration zone even though seed bearing trees are present along the length of the boundary and the ground preparation was the same.

The new woodland planting has established extremely well as a result of a combination of good planning, planting stock and subsequent maintenance and management. A notable feature of the young planting in its fifth growing season in 2011, and clearly demonstrating the success of the establishment phase, is the high number of flowering and fruiting species including Hazel, Blackthorn, Alder, Ash, birches, willows, Hawthorn, Spindle and Guelder Rose which will have attracted a wide variety of invertebrates, birds and mammals. It is hoped that these will disperse across the planting and local vicinity as well as further enhancing its aesthetic appeal and the transition of the planting into a young woodland rich in biodiversity. (See Plate 2, inside front cover.)

This winter, the management regime of the woodland is changing with a moving away from weed control and maintenance to a focus on initiating the diversification of the woodland's structure by undertaking small scale coppicing of shrubs and the securing of the trees' future timber potential with the early formative pruning of the better developed Oak and Ash. The ride network will continue to be maintained to facilitate continued public access.

Grant funding and acknowledgments

The SITA Trust and the Forestry Commission have been very supportive in the provision of grant aid towards the establishment of 800 Wood via their Enriching Nature Programme and Woodland Creation Grant scheme respectively. We are also grateful to have received support via funding from Cambridgeshire County Council for providing cycle racks which enables cyclists' easy access from Cambridge.

The success of 800 Wood is down to a true team effort lead by the University of Cambridge's Rural Estate department and supported by their forestry agents, Lockhart Garratt Ltd along with a dedicated team of contractors from Greenfields Countryside Services Ltd.

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The Backs

A report on the CNHS Field Studies area of 2011

Jonathan Shanklin

The Cambridge Natural History Society turned to the Cambridge Backs for its field studies area in 2011. This report follows a different pattern to those for previous years in that features are discussed individually, rather than presenting highlights in a diary for the year, although this is retained on the Society web pages. We logged over 550 plant species, and also recorded some other phyla. Record sheets for the area are available on the Society web pages.

Each year since 2004 the Cambridge Natural History Society (CNHS) has selected a different area of the city for extensive study over the course of a year. Areas close to the city have been chosen to allow participation by students and others without easy access to transport. The long term intention is to have a rolling programme with return visits to sites after a decade. Primarily these studies have concentrated on the vascular plants, however other phyla have been recorded, usually on an *ad hoc* basis. Whilst many of the study areas may be considered as lacking in interest, the detailed studies have revealed axiophytes (desirable, though not necessarily uncommon plants) and red-listed species growing in them, some of whose presence was previously unknown.

This year's study covered the Cambridge Backs, which for the purpose of the study was considered to encompass all of the monad TL4458. The monad includes a wide variety of habitats: busy roads, the general urban environment, older colleges and churches, the river Cam, Bin Brook and associated ditches, "wilderness areas" and playing fields. It is thanks to this variety of sites that the area has a high biodiversity as measured by the number of vascular plant species recorded.

It was an exceptionally dry year, with only 339 mm of precipitation recorded by the end of November, compared to the normal amount of around 510 mm (the mean annual total is 556 mm for the period 1961 - 2010). Apart from an occasional shower, the outings were not troubled by rain, though the dry conditions certainly affected the species that could be seen.

Geology of the area

The full geology of the Cambridge area is described in *The Geology of the country around Cambridge* (Geological Survey of Great Britain, 1969) and can also be seen interactively in the British Geological Survey "Geology viewer". The River Cam runs at 6m OD and the highest points are Pease Hill in the east (10 m), the north-west corner of the monad (12 m) and the south-west corner (10m). The river runs through a relatively narrow alluvial plain a few hundred metres wide, with terrace gravels on either side. Its channel has been straightened, with the original meanders now forming ditches. The first terrace gravels parallel the river, and are generally a few metres thick, though thicker

lenses are present. They were probably laid down some 20,000 years ago during the Arctic conditions of the last glaciation. The second terrace deposits are more extensive, but again only a few metres thick and cover most of the remaining area. These were laid down in warmer conditions towards the end of the last interglacial, and include mollusc shells and bones of *Hippopotamus*, *Cervus* and *Rhinoceros*. In the north-west corner, the Gault is at the surface, though fortunately for walkers this sticky clay is covered by playing fields. The deposit, around 40 m thick, was laid down in the Cretaceous, some 100 million years ago, when the area was covered with a relatively shallow coastal sea.

The gravels have a subtly different flora to the alluvial plain, though this may be through introductions as much as through nature. The lawn below Memorial Court of Clare College, which is on the first terrace gravels, has a good range of plants, including Field Wood-rush (*Luzula campestris*) and Lady's Bedstraw (*Galium verum*). The less developed "wilderness areas" of the Backs have quite different species such as Ramsons (*Allium ursinum*), Goldilocks Buttercup (*Ranunculus auricomus*) and Pignut (*Conopodium majus*). All may not be quite as it seems, as Babington suggested that colleges brought in turf, complete with flora, from the chalk downs outside the City. In addition, as Preston & Sheail (2007) have noted, there was much dumping of rubbish on the alluvial plain.

History of the area

Magdalene Bridge crosses the river near the site of the Grantanbrycge (ca 800 AD) which gave Cambridge its name. The Anglo-Saxons began St Benet's church, and its tower dates to 1033. The University came to Cambridge in 1209, and the growth of the Colleges and University since then have continuously changed the area.

David Loggan's 1688 map of Cambridge shows the Backs between Queen's Road and the River Cam in almost the same layout as they are today. East of the river there has been infill of several areas that are shown on his map as wooded or grassed. The map also shows the complex ditch system of the Backs, with causeways linking the colleges with higher ground to the east. Ordnance Survey maps show that the area west of Queen's Road still included some open fields until towards the middle of the twentieth century, when college and university expansion changed their character. More and more of the area is being developed, but occasionally the development process allows ruderal species to flower for a brief period.

The Colleges

The grounds of each college have their own character, and this is sculpted further by the direction of their gardening staff. Over centuries they have influenced the flora, introducing plants which have become naturalised, especially the spring bulbs for which the Backs are renowned. John Raven noted in the early 1950s that Slender Trefoil (*Trifolium micranthum*) was abundant in almost every college lawn in Cambridge (P.H. Oswald, pers. comm.) and we specifically noted it at Clare and St John's.

Clare College has only small patches of unmanaged terrain, but despite this has a good diversity of species. Indeed on our first visit we spent over half an hour just looking at the lawn by the College gates! Notable are some of the old walls, with ferns in shaded parts, and a wall top flora on the boundary wall with King's, including the only county record for Stranvaesia (*Stranvaesia davidiana*). The margins of the lawn in the Fellows Garden are a haven for spring flowers, with Field Wood-rush (*Luzula campestris*) present in this and other College lawns. Memorial Court sprang a number of surprises, with the first visit revealing Hare's-foot Clover (*Trifolium arvense*) and Early Forget-me-not (*Myosotis ramosissima*) growing in a sandy bed running along the drive to the north of the lawn. On the second we found Rough Clover (*Trifolium scabrum*), a rare Cambridgeshire plant, growing in the front lawn. It seems most likely that these were introduced in soil used to make good the lawns after building work a few years ago. Short-fruited Willowherb (*Epilobium obscurum*) growing by the side of Memorial Court was only the second recent record from the city.

The grounds of King's are perhaps the most managed, but despite this there are other species than grasses in the hallowed turf. King's Scholar's Piece on the west side of the river has cattle grazing in the summer, and is the only remaining area of the Backs water-meadows with "traditional" management. A few species were seen here and nowhere else, notably Agrimony (*Agrimonia eupatoria*) and the hybrid Dock (*Rumex* x *pratensis*).

Queens' has a small "natural" area known as The Grove, where magnificent Dutch Elms (*Ulmus* x *hollandica*) grow, and which have been, perhaps surprisingly, resistant to Dutch Elm disease. The grounds to the west of the river have good displays of naturalised spring bulbs, with several different species of Glory-of-the-snow (*Chionodoxa*) giving the botanists much to debate. The walls bounding Silver Street have a good flora, with Rue-leaved Saxifrage (*Saxifraga tridactylites*) thriving.

As one of the largest colleges Trinity has plenty of space for wild areas, and in particular maintains an old meadow in the Fellows' Garden, which is a City Wildlife Site. It is cut once a year with removal of arisings, and has a neutral to calcareous sward. Indicator species present include Quaking-grass (*Briza media*), Field Scabious (*Knautia arvensis*) Rough Hawkbit (*Leontodon hispidus*), Hoary Plantain (*Plantago media*), Goldilocks Buttercup and Salad Burnet (*Sanguisorba minor* subsp. *minor*). For most of the summer, building work was taking place in Great Court, so we did not see the aliens Common Purslane (*Portula oleracea*) and Small Love-grass (*Eragrostis minor*) which are known from there.

The other big college, St John's, also keeps a wild area (The Wilderness) in its Fellows' Garden, and this has a long history of botanical recording. Both Henslow and Babington noted that Meadow Saxifrage (*Saxifraga granulata*) grew here, and we were delighted to find it still present, as was Pignut, reported from here by Relhan in 1785, though Babington suggested that this was introduced with the turf. We did not refind Moschatel (*Adoxa moschatellina*), known here since 1860, though it was seen in 1991. The western boundary wall has long supported Tower Cress (*Pseudoturritis* (*Arabis*) *turrita*) and Philip

Oswald (2011) gives full details. The College playing fields cover a large area, but we made an unexpected find on their margins. When called to identify a small trefoil, Jonathan Shanklin spotted a plant of Wall Bedstraw (*Galium parisiense*) on rough ground nearby. Surprisingly this was not the first record from the monad as it had been found near the School of Music in West Road in the early 1980s.

The Churches

The churchyards of St Benet's, St Botolph's, St Clement's, St Edward's, Great St Mary's, St Mary the Less, and Holy Sepulchre (the Round Church) all lie within the area. That of Great St Mary's is well trampled by tourists, but is not diligently gardened and hence casuals such as Thorn-apple (*Datura stramonium*) (seen in 2006) and Cockspur (*Echinochloa crus-galli*) appear from time to time. Yellow-flowered Strawberry (*Potentilla* (*Duchesnea*) *indica*) is scattered in the churchyard, and this plant can also be found in King's and St John's. St Benet's is well tended by the Corpus Christi College gardeners, but Lady's Bedstraw (*Galium verum*) still persists in the lawn, and the churchyard wall supports several species of fern. Tussock Bellflower (*Campanula carpatica*) persists on a chest tomb in the churchyard, where it was first noted in 2006. St Botolph's churchyard is sadly normally closed to visitors and Holy Sepulchre is now a tourist centre. St Clement's has "wild" areas to it and provided several initial records on the traditional New Year's Day outing. St Mary the Less lies on the boundary of the area, and is a City Wildlife Site because the Nationally Scarce moss *Rhynchostegiella curviseta* is recorded from the site. A notable feature of the churchyard is the lawn of Mind-your-own-business (*Soleirolia soleirolii*), where it has been known since at least 1946.

The river, streams and ditches

The major feature is the River Cam. There is heavy traffic on it, though of a quite different nature to that of a century ago, particularly in the summer. Punts abound, and the river bed is kept relatively clear of "weed", though some can be found, for example Unbranched Bur-reed (*Sparganium emersum*).The bounding walls do however provide something of a haven, and on our punt trip we noted, amongst others growing on them: Pellitory-of-the-wall (*Parietaria judaica*), Ivy-leaved Toadflax (*Cymbalaria muralis*), Gypsywort (*Lycopus europaeus*) and Skullcap (*Scutellaria galericulata*), the last showing its striking blue flowers. The most interesting wall plant was yellow flowered Orange-peel Clematis (*Clematis tangutica*) growing on stonework by St John's. The Bin Brook, although prone to flash flooding, has a much cleaner flow and its seclusion provides something of a haven. The section along the Trinity Paddocks used to support Water Vole (*Arvicola terrestris*), but during our visits we didn't make any definite sightings. By contrast the ditches appear to be in poor condition, often overshadowed by neglected trees, and with anoxic conditions ensuring little biota. The best ditch section is that along the King's Backs.

The urban environment

Although a good part of the area consists of buildings, pavements and roads, plants find places to grow. Ferns find walls a good substitute for cliffs, and drain gratings often provide a damp environment. Polypody (*Polypodium vulgare sensu lato*) grows by a drain-pipe in Free School Lane, and also down a drain behind the University Library. Ribbon Fern (*Pteris multifida*) grows in a grating by Michaelhouse. Lady Fern (*Athyrium filix-femina*) was found by a drain of the Real Tennis Court off Burrell's Walk, not that far from where it had been seen on the brickwork of the Garret Hostel Lane causeway in 1961. Alan Leslie suggests that this may be the only self-sown plant in the city. Also found in Burrell's Walk was a single plant of Wood Melick (*Melica uniflora*), with no obvious nearby planting. An ornamental bed covered with ivy on the Sidgwick Site was filled with spikes of Ivy Broomrape (*Orobanche hederae*). Salted road verges showed several of the increasingly widespread halophytes, Buck's-horn Plantain (*Plantago coronopus*), Danish Scurvygrass (*Cochleria danica*) and Lesser Sea-spurrey (*Spergularia marina*), but we didn't see Reflexed Saltmarsh-grass (*Puccinella distans*), possibly because the Council sprayed the most likely verge on which it might be found. Another recent invader is Early Meadow-grass (*Poa infirma*), which is now abundant on the Backs. It appears to have expanded its range considerably from its native habitat of short turf near the sea in the south-west, but it is not clear if this is a response to climate, salted roads or better searching. In the case of Cambridge the last explanation appears unlikely and the first record was in 2001.

Birds

We rarely had birders with us, but did note 22 species. The most memorable sighting was a close up view of a Goldcrest (*Regulus regulus*) in a hedge by the University Library.

Bryophytes

Most records were made during a joint meeting with the Cambridgeshire group of the British Bryological Society, which took place in November. This meeting focused on the grounds of Clare, St John's and Trinity and recorded nearly 60 moss species. Notable were three species scarce for Cambridgeshire: *Leptobarbula berica* (5th v.c. record), *Rhynchostegiella curviseta* (6th v.c. record) and *Rhynchostegiella litorea* (3rd v.c. record). Quite surprisingly given the general lack of woodland habitat, nine hepatic species were recorded, putting the monad high in the county list of liverwort diversity. Common Liverwort (*Marchantia polymorpha* subsp. *ruderalis*) was ubiquitous in shaded areas amongst college cobbles, paving slabs and damp ground. Great Scented Liverwort (*Conocephalum conicum*) was found growing in a large band just above the water level along the brickwork of Garret Hostel Lane, with scattered specimens elsewhere along the drainage ditches.

Fungi

A few fungi were recorded as casual records during the course of the year, but the foray during the main fungal season suffered the effects of an extremely dry October, when only 17 mm of rain fell. Perhaps most notable was the apparent abundance of mildew, with eight different plant species recorded as supporting it.

Lichens

F H Brightman described the Lichens of Cambridge Walls in 1965, and the Cambridge of that period suffered heavily from the effects of coal fires. With the passing of the Clean Air Act, the atmosphere has changed and acid rain is a thing of the past. Differences between Brightman's work and recent surveys by the Cambridgeshire Lichen Group are described in *The Lichens of Cambridge Walls* in this issue The small churchyard at St Benet's gave a surprisingly large list, approaching 40 species. A survey of lime trees (*Tilia* sp) in St John's playing fields as part of an Opal air quality survey showed a preponderance of nitrogen-loving lichens such as *Physicia* and *Xanthoria*, with some intermediate species such as *Melanelixia*.

Invertebrates

We investigated several habitats during Opal surveys. Perhaps the most surprising discovery was the large number of spiders inhabiting a three metre stretch of hedge on the boundary of St John's playing field, with woodlice being the second most abundant group. Another survey looked at the relative number of species found in different types of habitat, and we found far more on the soft ground near Queens' Green than we did on the built environment of the Sidgwick Site. We did spot one of their "Species Quest" bugs – Devil's Coach-horse (*Ocypus olens*).

Vertebrates

Despite being close to the city centre, Badgers (*Meles meles*) inhabit Trinity Fellows' Garden and we also saw a Hare (*Lepus capensis*). Bin Brook may still support Water Voles and a fascinating spectacle was seeing a Water Shrew (*Neomys fodiens*) paddling in circles for several minutes in a quiet backwater. Frogs (*Rana temporaria*) and Grass Snakes (*Natrix natrix*) are present.

Conclusion

Despite the urban location, with often highly formal gardens, there is a surprising amount of natural green space in the area, and this still supports several scarce species. Altogether we made 1000 records of over 550 vascular plant species and records of around 200 other species. A diary style record of the visits is on the Society web page.

The 2012 survey is covering the area destined to become the Cambridge University North-West campus. Although the present CNHS group tends to concentrate on plants, we make records of other organisms too and would welcome beginners and experts with other interests. Do come and join in. Dates

for the monthly surveys, and flora lists for many of the wildlife sites near Cambridge are on the Society web page.

Thanks are due to Alan Leslie and Monica Frisch for comments on my original text and to Philip Oswald and Chris Preston for comments on the submitted version.

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Vascular Plant Records

Alan Leslie

Once again this annual list demonstrates that Cambridgeshire still has plenty of surprises to reward its botanical recorders. Whilst we may find few entirely new native plants to our records, there have been some welcome refinds of native plants in old localities (such as *Carex hostiana* and *Epipactis phyllanthes*), as well as new records for plants which are locally rare (such as

Adoxa and *Carex caryophyllea*). And good records need not always come from out of the way or little-visited places, as the confirmation of Alan Silverside's record of *Salix myrsinifolia* on Wicken Fen and the discovery of *Teucrium scorodonia* in Gamlingay Wood both demonstrate. However, sometimes a sharp eye cast over a place few botanists may venture, can produce surprising results, as shown by David Collins's report of *Silene conica* from his allotment on the sands at Fordham.

Records of new aliens continue to proliferate, and whilst some of these will have only a fleeting presence in our flora, others will be here to stay. It is not always easy to guess into which category individual species will fall, but it seems likely that *Lemna turionifera* will become a permanent member of our Flora (as has another alien duckweed, *L. minuta*). However, will *Polycarpon tetraphyllum* survive and spread beyond the small area in the city of Cambridge where it now seems to have a strong foothold? Other plants show how it is not always possible to provide neat definitions of what is native and what is alien: the record included here for *Trifolium scabrum* is almost certainly an accidental introduction, whereas it used to occur naturally on the sands over the south of the county.

The records below show a good spread across Cambridgeshire, from nineteen 10 kilometre squares (TF40; TL25, 34, 35, 36, 39, 43, 44, 45, 46, 48, 49, 54, 56, 59, 64, 65, 66, 67) and commendably span the year from January (*Juniperus communis*) to December (*Cotoneaster tengyuehensis*). 'Recent', used in the context of these records, refers to a period from 1987 onwards. Once again it will be evident from these records that the excursions organised by the Cambridgeshire Flora Group and the Cambridge Natural History Society have proved enjoyable and productive ways to see and study our flora. There is also a valuable and rewarding role to be played by individuals prepared to study a particular area in detail throughout the year or to research the records and ecology of an individual species. In this issue of *Nature in Cambridgeshire*, for example, Jonathan Graham's survey demonstrates the continuing spread of *Potamogeton compressus* in the county, whilst James Cadbury has shown that *Stellaria palustris* is much more widespread than we had thought in the Ouse Washes. On a less positive note, James's report on *Trifolium ochroleucon* highlights a long decline in this species, but even for this species there are still new sites being reported.

Work on the new Flora has progressed well over the last year and at least half of the individual species accounts are now prepared. I am particularly grateful to all those that have helped with enquiries, read the accounts or generally assisted in taking this project forward, but there is a lot more still to do!

Acaena novae-zelandiae Several patches on thinly vegetated, dry, open ground, at the north-west corner of the junction of the main runways, old military airfield, Waterbeach, TL49066718, A.C. Leslie (Local Records Centre recording meeting), 6 August 2011, **CGE**. First v.c. record for the Pirri-Pirri Bur, a native of New Zealand and Australia, which is sometimes grown in gardens.

Adoxa moschatellina Two patches on north bank of disused railway line, east of Horseheath, TL630465, J.D. Shanklin, 9 April 2011, and another on top of the bank just to the south-west, TL628465. A new site for a very local Cambridgeshire plant, last seen in this general area by W.M. Palmer in the early part of the twentieth century.

Alopecurus aequalis Eight flowering stems in a drying up pond, otherwise covered in *Crassula helmsii* and some *Mentha aquatica*, Cardinal's Green, TL61494643, J.D. Shanklin, 19 August 2011. A new site for a very local grass, which has not been recorded in this part of the county before.

Carex arenaria Vegetative plants only, abundant over several metres, in turf adjacent to kerb, south verge of spur road to building no.314, Cambridge Science park, Milton, TL462616, C.D. Preston & D.J. Barden, 5 April 2010. Sand Sedge is another addition to the accidentally imported, Breckland-type flora at this site (see Barden, in *Nature in Cambridgeshire* 2006).

Carex caryophyllea A patch c.1 x 5m in short turf in grassland on south-facing bank, south south-west of old rifle butts, Coldham's Common, Cambridge, TL47705835, J.D. Shanklin, 12 April 2011, det. S. Hartley. A new site for a very local Cambridgeshire plant and an interesting addition to the calcicole flora of this end of the Common.

Carex hostiana Several plants in south corner of Shepreth L-Moor (north of the railway), Shepreth, TL38664747, 3 July 2011, CNHS excursion. The first record of Tawny Sedge on the L-Moor since 1959: this has always been very local in Cambridgeshire and has been seen recently only at Sawston, Thriplow and Chippenham. It could still be on Wicken Fen, where it was last reported in 1986.

Cotoneaster atrovirens One plant, bird-sown on the south-west face of the Devil's Ditch vallum, just north-west of the Cambridge Gap, TL61506180, A.C. Leslie, 16 October 2010, **CGE**, det. J. Fryer. First v.c. record for a plant similar to *C. horizontalis*, with which it is growing, but with a noticeably deeper green, glossier leaf.

Cotoneaster tengyuehensis One plant in scrub, above railway cutting, on south-east side of Paddocks Drive, Newmarket, TL642625, A.C. Leslie, 10 December 2010, **CGE**, det. J. Fryer. First v.c. record.

Digitalis lanata Several hundred plants on waste ground and an abandoned field, just south-west of old level crossing, north of Longstanton, TL39776803, A.C. Leslie, 6 November 2011. First v.c. record for the biennial to perennial Grecian Foxglove, which is grown in gardens and may have been grown commercially in this field in the past.

Dorycnium hirsutum Three self-sown plants in tarmac of former playground, by village hall, Kingston, TL3455, P.J. Reynolds, 16 October 2010 (**CGE**, collected from the one that survived the previous hard winter); no evident parent nearby. First v.c. record for a dwarf shrub, or woody-based perennial, from the Mediterranean region, grown in gardens for its heads of white pea flowers, sometimes flushed pink, and very hairy calyces.

Epilobium lanceolatum One plant in locked reserve, Bramblefields, Chesterton, Cambridge, TL473606, J.D. Shanklin (CNHS excursion), 7 July 2011. Second recent record for Spear-leaved Willowherb, which has twice before been recorded as a weed in Cambridge: in 1982 along Victoria Road and in 2002 at the junction of Gilbert Road and Colwyn Close. Is it being missed elsewhere as a garden weed?

Epipactis phyllanthes (a) one plant, Robinson Crusoe Island, by R. Cam, Cambridge, TL4457, S. Butchart, 2009; another subsequently found nearby, the same year, by R. Johnson, J. Bird & A. Symes; two plants found in flower (both plants less than 15cm tall), July 2011, M. Frisch. A welcome return for a rare orchid last reported from this site in 1987 and from which it was first noted in 1896 (b) one plant in ash belt at north end of Thriplow Meadows, TL4347, G. Belcher, 7 August 2011; another good refind, it was first seen in this area in 1958 and last reported in 1983. Although neither population can be said to be flourishing, they demonstrate how persistent rare plants can be and that it is always worth searching old sites.

Euphrasia confusa x *E. nemorosa* A small population in short turf on the south-east margin of old runway, on the disused Waterbeach airfield, TL49446750, 5 August 2006, J.D. Shanklin (**CGE**, det. A.C. Leslie, conf. A. Silverside, material collected by ACL 2011). First v.c. record and a remarkable find. One of the parents, *E. confusa*, has never occurred in the county, although it is frequent in forestry rides in parts of the Norfolk Breckland (less so in open heaths in the Suffolk brecks). This widespread fertile hybrid is noted to occur elsewhere without its parents, sometimes in large colonies.

Galium parisiense (a) a patch over 3 square metres, bare ground west of lake, disused military airfield, Waterbeach, TL48916718, S. Lambert (Local Record Centre recording meeting), 6 August 2011 (b) one plant on rough gravelly ground behind tennis courts, St John's College playing fields, Cambridge, TL44225865, J.D. Shanklin (CNHS excursion), 28 August 2011. Two new sites for this delicate little annual; in both cases probably introduced with sand or gravel. Wall Bedstraw has otherwise only been seen recently on railway sidings at March.

*Geranium asphodeloide*s Numerous clumps in and beside field entrance, east side of Coneywood Road, Doddington, TL40159120, A.C. Leslie (CFG excursion), 13 August 2011, **CGE**. First v.c. record for a variable garden plant, native from southern Europe to the Crimea and the Caucasus. Probably originally dumped here, but now well established and probably self-sowing.

Hypochaeris glabra (a) Probably tens of thousands of plants in dry, sandy, grazed paddocks, immediately to the north-west of Isleham Plantation (and east of B1104) e.g. TL65827134, A.C. Leslie, 9 June 2011, by far the biggest population in the county and growing with significant numbers of *Medicago minima* (b) about 36 plants in corner of sandy arable field, west of B1104, opposite Mamre Farm, Isleham Plantation, TL65707097, A.C. Leslie, 9 June 2011.

Hyssopus officinalis One plant, probably introduced accidentally with soil, on bank of filled in railway bridge, west side of road, just north-west of T-junction, Kingston, TL346558, D.J. Barden, 4 July 2010, conf. A.C. Leslie. First v.c. record for a popular garden plant from the Mediterranean region: naturalised on walls and in quarries elsewhere in the British Isles, but unlikely to persist in this site.

Juncus gerardii Two long linear colonies on south-eastern verge of North Bank (in an apparent seepage area at the base of the river flood bank), north-east and south-west of Rummers Farm, near Wisbech, TF42430596-42260581 and 42010558, A.C. Leslie, 12 June 2010, **CGE**, conf. M. Wilcox. Long-known and still present in brackish habitats at Foul Anchor and formerly reported from a few other places in the Fens. Almost certainly the plant previously reported from this site as *J. compressus.*

Juniperus communis One plant, apparently bird-sown between rows of mixed, planted woody species, east end of the new Foxton Wood, Chalk Hill, Foxton, TL41284779, A.C. Leslie, 20 January 2011. There are many other bird-sown trees and shrubs here such as *Taxus baccata*, at least four *Cotoneaster* spp. and several brambles, but whether this juniper is from a garden source or perhaps derived from our only extant native population on the Fleam Dyke would be hard to prove.

Lemna turionifera Old Bedford River, south-west of Delph Bridge, TL51869239-51909244, 6 September 2011, R.V. Lansdown & R. Blackman; also seen the same day, by the same recorders, in the R. Delph, south-west of Delph Bridge, TL51949241-51899234 and the following day in the Old Bedford River, downstream of Mepal Bridge, TL43718137-43798148. On 8 September it was recorded in the Forty Foot Drain, south-east of Horseway, TL43268701-43368698 and 43618691, by R.V. Lansdown, R. Blackman & H. Tucker. These are our first records for an alien Duckweed, native to North America and northern Asia, which we may have been overlooking. It was only recorded for the first time in the British Isles in 2007. It has more-or-less flat fronds, with red colouration on the lower side which starts around the root attachment and spreads outwards.

Lonicera xylosteum One large shrub, apparently bird-sown in damp woodland developed on the largely overgrown site of pond, south-east of B1093, Doddington, TL40499089, A.C. Leslie (CFG excursion), 13 August 2011, **CGE**. An alien in Cambridgeshire, Fly Honeysuckle has been recorded bird-sown recently only at Milton and Swaffham Prior. It is occasionally grown in gardens and included in amenity planting schemes.

Lupinus arboreus Two flowering shrubs on north-facing bank of capping on old refuse tip, Kennett, TL69536887, A.C. Leslie, 16 June 2011, growing with more numerous *Ulex europaeus* and *Cytisus scoparius.* The flowers were pale yellow (f. *arboreus*). First v.c. record for Tree Lupin, which may have arrived here with the capping soil.

Melica uniflora A few plants on the Cambridgeshire side of the county boundary, Waresley and Gransden Woods, TL264544, D.J. Barden, 1 May 2010, much more abundant on the Huntingdonshire side of the border. Although Wood Melick is scattered in woods over the eastern boulder clay in Cambridgeshire, it has never been reported before from our western clays: it only does so here by a very narrow margin!

Mentha pulegium Frequent around the upper margins of the most north-western of three field reservoirs, south side of Broadhill Drove, Soham, TL59727645, A.C. Leslie, 24 June 2011. This was the variant with erect stems, considered to be a recent introduction to the county. It has become well naturalised along dry road and tracksides in southern Cambridgeshire, chiefly on or near the A11 between Little Abington and Stump Cross.

Mentha x *villosonervata* (*M. spicata* x *M. longifolia*) A patch at base of wire fence, opposite entrance to Pisces Country Park, south-west of Welney, TL52269299, CFG excursion, 21 August 2010 (**K**, conf. R.M. Harley). First v.c. record for a mint which resembles a hairy Spearmint with acuminate, often spreading leaf teeth; of garden origin in this country, where neither parent is native.

Origanum laevigatum On imported soil on site of former road bridge over disused railway line, on the Caldecote road, just to the north of the Toft to Bourn road, Kingston, TL3455, P.J. Reynolds, 17 October 2011, **CGE**. First v.c. record for a popular garden plant, native of the eastern Mediterranean region.

Origanum vulgare subsp. *hirtum* (*O. heracleoticum*) Five plants, self-sown on low brick wall in front of 45 New Square, Cambridge, TL45535865, J.D. Shanklin, July 2011, det. A.C. Leslie, parent nearby in garden. First v.c. record for a garden plant, native of the south-eastern Mediterranean region, and usually with white flowers and green bracts, the latter smaller and more glandular than our native Marjoram.

Polycarpon tetraphyllum Frequent along wall bases, in road gutters and in paving cracks, in an area of flats on the south-east side of East Road, Staffordshire Gardens, Cambridge, TL4658, A.C. Leslie, 25 October 2011, **CGE**. First recent record for Four-leaved Allseed, a Mediterranean annual, which may be a weed brought in with container-grown plants from southern Europe.

Potentilla argentea Scattered over derelict field between disused railway line and Pampisford Road, Great Abington, TL53414798, J.D. Shanklin, 24 July 2011 (**CGE**, coll. A.C. Leslie, 30 July 2011). Several hundred plants, mostly in areas where rabbits have left the ground otherwise bare, and seemingly untouched by them. This site is just across the Granta valley from our only recently recorded native population on Hildersham Furze Hills.

Ranunculus parviflorus One plant on disturbed roadverge, north-west side of A14, below new sign gantry, just north-east of the Devil's Ditch footbridge, west of Newmarket, TL60446324, A.C. Leslie, 2 June 2011 (**CGE**). Second recent record.

Ranunculus sardous At least 23 plants on disturbed roadverge and amongst small paving blocks, north-west side of A14, below new sign gantry, just north-east of Devil's Ditch footbridge, west of Newmarket, TL60446324, A.C. Leslie, 2 June 2011, **CGE**. Possibly native near the coast in southern and eastern England, but probably always an alien, and very rarely encountered, in Cambridgeshire.

Rubus anglocandicans Clambering over wire fence and spreading along west side of road leading from B1093 to Washbrook Farm, Doddington, TL38909095, A.C. Leslie (CFG excursion), 12 August 2011, **CGE**. Previously only recorded from Gamlingay and Cambridge.

Rubus dasyphyllus Several patches in the central part of Red Lodge Plantation, Chippenham, TL6769, A.C. Leslie, 4 March 2011. Second recent record; otherwise known only just to the south-east on a roadside near Kennett.

Rubus insectifolius Several patches on ride margins, south-western end of Little Chishill Wood, TL42283698, A.C. Leslie (joint CFG & Essex Field Club excursion), 9 July 2011, **CGE**. This is our only locality, from where it was last reported in 1954. The wood is in administrative Cambridgeshire, but in v.c. 19.

Rubus leightonii A few stems along the south-west edge of scrub on the north-east fringe of recreation ground, Doddington, TL40519130, A.C. Leslie (CFG excursion), 13 August 2011, **CGE**. Previously only recorded on roadsides and disused railway lines just to the north of March.

Rumex palustris x *R. obtusifolius* In the record published for this hybrid in *Nature in Cambridgeshire* **54**:88 (2011), the hybrid binomial was given incorrectly as *R.* x *erubescens*. The correct hybrid binomial is *R.* x *steinii*.

Salix aurita x *S. cinerea* (*S.* x *multinervis*) One large, rounded and intricately branched shrub, field bank above roadside, south side of Shudy Camps, TL620442, A.C. Leslie, 9

October 2010, conf. R.D. Meikle. A rarely recorded hybrid in the county (where *S. aurita* is very rare), but common in parts of the northern and western parts of the British Isles. There is no known *S. aurita* in the surrounding area, but this species has recently been found as part of amenity planting in Cambridge, so may also be introduced elsewhere.

Salix cinerea x S. myrsinifolia (*S.* x *puberula*) One large shrub, with both parents, on north side of a strip of carr running along the south edge of Sedge Fen, Wicken Fen, TL55937022, CFG excursion, 23 July 2011, **CGE**. A third locality for this hybrid, previously recorded at Fordham Woods and Chippenham Fen.

Salix myrsinifolia (a) One large shrub on north side of a strip of carr running along the south edge of Sedge Fen, Wicken Fen, TL55937022, CFG excursion, 23 July 2011, **CGE**, confirming a record made by Alan Silverside in 1995 and previously unknown on the Fen (b) one shrub, self-sown at base of deep ditch on north-east side of Soham Road, Fordham, TL61757124, A.C. Leslie, 13 October 2011, **CGE**. Two new sites for a predominantly northern willow, which has flourishing populations at Fordham Woods and on Chippenham Fen.

Scandix pecten-veneris Thousands of plants along arable margin, by footpath west of Upend Green, Kirtling, TL689588 to 694.587, D.J. Barden, 3 May 2010. An entirely new locality for Shepherd's Needle, which is now a very local cornfield weed.

Senecio aquaticus x *S. jacobaea* (*S.* x *ostenfeldii*) Several plants, with both parents, on flat ground between the water and the flood bank, south-east side of 100 Foot, north-east of Mepal, TL45268227, A.C. Leslie, 27 August 2011. Probably an overlooked hybrid, only recorded previously on the Welney Washes in 1959 and on Coe Fen in 1977.

Silene conica About 80-90 plants in an area of sandy allotment, east side of Collin's Hill, Fordham, TL63467064, D. Collins, May 2011 (shown to ACL & C. Turner 14 May 2011). The area concerned had previously been used for cut flower production and now holds young fruit bushes. It had been left unweeded for the last year. Sand Catchfly has long been known in the Chippenham area, but was last reported on the Freckenham Road in 1991 and was feared extinct in the county.

Teucrium scorodonia Gamlingay Wood, TL c.242535, M. Woods & D.C. Wood, 16 April 2011; the same clump was found independently by P.E.G. Walker on 26 July 2011, who reports that it is in the Bracken glade along the main ride, in the area with the recently rediscovered *Carex pilulifera*. Wood Sage has always been a great rarity in the county, occurring with certainty as a native only at Gamlingay, principally from White Wood and not reported for many years; never previously reported from Gamlingay Wood.

Trifolium scabrum One plant in mown turf near the north end of lawn along the east front of Memorial Court, Clare College, Cambridge, TL44305844, CNHS excursion, 13 July 2011. Almost certainly an accidental introduction with sand or gravel used in recent building works or in making good the lawn, this being the site of the portacabins used by the builders. Growing with *T. arvense, Echium vulgare, Oenothera* sp. and several other unexpected plants in this locality, but a flora reminiscent of many sand or gravel pits! Last reported in the county by Graham Easy in the 1990s in several places around Kennett and near Isleham Plantation, but not reported since.

Bryophyte records

T.G. Charman and C.D. Preston

We continued to concentrate our attention on Huntingdonshire (v.c. 31) in the 2011/12 field season, and this is reflected in a number of new vice-county records listed below. These include five made on a single excursion on 3.11.2011 which was so productive that it was featured in the national bryophyte report in *British Wildlife* (Bosanquet 2012). However, our occasional excursions to Cambridgeshire have also produced interesting records, as has Jonathan Graham's resurvey of East Pit, Cherry Hinton, after the Wildlife Trust's recent scrub-clearance works (Graham 2012).

Mosses

Abietinella abietina var. *abietina* **29:** Thinly scattered in lightly trodden turf, with *Campyliadelphus chrysophyllus*, *Homalothecium lutescens*, *Pseudoscleropodium purum* and *Thymus polytrichus*, S. edge of path along Fleam Dyke N. of Bedford Gap, TL55235377, C.D.P., 15.1.2012. Grassland along old railway line, Devil's Ditch, TL575652, D. Napier, 1.1.2012, det. & comm. D. Callaghan. This species was last seen at Fleam Dyke in 1984 and Devil's Ditch in 1998; it has only been found at two other sites in the vice-county since 2000.

Didymodon acutus **29:** Bare chalk soil at base of chalk cliff forming E. edge of pit, in a tuft mixed with *Barbula unguiculata*, *Calliergonella cuspidata*, *Didymodon fallax* and *Homalothecium lutescens*, East Pit, Cherry Hinton, TL48525574, C.D.P., 2.3.2012, conf. M.O. Hill. This is the first record from v.c. 29 since *D. acutus* was last seen in this chalk pit in 1985.

Hennediella macrophylla **31:** On trampled earth just off a path running through plantation woodland at Hinchingbrooke Country Park, TL22137167, C.D.P., 3.12.2011, BBSUK, conf. T.L. Blockeel. Luxuriant patches on bare earth around a rabbit warren in Hinchingbrooke Country Park, TL21977179, M.O. Hill, 3.12.2011. New to v.c. 31. This non-native moss is spreading in Britain; it was first discovered in v.c. 29 in 2003.

Hennediella stanfordensis **31:** Under hawthorn along a hedgebank near Cow Lane Gravel Pits, TL26017179, C.D.P., 3.12.2011, BBSUK, conf. T.L. Blockeel. New to v.c. 31. Like the similar *H. macrophylla*, this is also a non-native species and is also known from Cambridgeshire, where it was the first of the pair to be recorded (in 1977) but where it appears to be less frequent than *H. macrophylla*.

Pterygoneurum ovatum **29:** About 100 plants in three patches on newly cleared chalk soil, with *Aloina aloides* and *A. ambigua*, East Pit, Cherry Hinton, TL48485585, J.J. Graham, 16.3.2012 (Graham 2012). This declining species was last seen at East Pit in 1975, but it has reappeared following major scrub clearance work in the 2010/11 winter.

Rhynchostegiella litorea **29:** Steep earth bank of ditch, above water level, Bin Brook by Fellows Garden, St John's College, Cambridge, TL443587, M.O. Hill, 20.11.2011. Shaded root of ash surrounded by ivy, and shaded chalk soil nearby, Lime Kiln Close, Cherry Hinton, TL48525599, C.D.P., 2.3.2012. On base of elm and nearby soil in chalk pit, with *Amblystegium serpens*, *Brachythecium rutabulum*, *Eurhynchium praelongum* and *Fissidens* sp., Callow Bank, Soham, TL59077121, M.O. Hill, 28.12.2011. The species was last seen at Lime Kiln Close in 1991, and the only other records from the county are from West Wickham

(1960) and Sawston Hall (2001). *R. curviseta* was also found by the Bin Brook at the St John's College site.

Scleropodium cespitans **31:** On a fallen log in a small block of wet woodland at Cow Lane Gravel Pits, TL261721, M.O. Hill, 3.12.2011, BBSUK, conf. T.L. Blockeel. New to v.c. 31. A relatively common plant of lowland streams and rivers, found here in its typical habitat.

Tortula schimperi **29:** Disused gravel pits, near Gray's Moor, N. of March, TF414005, E.A. George, 10.5.1960, CGE, det. C.D.P. Chalky soil below trees on stream bank, small valley S. of Over Wood, TL631480, C.D.P., 20.4.2002, BBSUK, conf. T.L. Blockeel. **31:** On the edge of a horse chestnut root on the N. bank of the Alconbury Brook, Hinchingbrooke Country Park, TL22127143, C.D.P., 3.12.2011, BBSUK, conf. T.L. Blockeel. On a shaded earth bank along a track in the Cow Lane Gravel Pit complex, TL26177170, M.O. Hill, 3.12.2011. The *Tortula subulata* aggregate has recently been revised (Cano *et al*. 2005) and is now regarded as comprising two species, *T. schimperi* (*T. subulata* var. *angustata*) and *T. subulata sens. str*. Most Cambridgeshire specimens are *T. subulata* (see below) but the two listed above are *T. schimperi*, which nationally appears to be a much rarer, predominantly eastern species. (Richard Fisk has found it in several sites in Suffolk). *T. subulata sens. lat.* has not hitherto been recorded from Huntingdonshire, and it was the discovery of *T. schimperi* at Hinchingbrooke which prompted the re-examination of the Cambridgeshire material.

Tortula subulata **29:** On base of beech tree on steep chalk slope, N. side of chalk pit, Morden Grange, Steeple Morden, TL296402, C.D.P., 2.1.2005, herb. C.D.P. Wandlebury, [TL4953], C.D.P., 8.11.1975, herb. C.D.P. On the ground in a roadside copse near Egerton House, Newmarket, [TL66A], C.C. Townsend, 23.4.1955, E, NMW. With *Bryum moravicum* on bark of elder, Devil's Ditch, TL6161, H.L.K. Whitehouse, 10.6.1990, CGE. On ground under line of beech trees, entrance to National Stud, parish of Stetchworth, S.W. of Newmarket, TL617614, C.D.P., 2.12.2001, herb. C.D.P. Stream bank, Lower Links Covert, Woodditton, Cambs., TL639607, J.H. Dickson, J. Dransfield & H.L.K. Whitehouse, 28.2.1970, CGE. These specimens have been re-examined by C.D.P. and confirmed as *T. subulata sens. str*. rather than *T. schimperi* (see above). They suggest that this is the usual segregate in v.c. 29, at least on chalk soils. Re-examination of a specimen of the plant listed as an associate of *Eucladium verticillatum* in *Nature in Cambs*. **33**: 68 (1991) has shown that it is actually rather unpleasant material of *T. marginata*, and this species was refound at the same site by M.O. Hill on 28.12.2012.

Ulota crispa **31:** On an ash along the wooded streamside at Old Weston**,** TL0977, J. Shanklin, 24.3.2012, BBSUK, conf. T.L. Blockeel. First confirmed record from v.c. 31. The *Ulota crispa* aggregate has spread in Britain in response to decreasing air pollution, but *U. bruchii* is a more frequent colonist than *U. crispa sens. str.* It may be that the latter is rather under-recorded, as identification requires mature capsules but all too often they are immature.

Ulota phyllantha **31:** On an ash in plantation woodland at Hinchingbrooke Country Park, TL2271, M.O. Hill, 3.12.2011, BBSUK, conf. T.L. Blockeel. New to v.c. 31. This widespread epiphyte has been recorded in Hunts on previous occasions, but these records have not been accompanied by specimens and so the species has not hitherto been included on the official vice-comital list.

Liverworts

Cololejeunea minutissima **31:** Several small gemmiferous patches on two widely separated elms, Old Weston Grove, TL088770 and TL090770, C.D. Preston, 24.3.2012. The second record of this tiny epiphytic liverwort in v.c. 31. It is now well established in v.c. 29, so more Hunts records may well follow.

Lophozia perssonii **29:** Frequent tiny but vigorous, gemmiferous patches on newly cleared chalk soil, always with *Leiocolea turbinata* and sometimes with *Aloina aloides*, *A. ambigua*, *Didymodon fallax*, *Seligeria calcarea*, *S. calycina* and, rarely, *Pterygoneurum ovatum*, East Pit, Cherry Hinton, TL484557-484558, J.J. Graham & C.D.P., 2.3.2012 (Graham 2012). This species has clearly responded to the disturbance of the floor of the chalk pit during recent scrub-clearance works. In the dry spring of 2012 plants were most frequent in a large, shallow hollow, especially below dead *Reseda* plants.

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Invertebrate records

Louise Bacon

Hemiptera (bugs)

The striking red and black bug (*Corizus hyoscyami*) first reported here last year is now making more of a presence in the county. It was recorded at Kingston on 6th July by Iain Webb and at two locations on 5th August - Kings Dyke near Whittlesey by Joe Lynn and in an Elsworth garden by Paul Harding on *Geranium pyrenaicum* (one adult and one possible nymph).

The Western Conifer Seed Bug (*Leptoglossus occidentalis*), a non-native, was recorded in Shelford by Lucy Evans on 25th September. This invasive species was previously limited to western North America, but in the past 50 years it has increased its range in North America and in the last 10 years has become established in many European countries including the UK. It feeds on a number of trees from the pine family, with nymph feeding causing significant seed loss in commercially important crops such as Douglas Fir (*Pseudotsuga sp.*). It is a very striking bug, easy to identify and many images and a reporting mechanism are available on the internet.

Diptera, Syrphidae (Hoverflies)

A single female of the very rare Golden Hoverfly (*Callicera spinolae*) was recorded on 14th October, from the same confidential site in South Cambridgeshire as in September 2009. As is often the case with this Red Data Book species, this individual was feeding on ivy flowers. (John O'Sullivan).

Coleoptera (Beetles)

A Black Oil Beetle (*Meloe proscarabeus*) was photographed by a butterfly enthusiast (Stuart Elsom) at the Burwell cutting/Devils Dyke area in spring 2011. This species has been the focus of a survey by Buglife over the past couple of years, and all the *Meloe* species appear to be in decline. The Black Oil

Beetle is the commonest but in Cambridgeshire there are still only records from here and a couple of new localities in Fenland from the Buglife survey.

A snail-killing beetle (*Silpha laevigata*) was found in Orwell Clunch Pit by Vince Lea and Louise Bacon on 7th April whilst searching unsuccessfully for *Meloe* sp. The beetles of this group are identified by their very small, long heads, which can access snails inside their shell, hence the name! This species is found mainly in the southern half of England, and may be abundant in some areas, particularly near the coast, but scarce or absent in others, and does not appear to have been recorded in vc29 before.

Lepidoptera (Butterlies and Moths)

Whilst not a notable year for migrants or unusual species, the year was very notable by being around three weeks early for many spring species and about two weeks early for those species of later in the summer. Green Hairstreak butterflies had a very good year, and were found at new sites, including on one of the Cambridge Commons. Two beautiful butterflies of high summer, the Silver-washed Fritillary and its relative the Dark-green Fritillary both continue to increase their range in the county. The former is now to be found in many of the woodlands of the southern and western half of Cambridgeshire, and it is believed to be spreading naturally, as its spread can be tracked firstly into Potton Wood on the border and Brampton Wood and woods around Peterborough in 2006, and has spread since then, with 2010 and 2011 being significant spread years, being found for the first time in many decades in, for example Hayley, Hardwick, Eversden, Gamlingay and Waresley-Gransden woods. The Dark-green Fritillary has been observed on a few tantalisingly brief occasions over the past few years, but last year a colony has probably established itself on the Fleam Dyke – several individuals were seen together during the flight season.

Arachnida (Spiders)

The first False Widow Spider, (*Steatoda nobilis)* for the county was recorded by Ian Dawson at Waterbeach Barracks on 6th August, under the light at the guardroom. This species is not native to the UK and was accidentally introduced more than 100 years ago from the Canary and Madeira islands, probably among crates of imported fruit. It slowly established itself near the south coast, particularly in Dorset, Hampshire and Devon, and in the last 25 years has significantly increased its foothold in the UK. Sightings of the False Widow Spider continue to come from further afield, and it is likely that climate change, and the warmer winters this brings, has contributed to this spider's continued colonisation of the UK. The Wasp spider is now seen annually in a few locations, turning up at new sites each year, first reported here from Cambourne about four years ago.

Hymenoptera (Bees, Wasps and Ants)

A record from Huntingdonshire here, but a very exciting observation nonetheless. Joe Lynn recorded and photographed a Velvet Ant (*Mutilla europaea*) from Woodwalton Fen, close to the Raveley Drain on 31st July. This species has not been recorded on the site for at least 80 years, and we can find no other records of this striking insect in the county.

OBITUARIES

Robert Frost (1938 - 2012)

Robert (Bob) Frost spent his early years in Woking, but from the 1970s until the end of his life he lived in St Ives with his wife Fay. Bob was a wonderfully enthusiastic and determined naturalist with a particular passion for birds. His career in the RAF led him to live for a time in Cyprus, where he developed a keen interest in birds of the Mediterranean region. Like many natural historians, Bob was keen to keep lists of the species he had seen and to have as many as possible ticked off. A case in point was the butterflies of Britain. Bob had seen all but one species by the time his health was starting to fail. His determination was such that frailty would not prevent him from completing his list, so he arranged a special trip to Scotland with Fay to seek out the last species, the Northern Brown Argus (*Aricia artaxerxes*). And after various struggles with steep slopes, see it he did!

Ladybirds were another group that Bob developed a keen interest in. Inspired by a training weekend led by the late Michael Majerus, in 2004 Bob set out with his grandson James to seek out all of the British species. The arrival of the Harlequin Ladybird (*Harmonia axyridis*) led me to become project officer for the UK Ladybird Survey, and in 2005 Bob got in touch, to share his ladybird records. He offered to carry out regular surveys as part of a plan to monitor long term changes in ladybird species. So for five years he completed about nine surveys per year at each of three local sites, often assisted by the ever-loyal Fay. This work was used in my PhD thesis and in two peer reviewed papers (Brown et al., 2011; Roy et al., 2012). The latter helped to show a consistent pattern of decline in various ladybird species in Britain, Belgium and Switzerland.

For six or so years a small group of us worked to compile and write a national atlas of the 47 ladybird species of Britain and Ireland. Bob was a major contributor and co-author of the book (Roy et al., 2011). In addition, we persuaded Bob to take the lead on a tetrad-resolution regional atlas, a job which he accepted with his usual enthusiasm (see Frost & Brown, 2009). Six years on, after an enormous amount of work from Bob, his project is over half complete. It was a great source of frustration to him that due to his failing health, in the last year or so he could not do more survey work. We owe it to Bob to complete the project and aim to publish the atlas of ladybirds of Huntingdonshire and Cambridgeshire in due course. If anyone wishes to assist by contributing records, then please contact me on the email address below.

We will always remember Bob with great fondness. I will miss our frequent chats, which normally focused on either ladybirds or football: Bob was an avid Portsmouth fan and was delighted to attend their FA Cup Final victory at Wembley in 2008. His determination, enthusiasm, loyalty and humour will stay with us - as will the image of him bashing branches above an upturned umbrella, to catch the falling insects.

Peter Brown (petermjbrown@googlemail.com) with Helen Roy & Remy Poland

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Ronald Malcolm Payne 1922-2010

Ron was born in South London and his career was spent in the Civil Service, which he combined with a deep involvement in natural history. As a teenager, with some guidance from his botanist father, he developed interests first in entomology and then in botany. He joined the London Natural History Society in 1942 and the BSBI in 1947, and was editor of *The London Naturalist* from 1953 to 1967. His first botanical paper was published in 1960, to be followed by many more contributions to entomological and botanical literature until his death (see Adams 2012).

A particular interest in the grasses dated from 1943 when, working as a civil servant in Leicester (and serving with the Home Guard), Ron was encouraged by C.E. Hubbard to collect grasses from the Midlands for Kew. He amassed a worldwide herbarium of 4500 sheets of grasses, representing over 1750 species, which he presented to the University of Reading in 2003. Several moves during his career provided opportunities to botanise widely in the UK, from Essex to the West Country, contributing actively to local natural history societies. He also became a Fellow of the Royal Entomological Society and of the Linnean Society.

Ron retired from the civil service in 1982; he and his wife Sheila moved from Bristol to Watlington, near King's Lynn, in 1991. He then set about producing a series of detailed small Floras of precise habitats, particularly roofs and walls. Advancing years and difficulties with eyesight were not considered barriers to field study involving remote churches, dilapidated farm buildings and pillboxes, as well as river and railway banks, in several parts of East Anglia, particularly West Norfolk and the Fens. With an exacting botanical and editorial eye, his standards for his publishers were very high, and these later works were published in various places, or privately. We at *Nature in Cambridgeshire* were pleased to include his article on *The flora of walls and buildings in the Isle of Ely* in our 2005 issue (and also as an offprint).

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Jane Bulleid

BOOK REVIEWS

Ancient Trees in the Landscape: Norfolk's arboreal heritage. G. Barnes & T. Williamson. Windgather, Oxford, 2011. Paperback. 179pp. ISBN 978-1-905119-39-4. £25.

What is an ancient tree? The term is relative: an ancient oak is older than an ancient willow, just as an ancient coin implies a different date-range from an ancient car. This book deals with trees of historical significance, including that wider and larger class of *veteran* trees — trees that have dead branches, hollow trunks, and red-rotted insides, features that make the ecological importance of old trees as a habitat for other wildlife. As the authors appreciate, veteran and even ancient trees are not necessarily big trees.

Norfolk, the prime county for agricultural innovation, has a complex and unstable landscape history. It might seem an unpromising place for trees to be allowed to reach old age. But a survey over many years has brought to light some 5500 ancient and veteran trees. Barnes & Williamson's purpose is to investigate why old trees occur where they do, in some places but not others. The answer lies in the complexities of human landscape history, especially the history of pollarding, a treatment that generated veteran trees and also generated friction between landlord and tenant. A few ancient trees were venerated and had names, of which a very few survive, like the two Kett's Oaks.

Old trees can occur almost everywhere *except* in ancient woodland: by convention, woodland coppice stools, even though centuries old, do not count. Old trees are most abundant in the ancient, well-hedged landscape of south Norfolk where the innovators had least effect, but occur almost throughout Norfolk, even a few in the Breckland, Fens, and Broadland.

Medieval park trees, like those of Staverton Park in Suffolk, rarely if ever survive in Norfolk. But the authors draw attention to the savanna-like heaths, with scattered pollard trees, that were once prevalent in Norfolk. Heaths were associated with the human history of common-land. Most Norfolk heaths perished through enclosure acts and land-grabs between 1790 and 1830 (there is a surviving example in Mildenhall, Suffolk), but a large minority of their ancient trees were incorporated to give an air of respectable antiquity to new landscape parks, or lurk unnoticed among nondescript plantations.

There is a special treatment of the rows of gnarled pines that are a distinctive feature of Breckland. These turn out to be relics of a short-lived fashion for pine hedges in the 1810s.

Cambridgeshire is unlike Norfolk. Ancient landscapes and ancient hedges are rare, and enclosure-act hedges are usually later (with a few exceptions in

Huntingdonshire) and have not had time to develop veteran trees of their own. The practice of pollarding died out earlier than in Norfolk. I remember ancient pollards, mostly elms, that gave character to shrunken or deserted villages (Hardwick, Knapwell, Boxworth, Wimpole); there was even one in Cambridge bus station; ancient pollards marked the edges of woods. Nearly all these, alas, have fallen victim to Elm Disease or tidy-minded developers. A very few are left, like the Old Oak in (originally just outside) Hayley Wood. The best to be said is that a new generation of hollow veteran trees is coming on in Hayley and other woods where they escaped 19th- and 20th-century felling.

This is a well-written and well-illustrated book, with plenty of pictures showing the wonderful and bizarre shapes that ancient trees assume. I would have wished to see some discussion of how often planted (as opposed to wild) trees become veterans: an important question for future conservation. My only complaint is the practice of printing computer-generated maps with areas distinguished by colours only, without hatching or numbers. This reader's eye struggles to differentiate more than twelve colours, whereas one of the maps has 36!

Oliver Rackham

A Flora of King's Lynn. Frances Schumann & Robin Stevenson. Norfolk & Norwich Naturalists' Society Occasional Publication 13, 2011. 128 pp.; 80 colour photos. Paperback, £8.00. ISBN 10: 0-9501130-8-5. Available from www.nnns.org.uk.

This attractively presented little Flora has on its front cover a fine colour photograph of King's Lynn from the west across the River Great Ouse, with Russian Comfrey (*Symphytum* × *uplandicum*) and Cow Parsley (*Anthriscus sylvestris*) in the foreground, and on the back an aerial photograph of the area covered in the Flora. It is one more in a small eruption of accounts of the flora of towns and cities and is of special interest to me for the comparisons that can be made with the street floras of Cambridge and Aberystwyth described in *Nature in Cambridgeshire* No. 42 (Chater, Oswald & Preston, 2000) and with several works of Ron Payne (see his obituary in this issue) including his privately published booklet, *The Flora of King's Lynn* (1995), a much more modest account of the plants "found within the boundaries of the former medieval town", "an area of only 1.3 square kilometres" (pp. 7 and 32 of the book being reviewed here), and 'The Flora of Walls and Buildings in the Isle of Ely' published in *N. in C.* No. 47 in 2005, though such comparisons are outside the scope of this review.

The introductory chapters (pp. 2–32) are illustrated by well chosen colour photos with explanatory captions, usually with two to four photos per page, but two pages are wholly devoted to five photos with extended captions. Oddly, the photos of Hart's-tongue (*Asplenium scolopendrium*) and Pellitory-of-the-Wall (*Parietaria judaica*) peeping through road drainage gratings are not captioned, though this habitat is twice mentioned for the former species in the text. Eccentrically too, the contents page is at the end of the book; one wonders why it was not exchanged with the acknowledgments on p. 2.

The introduction explains that the book "lists, and comments on, those plants found growing wild within the area defined by the 25 one-kilometre squares of the National Grid which encompasses the bulk of the built-up area of King's Lynn", totalling some 800 vascular plant species. This area equates to a quarter of one of the 10-km squares standardly used for plant recording, but, as shown on p. 117, it comprises the second to the sixth squares from the west of the southern three rows in TF62 (labelled A–O) and of the northern two in TF61 (P–Y); moreover the lettering of the squares runs conveniently from left to right and down the map rather than in the familiar grid reference order.

There follow chapters entitled 'The setting' (including climate, geology and soils, history of the town and history of recording), 'Plant habitats' (divided into 'Urban and suburban', 'Freshwater', 'Estuarine', 'Woodland' and 'Rural margins'), 'Conservation' and 'Changes in the flora' (the last omitted from the contents page) before the species accounts themselves on pp. 34–110, introduced by a map of the area covered by the Flora divided into the 25 squares clearly lettered A–Y. The species are listed in alphabetical order of their scientific names from the third (2010) edition of Clive Stace's *New Flora of the British Isles* (with helpful cross-references "where very recent changes in scientific nomenclature have occurred") and the English names "used by MapMate" follow them. Each brief account is accompanied by a smaller, fainter version of the map without the lettered squares but with bold dots indicating the plant's distribution, except for "the ubiquitous (or nearly so) species, i.e. those found in 24 or 25 squares", for which the number of squares is given at the beginning of the account, and "those species occurring in fewer than four squares (or occasionally five in the case of garden escapes)", for which "the letters of the squares concerned are listed" there. This system works well.

In the brief species accounts, as indeed in the photo captions previously mentioned, the authors have often adopted an "eclectic approach, in some cases commenting on biology, in others on history, uses, or folklore", in the hope that "even a casual reader may find something of interest". I was delighted by the story of the introduction of Hoary Cress (*Lepidium draba*) to Britain "in 1809, as a result of one of the less glorious episodes of our fight against Napoleon", and by the suggestion that passing by without stealing one of the round silver 'coins' of *Lunaria annua* is "a test of your honesty", as also by the information in the caption to the photo of Japanese-lantern (*Physalis alkekengi*) that its fruits are "delicious, especially if dipped in hot chocolate which is then allowed to cool to a hard crust around the orange berry". However, Robin Stevenson has sometimes allowed his quirky sense of humour to run away with him: I could just about accept the idea that in return for our early colonisers introducing Purple-loosestrife (*Lythrum salicaria*) to America, "where it has become a serious weed of wetland areas", "the USA has given us burgers and rap music", but the inclusion of a fictional "nationally endangered plant", Sukebind (*Terrenum solacifredum*), formerly "alleged to have aphrodisiac properties", "found scrambling over the remnants of a disused woodshed" in square W, seems to me a step too far in a serious Flora in which the authors "have

concentrated on trying to get the names right, and on plotting the distribution of the plants".

Among the unexpected findings of this Flora was that Flixweed (*Descurainia sophia*), "generally counted as an agricultural weed", was "actually commoner within the urban area than in the rural margins"; similarly two very widespread weeds, Petty Spurge (*Euphorbia peplus*) and Ivy-leaved Speedwell (*Veronica hederifolia*), were not recorded in several of the most rural squares. As well as garden escapes, species included in wildflower mixtures are becoming evident in King's Lynn, for example Musk Mallow (*Malva moschata*), Sainfoin (*Onobrychis viciifolia*) and Corn Chamomile (*Anthemis arvensis*), though, perhaps surprisingly, not Kidney Vetch (*Anthyllis vulneraria*). One troublesome aquatic, New Zealand Pigmyweed (*Crassula helmsii*), was observed in a single locality, but another, Floating Pennywort (*Hydrocotyle ranunculoides*), first recorded in Britain in 1990 but now spreading apparently relentlessly in Cambridgeshire, was not found.

After the species accounts there follow a useful glossary (principally for words that are, helpfully, italicised in the text), brief details and grid references of named localities (including "botanical hotspots"), a "summary of habitats" (listing the lettered squares with their grid references and giving brief details of the habitats included and the number of species recorded in each), references cited, four brief classified bibliographies, further information about relevant organisations (with websites) and an index of English names. The last of these is one of the few weaknesses of the book, with various inconsistencies in presentation; for example, False London-rocket is listed three times, but Hybrid Black-poplar only under "Hybrid" (with "Common" added at the end of the name, though not present in the text), and Red Bartsia and Red Valerian are listed twice (the latter including a rare feature, a misprint – "Vaerian, Red"), but Red Currant and Red Goosefoot only under the second word.

The summary of habitats on p. 117 is especially instructive. The number of species recorded per square ranged from 116 in A ("Dominantly intensive arable; dykes; farm roads; shelter belts"; well below the next lowest, B, also mainly arable, with 180) to 355 in V ("River Nar and banks; railway line; industrial and retail park; cemetery; amenity grassland; dykes and waterways"). Square K ("Historic and commercial core urban; industrial; tidal banks of the Great Ouse; brownfield") held 300 species, and 14 of the 25 squares held more than 300. This pattern accords with findings elsewhere of the relative species-richness of urban areas compared with intensively managed areas of today's countryside, though this is of course partly due to garden escapes and casual occurrences of alien species.

Philip H. Oswald

Flora of Bedfordshire. C.R. Boon and A.R. Outen. Bedfordshire Natural History Society, Potton, 2011. Hardback. vi + 718 pp. ISBN 978-0-9506521-8-4. £42.50.

Bedfordshire, with an area of about 1,200 km^2 and no coastline, is the fourth smallest vice-county in England. Huntingdonshire (950 km^2) is even smaller.

Cambridgeshire (including the Isle of Ely) is 2,200 km^2, almost twice as big. Our county may have a bigger territory, but there is much for us to envy in our small neighbour. There is still some extensive chalk grassland. There are heaths and acid sandy grassland. The roadside at Honeydon with *Melampyrum cristatum* and *Ornithogalum pyrenaicum* (p. 55) is so mouth-watering that it could be in another country. In exchange, we in Cambridgeshire have more boulder-clay woods and better-preserved wetlands.

Chris Boon wrote the accounts of vascular plants (pp. 61-600). Alan Outen wrote the accounts of bryophytes (pp. 601-671). This proportion is similar to that in Dony's (1953) flora, where 31 pages are devoted to bryophytes and 270 pages to vascular plants. The new flora has thick A4 pages. It weighs 3.6 kg. Dony's flora weighs about 0.7 kg. Whether the weight of each volume is a reflection of the amount of work that went into it may be difficult to ascertain; but there is no doubt that modern authors are at an advantage because of the ease of electronic communication. This not only facilitates networking within the flora group but allows large databases to be assembled. The data can then be queried with great speed.

The new flora is comprehensive. It includes all plants recorded in the county, including species such as *Hammarbya paludosa* that vanished 200 years ago. For the rarer species, it even lists secondary sources that cited earlier works. Thus for *Spiranthes spiralis* at Knocking Hoe, we learn that there is a specimen dating from 1879. This was cited first by the finder James Saunders and subsequently by other authors in six later publications. Hawkweeds, dandelions and brambles are treated in full. Wool-shoddy casuals and planted trees are given substantial space. Introduced taxa are for the most part welcomed to the county. *Parentucellia viscosa*, introduced to Bedfordshire, was first found there in 1991. 'It may well become an attractive regular member of the county's flora'. Both it and *Impatiens glandulifera* appear as photographs as well as in the text.

John Dony (1899-1991), doyen of Bedfordshire recording, not only invented the 'DINTY' notation for tetrads, but himself published a tetrad atlas of the county's flora (1976). Both Boon and Outen have recorded tetrads in full. Thus for vascular plants there is Dony's 'first tetrad survey' (1970-1975) and the 'present survey' (1987-2006). These two surveys are mapped together, so a direct visual comparison is possible. Tetrad counts are also given at the end of the text for each species. The first tetrad map is surprising: *Ophioglossum vulgatum* has apparently increased but was not refound in half of the tetrads where it was seen in the first survey. Is it in fact a wanderer?

Bedfordshire has experienced rapid and continuing change. In Dony's (1953) flora, Sir Edward Salisbury notes drainage and industrialization as major factors. Dony made 86 habitat studies, comprising 125 individual plots in 11 broad habitat types. Fifty years later, these were revisited by Kevin Walker, whose results are set out in a chapter by Walker, Preston and Boon. Two factors, neither mentioned by Salisbury, have caused the most change: intensification of arable cropping and improvement of semi-natural grasslands. Woods have changed the least. The chalk grassland of Knocking Hoe has been sustained as

grassland, but it is impossible to agree that it has changed little between 1923 and 2006 (p. 36). In the early photo we see hard-bitten turf with much bare ground. In the later photo the turf is composed of tussocky closed grass with a substantial uneaten surplus.

The survey of bryophytes is based on records over the period 1970-2010, with most recording before 1990. This means that the tuberous mosses, which were poorly understood till the 1970s, are well covered. On the other hand, the increase of epiphytes in the past decade has produced fewer records. Even so, the process is very clear, with the formerly extinct *Orthotrichum pulchellum* and *O. tenellum* rediscovered only after 2005. There are good photographs of bryophytes as well as of vascular plants. Beautiful illustrations by Caroline Gaye were painted between 1831 and 1841. Her record of *Buxbaumia aphylla* (1840) remains the only one for the county.

As befits a comprehensive flora, there is an excellent chapter on the history of botanical recording. Geology and soils (M.J. Whiteley and T.S. Farewell), Site conservation (J. Comont) and Botanical hotspots are additional good chapters. There is a striking topographic map (p. 58) which so emphasizes the relief of the county that it appears almost mountainous.

There will not be another comprehensive flora of Bedfordshire like this one. It would weigh too much. However, Chris Boon's assertion that 'It may be that this Flora is the last to be produced in print and all future material will only be available on the internet' is surely incorrect. Future authors will have to be more selective, devoting less space to extinct casuals and individual historical records. These can be fully presented on the internet, as devotees of Gigi Crompton's *Cambridgeshire Flora Records since 1538* know well. But for now, we in the east may salute a fine local flora, the ripe fruit of 25 years' work.

Mark Hill

History & Mystery: Notes and queries from newsletters of The Society for the History of Natural history. edited by Dr Charles Nelson for the Society for the History of Natural History, 2011, 200p, ISBN 978-0-901843-09-8. Available direct from the Society. £15.

'History & Mystery' has something for everyone, some footnote to the history of natural history that will provide amusement, make an unexpected connection, revive a distant thought or stimulate a new one. 'Notes and queries from newsletters of the Society for the History of Natural History', published by the Society and edited by Dr Charles Nelson to celebrate the Society's 75th anniversary, is a volume to treasure, something to dip into at any time.

Even though the contributions inevitably postdate the 1977 inauguration of Newsletter publication, they have a pleasing whiff of antiquarianism and scholarship. They have been sorted into a wonderful diversity of topics ranging from 'Mainly About Naturalists' through 'Women in natural history', 'Mysteries!', 'Books and bibliography' to an unexpected section on 'Taxation' in relation to natural history collecting and specimens, on to the inevitable 'Memorials to

naturalists', plus lots more; some 39 topics altogether.

All this might seem a bit fusty but amongst the 200 pages lurk curious and appealing tales. The ‘Bs’ alone cover bankruptcy, Bligh of the Bounty, Bonaparte, Prince of Musignano and Canino, Bond (as in secret services); even the Broadwood Piano Company features with a connection to a 'Dr Gray of the British Museum'. I will not spoil your enjoyment by making the connections here, you can discover them for yourselves in this estimable volume. By the by, I am surprised that bankruptcy does not feature a bit more, as I am sure that it was not an uncommon aspect of the all too precarious lives of naturalists in the past.

One of my own favourite snippets concerns the subject of the very first preserved daguerreotype, taken in 1837, a man by the name of Huet, who was a fossil collector for the Museum of Natural History in Paris. Perhaps the palaeontological community should take notice and adopt Huet as representative of all the otherwise unknown collectors, professional and amateur, who helped fill our museums with all their treasures drawn from the natural world?

Many of the contributions take the form of queries, published in the hope that some member of the society or other reader might provide the answer. In his Prologue, the editor E. Charles Nelson refers back to Professor David Knight’s 1997 request for clues as to the origin of the maxim “What’s hit is history, but what’s missed is mystery”, from which the title of this wonderful book is derived. Fortunately, not all is mystery, Nelson has made the effort to find out which of the past queries were resolved and these are helpfully listed as Addenda. Nevertheless, many of the queries remain tantalizingly unanswered and hopefully will stimulate any would be sleuth to get to work.

Douglas Palmer

Weather Summary for 2011 from the Cambridge University Botanic Garden

John Kapor

JANUARY was a month of two halves rainfall wise with a total of 61.6mm making it a wetter than average month with most of the rain falling in the first 17 days and only 2.4mm after that. On the 17th 15.4mm fell, making this the wettest 24 hours. Frosts were more limited over the month with -3.1°C in the air and -8.6°C on the grass on the 29th being the coldest, and only one day when a few snow flurries fell. 13.1°C was reached on the 13th.

FEBRUARY was on the dryer side with 31.4mm being measured. This precipitation was all rain or drizzle with no snow down to sea level with us. It was a dull month and on the mild side, 14.8°C was reached on the 25th and there were 14 days with a maximum day temperature in double figures. Frosts were limited with only two air frosts, the colder of these was recorded at -2.8°C on the 1st. The month ended on a dull cool note.

MARCH was a very dry month, there had only been 0.7mm up to the 28th, then a couple of weak fronts crossed us and gave some light rain so the month's total then struggled up to 3.0mm. We have to go back to the 25th of Feb for the last appreciable rainfall. The conditions meant that for the first time, we think, the three acres of Systematic Beds were all hoed over by the end of March! The maximum temperature in March was 18.4°C on the 23rd followed by 18.2°C on the 31st. There were four air frosts with -4.2°C on the 8th being the lowest and -9.0°C on the ground during the same night.

APRIL continued the very dry theme with only 1.7mm of rainfall, lower even than the 1.9mm that fell in April 2007. In combination with March, this makes 4.7mm for the last two months. A look back through the records show that the next lowest totals for these two months are 14.0mm in 1938 and 19.1mm in 1997. In some parts of Cambridgeshire the combined March/April rainfall is the lowest for at least 163 years. We are now on 97.7mm for the first third of this year, a total boosted by a wet January.

MAY This month had a total rainfall of 16.4mm in the end, thanks mainly to the Bank Holiday Monday washout when 8.7mm fell on the 30th, the wettest day since 17th January. It was slow and steady rain, falling over several hours that will have done much more good than a short sharp burst. What has made this three month period dry spell so pronounced is that March (3.0mm) and April (1.7mm) were also extremely dry months in Cambridge, and give us a total of only 21.1mm for this usually intense period of plant growth and horticultural activity. The winds have not helped the situation by enhancing the drying process. There were several ground frosts in May and a -0.5°C in the air on the 4th.

JUNE turned out a bit wetter than average (the first month to be wetter than average since January). The rainfall total was 64.0mm, with 11.4mm falling on the 12th and 11.2mm in the thunderstorms on the 27th.The total so far this year is 178.1mm. The maximum temperature so far this year was 31.9°C on the 27th June (the hottest day since July 2006), and the 27th also saw the warmest night so far.

JULY was another dry month with less than the average rainfall. 34.5mm was measured, with three consecutive days with useful rain in the middle of the month - 14.3mm on the 16th, 7.6mm on the 17th and 6.0mm on the 18th. This helped to green things up again. The maximum temperature for the month was on the 5th when 26.4°C was reached, and by contrast the grass minimum was 4.3°C on the 30th.

AUGUST saw slightly above average rainfall with 48.9mm, the 25th and 26th were the wetter days with 8.5mm and 8.7mm. Temperature-wise the month got off to a warm start, the 3rd was the warmest with around 30°C reached, in contrast the grass minimum dropped to 3.9°C on the 19th. A large part of the month was on the cool side with quite a lot of cloud at times.

SEPTEMBER What an Indian summer!! During the week beginning 26 September, the air reaching the Garden was of a warm source and with unbroken sunshine on several days the temperatures continued to rise. Unfortunately, during this period, the Garden's maximum thermometer was not functioning

correctly, so the data used is from the roof of the main AT&T laboratory building in Cambridge, which records:

28/9/11 25.7°C: 29/9/11 28.3°C: 30/9/11 28.7°C: 1/10/11 29.1°C; 2/10/11 28.3°C: 3/10/11 27.8°C

These are exceptional temperatures for this time of year and long-standing records for individual days have been broken on numerous occasions. The rainfall total for September 2011 was only 24.9mm which is about half the average, so with this warmth and low rainfall, there are a lot of very dry autumn leaves on the ground.

OCTOBER For much of the month, October felt more like summer than autumn. The first three days of the month were exceptionally warm, the warmest being 1/10/11 when 29.1°C was reached, and even the last day of the month saw the temperature climb to 17.8°C. There was a cooler period mid month, and only 12.9°C was recorded on the 19th. It was another very dry month with only 16.9mm of rain, and most of this fell in insignificant amounts so the ground was dry to quite a significant depth. Total rainfall for the year so far was just 303.3mm, significantly below average. There was not quite an air frost on the night of 20th, since insulating cloud increased, but the grass min was -3.2°C.

NOVEMBER was another dry month with only 29.9mm of rain. It was a mild month with only one day when the maximum temperature failed to reach double figures, and a mean maximum of 13.5°C. The warmest day was on the 3rd with 17.6°C recorded, and the mildest night was 11.8°C. There was only one air frost.

DECEMBER The year ended with almost average rainfall for the month with 47.2mm falling in total. The wettest day was on the 23rd with 7.9mm. This rainfall did not manage to prevent the year from being very dry indeed with the annual total amounting to just 380.4mm, making 2011 the second driest year since 1900. It was a mild month with three days when the temperature reached 13°C and fifteen days when the maximum was in double figures; there was a brief fall of wet snow on the 16th but with mild ground temps it thawed very readily.

Plate 3. Bob Frost collecting insects. (See obituary, page 82). Photograph by Darren Frost.

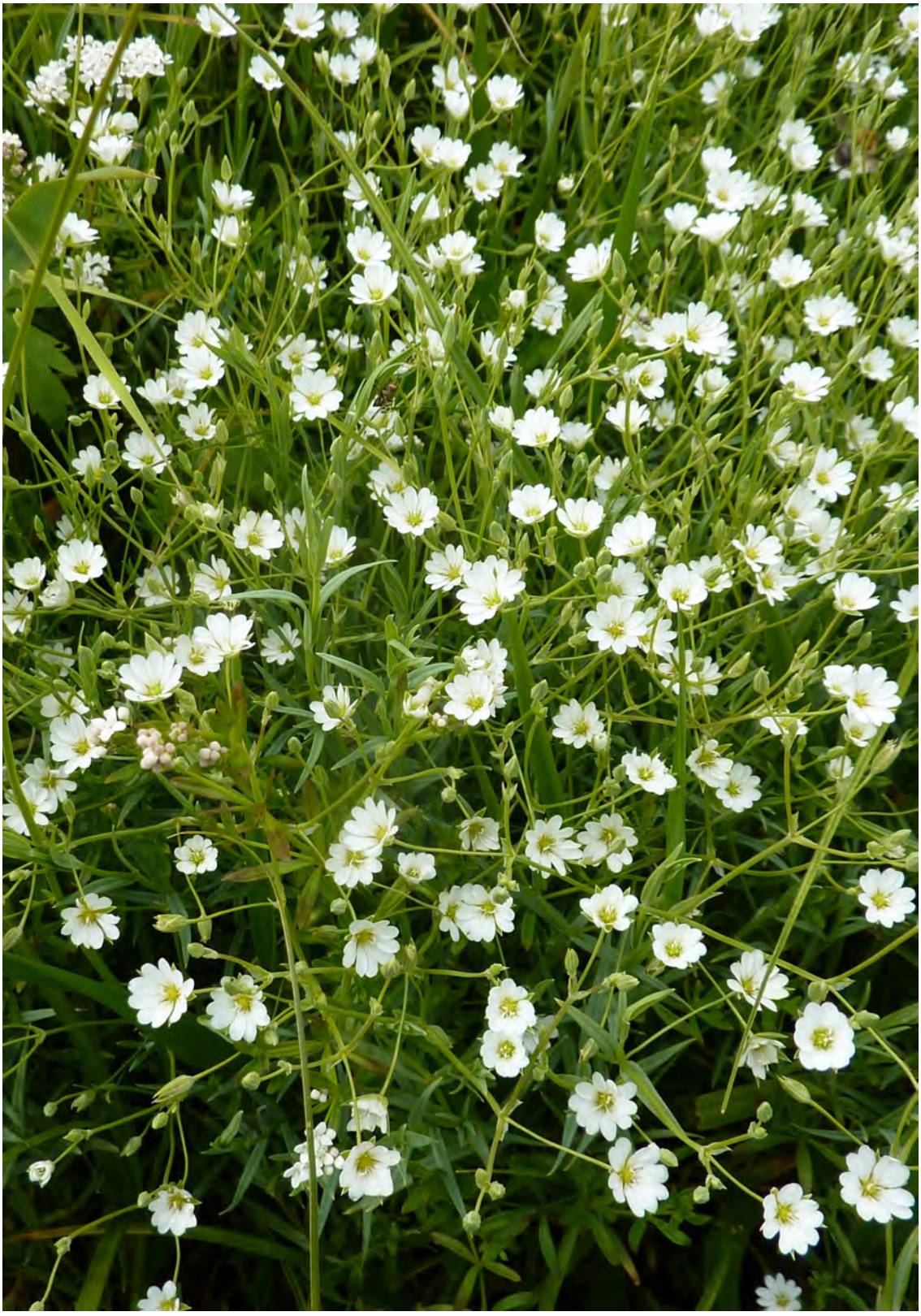

Plate 4. Marsh Stitchwort (Stellaria palustris) (See article on page11) Photograph by C. James Cadbiry