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EDITORIAL

Early in this year (2017) we learnt of the death of Hilary Belcher, one of our most regular contributors. Between 1980 and 2013 she contributed no fewer than thirty-six papers, jointly with Erica Swale, missing only six years in that period. Then, shortly before this edition went to the printers, we learnt that our last chairman, Elizabeth Platts had died. Our sympathies go to their families and friends. We expect to publish obituaries in the next issue.

Botanical subjects this year include fungi in the Cambridge Botanic Gardens, Round-fruited Rush in Cambridgeshire and lichens in Mepal.

Mammals and plants are jointly covered in a paper on the effects of Muntjac on the Early-purple Orchid in a Huntingdonshire wood.

Invertebrates are covered in a report on the beetles of the Fleam Dyke and the Silver Barred Moth at Chippenham Fen.

There are two papers on amphibians and reptiles, and one on Nightingales.

The paper on Nightingales describes a survey that relies on hearing the birds. Most natural history work relies on sight, but in a short paper Toby Carter poses an interesting question – "How does your nature smell?". That leaves only two senses, touch and taste. Some of the mycologists I know have a worrying tendency to nibble specimens in the field, often followed by violent spitting. Perhaps one day we will have a paper "How does your natural history taste?".

The regular contributions are the CNHS Survey report, Bryophyte and Vascular Plant records, plus Weather Notes from the Botanic Gardens.

Fungi in the Cambridge University Botanic Garden

Jonathan Shanklin and Henry Tribe

There are many fungi in the Botanic Garden. Most are cryptic, producing fruiting bodies during the appropriate season, when conditions are suitable. Some emerge in most years, but others may do so very rarely. Autumn is usually regarded as the season when many fungi are visible, and so the Cambridge Natural History Society (CNHS) has traditionally held Fungus Forays at this time of year. Since 2001 the CNHS has held a Foray in the Cambridge University Botanic Garden because it is a readily accessible location where members and students can gain an introduction to fungi. Henry Tribe (2004) published a paper in *Nature in Cambridgeshire* listing the species of larger fungi found during the October Forays to the Garden in the years 2001 - 2003. With a dataset collected over a longer period it is now possible to draw some conclusions about the fungi found in the Garden.

In addition to the CNHS Forays, further records are available over the period 1996 to 1999 and some additional species were also recorded by Alan Outen and others during visits around the time of the main Foray from 2005 to 2007. Many individuals have contributed to identifications. Most species of larger fungi in 1996-9 and 2006-2007 were identified by Alan Outen, those from 2001 by Jonathan Revett, in 2002 by Michael Jordan and in 2003 by Hélène Davies and Beti Evans. There are no records from the 2004 Foray. The Forays from 2008 onward have been led and fungi identified by many people including Anthony Burnham, Hélène Davies-Green, Lucy Evans, Steve Hartley, John Holden, Nick Jardine and Jonathan Shanklin. Fungus identification is not straightforward and it is highly likely that some species will have been misidentified and may appear under different names. In addition there have been many taxonomic revisions and some synonyms may have been missed. Earlier Forays often used the books by Phillips (1981) or Jordan (2004) to aid identification, whilst more recently that by Buczacki (2012) has become the standard reference. The nomenclature used therein is followed here. The correct determination of fungi often depends on the microscopic characteristics of the spores and identification in practice will depend largely on the specialist who examines them and the length of time spent on their examination. The species lists for all the Forays from 2001 onwards have been collected together and form the basis of the information in this paper.

In some years, and when possible, approximate locations for the fungi were noted using the grid system of the Botanic Garden maps. The grid on the colour map of the Garden is more or less reversed compared to the older black & white map and is to a slightly different scale. The new grid is aligned with north, whilst the old grid was aligned with Bateman Street. The original Bateman

Street entrance was in W1 of the older map, but is in C12 of the new map.

Two hundred and sixty-eight species of fungi were identified in the Forays between 2001 and 2016, with a further six prior to 2001. This total is an underestimate of those in the Garden because many species were found which remained unidentified, even to genus, especially “small brown jobs” and resupinate fungi. Visits only took place in the autumn, so fungi emerging at other times of year were not recorded. Of the species recorded since 2000, 39% (104) consisted of just a single record and 36% (96) of two records. Thus three-quarters of the species were found only once or twice. Only 27 species (10%) were recorded on six or more Forays and these are listed below. The greatest number of species recorded was 102 in 2006 (91 in 2007), when Alan Outen led the Forays and also made some additional visits. The lowest numbers were 16 in 2003 and 23 in 2016, which were both very dry autumns. The median number of species recorded was 40.

Common name	**Scientific name**	**No. years seen**
Honey Fungus	*Armillaria mellea*	9
Jelly Ear	*Auricularia auricula-judae*	9
Tripe Fungus	*Auricularia mesenterica*	6
Smoky Bracket	*Bjerkandera adusta*	8
Glistening Inkcap	*Coprinellus micaceus*	12
Magpie Inkcap	*Coprinopsis picacea*	7
Hare’sfoot Inkcap	*Coprinopsis lagopus*	8
Field Bird’s Nest	*Cyathus olla*	6
Southern Bracket	*Ganoderma australe*	11
Poisonpie	*Hebeloma crustuliniforme*	7
Veiled Poisonpie	*Hebeloma mesophaeum*	6
Sulphur Tuft	*Hypholoma fasciculare*	6
Freckled Dapperling	*Lepiota aspera*	8
Stinking Dapperling	*Lepiota cristata*	10
Clustered Domecap	*Lyophyllum decastes*	6
Common Bonnet	*Mycena galericulata*	6
Pleated Inkcap	*Parasola plicatilis*	6
Dryad's Saddle	*Polyporus squamosus*	9
Upright Coral	*Ramaria stricta*	6
Giant Elm Bracket	*Rigidoporus ulmarius*	7
Verdigris Roundhead	*Stropharia aeruginosa*	12
Lumpy Bracket	*Trametes gibbosa*	6

Turkeytail	*Trametes versicolor*	7
Scurfy Twiglet	*Tubaria furfuracea*	6
Stubble Rosegill	*Volvariella gloiocephala*	6
Candlesnuff Fungus	*Xylaria hypoxylon*	7
Dead Man's Fingers	*Xylaria polymorpha*	6

Some fungi which were seen regularly during the Forays attracted particular attention from participants, usually because of their size, colour or form:

Magpie Inkcap (*Coprinopsis picacea*) (see front cover) is an attractive black and white/pink coloured large fungus, often found growing under conifers near Hobson's Conduit by Brooklands Avenue. It was not recorded in the Garden until 2008. Although present in many subsequent years, it was not found in 2014 or 2016, the latter being a very dry autumn with poor fungal emergence. There is no obvious reason for its absence prior to 2008, as it is a distinctive species that is listed as widespread in southern England.

Field Bird's Nest (*Cyathus olla*) (Plate 1, inside front cover) and Fluted Bird's Nest (*Cyathus striatus*) (Plate 2, inside front cover)were often found on bark chippings at the margins of the New Pinetum. These small fungi, about a centimetre across, live up to their English name, complete with small "eggs" in the nest. The "eggs" are in fact peridioles, which are specialised spore bearing tissues.

Southern Bracket (*Ganoderma australe*) is extensively present on a Horse Chestnut (*Aesculus hippocastanum*) near Hobson's Conduit, coating the tree with rusty spores. This tree is adjacent to the one mentioned below.

A very large Giant Elm Bracket (*Rigidoporus ulmarius*) was for many years found on a Horse Chestnut stump near Hobson's Conduit, though in Tribe (2004) the host is given as an Elm. When measured in 2003 it was 150 centimetres across, though in decline as it consumed the stump and it was last recorded on the 2009 Foray.

Earthstars (*Geastrum* spp.) are another group that lives up to the English name, with a spherical fruiting body supported by star-like rays. Four species have been found in the Garden: Sessile Earthstar (*G. fimbriatum*) in the New Pinetum, Beaked Earthstar (*G. pectinatum*) under Black Pine (*Pinus nigra*) also in the New Pinetum, Striate Earthstar (*G. striatum*) under the Caucasian Wingnut (*Pterocarya fraxinifolia*) by the Stream Garden and Collared Earthstar (*G. triplex*).

The remains of Chicken of the Woods (*Laetiporus sulphureus*) were sometimes found on the Caucasian Wingnut, however the fungus was invariably well past its best and definitely not fit for eating. It often grows on Willow, and when freshly emerged shows a golden yellow colour and is then worth eating, though can cause an allergic reaction in some people.

Specimens of Roundheads (*Stropharia* spp.) showing the typical slimy, bluish

cap of the species were often found during the Forays. Although frequently identified as Verdigris Roundhead (*S. aeruginosa*), there is some ambiguity with the similar Blue Roundhead (*S. caerulea*) and Peppery Roundhead (*S. pseudocyanea*) because only the first is shown in Philips (1981).

Candlesnuff Fungus (*Xylaria hypoxylon*) and Dead Man's Fingers (*Xylaria polymorpha*) were seen on many Forays. The former has a white top to the antler like fungus growing a few centimetres high, whilst the latter has black "fingers" pushing up from dead wood near the soil surface.

In addition to the larger fungi, records of about 80 taxa of parasitic microfungi (rusts, mildews, and moulds) with citation of their plant habitats and also records of slime moulds (*Myxomycetes*) were collected during the Forays. Nearly all the former were determined by Alan Outen in the years 1996-9 and 2005-2007, whilst the latter were mostly determined by John Holden. None were recorded from 2001-2003 and only a few after 2008.

A spreadsheet, listing all the species found by the CNHS in the Botanic Garden, is available as online supplementary material on the Nature in Cambridgeshire web page (www.natureincambridgeshire.org/volumes/vol-59.htm), as is a one page checklist of the commonest fungi.

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Invertebrate Survey on the Fleam Dyke S.S.S.I., Cambridgeshire. IV. Beetles (Coleoptera)

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Introduction

The Fleam Dyke is a large Anglo-Saxon linear earthwork consisting of a ditch on the west side and a bank on the east. It is 5 km long and has never been cultivated. For hundreds of years the Dyke and adjacent areas were covered in chalk grassland grazed by sheep and rabbits, but sheep farming declined by the early 20th century, and the surrounding land was cultivated. After myxomatosis hit the rabbit population in the 1950s, much of the Dyke was invaded by dense scrub.

Recent and current management by the Wildlife Trust aims to selectively remove scrub and restore the chalk grassland. In 2003-4 a baseline survey of invertebrates was carried out by JPECD. All the beetles collected were identified as far as possible, and the present paper is an account of this work.

Methods

For the Invertebrate Survey, samples were taken at fixed points along the top of the bank, or along the footpath where the bank has been levelled. Three replicate samples were collected at each sampling site (map, Figure 1) and the catches combined. The sites are best described in Disney and Darlington (2014), and briefly in Kirby and Darlington (2015).

Samples were collected passively over four hours in 8 cm diameter traps containing water with a trace of detergent. These traps catch small day-flying insects efficiently, but larger insects are able to escape. The insects were then immediately preserved in 70 % alcohol. While the traps were catching, general collecting was carried out opportunistically at various sites within the survey area using nets and large water traps (dishes). Most of the beetles were caught in nets by sweeping over grass or stands of flowering herbs. On a single occasion a few were caught in pitfall traps set overnight. Collection dates for the Invertebrate Survey are given in Table 1.

Results

All identified beetles are listed in the Appendix, (which is available as online supplementary material on the Nature in Cambridgeshire web page (www.natureincambridgeshire.org/volumes/vol-59.htm) together with full collection data. The Appendix lists a total of 178 species in 31 families (Table 2) excluding the sub-family Aleocharinae (Staphilinidae), in which the species were not identified. For comparison, there were 50 species of Phoridae (Diptera) (Disney & Darlington, 2014), 52 species of leafhopper bugs (Kirby & Darlington, 2015) and 46 species of spiders (Symonds & Darlington, 2015).

Many of the species were caught or recorded only once in the survey, a total of 96 (in 11 families), which is just over half of the overall total (53.9 %); and some other species just a few times. Only a handful of species were recorded often enough to draw even tentative conclusions about their distribution in time and space.

Of the total of 31 families, only five contributed many species, namely Carabidae (19), Staphilinidae (35), Coccinellidae (10), Chrysomelidae (32) and Curculionidae 15).

Carabidae (ground beetles) are active surface predators (Forsythe, 2000), which enter the survey traps by running rather than flying. Five species were caught in pitfall traps (set only on one night) indicating that they are nocturnal predators, notably two very large species *Pterostichus madidus* and *Pt. melanarius* which

are too large to be caught in the regular survey traps. Ten species were recorded in those traps (52.6 % of the total) and of these, five were collected only once. This family is not likely to be useful in monitoring.

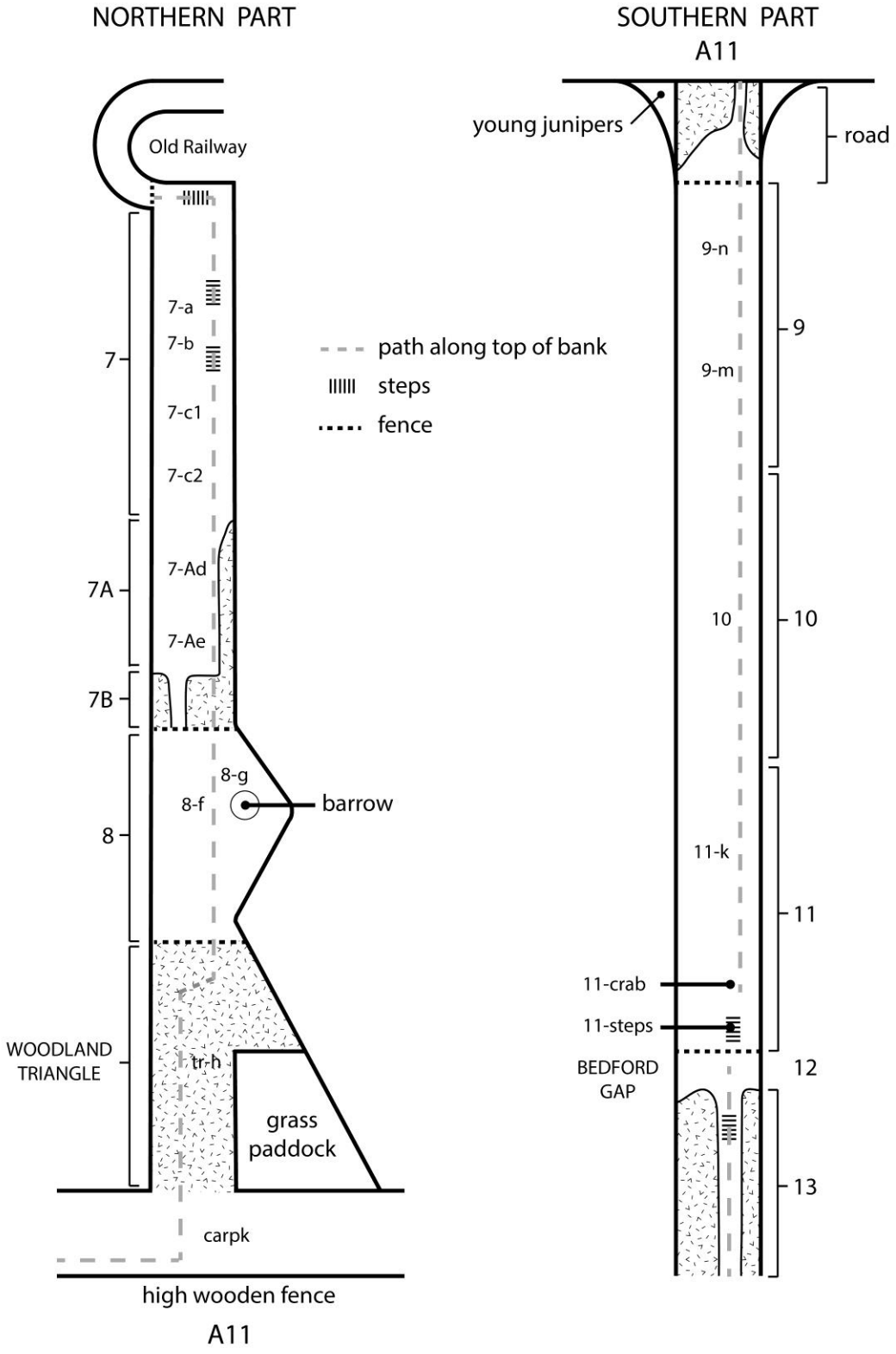

Figure 1. Schematic map of the Survey sites on the Fleam Dyke, not to scale.

Staphilinidae (rove beetles). Beetles in the large sub-family Aleocharinae were not identified to genus or species (with one exception). Their combined number of individuals (Table 3) shows them to be active from March to late May (Survey nos. 1 - 4, absent from June to mid September (nos. 5 - 9), present in small numbers in September and October (nos. 9 - 10) then absent through the winter until reappearing in late March of the following year (no. 13).

A total of 35 species was collected, of which 23 (65.7 %) were recorded only once. Thirty species were represented in the survey (85.7 %) of which 17 occurred only once (representing 56.7 % of the total). None of the species occurred in large numbers.

Coccinellidae (ladybirds) seem to have some potential for monitoring, as they are active by day, and are easy to catch by methods other than water traps and easy to identify. They are mostly carnivorous both as adults and as larvae, and some are significant biological control agents of aphids. Ten species were recorded, but all in small numbers. Their habitat preferences were listed by Majerus and Kearns (1989) as follows: Three species of diverse habitat (2-spot, 7-spot and 14-spot ladybirds), four species associated with grassland (16-spot, 22-spot, 24-spot and *Rhizobius litura*) and one associated with hedgerows (10-spot). However, the remaining two species (Eyed Ladybird, Pine Ladybird) prefer conifer woodland, which does not occur nearby, indicating high mobility. The survey was made before the invasion of the exotic Harlequin Ladybird *Harmonia axyridi*s (Pallas) which is likely to have disrupted the ladybird fauna in that area.

Chrysomelidae (leaf beetles; including flea beetles, which are able to jump as well as fly). Adults eat the leaves of herbs, and are more or less specific as to food plants, including some crops. The larval stages eat plant roots, or in a few cases feed as leaf-miners. With a total of 32 species exploiting a variety of food plants, some of them with very narrow food preferences, this might seem to be the best place to look for possible species to monitor the vegetation. However, identification is laborious, and it would be much easier to monitor the vegetation itself on a regular basis.

Of the 32 beetles listed, 12 (37.5 %) belong in the genus *Longitarsus*, nine in the genus *Phyllotreta* (28.7 %) and three in *Psylliodes* (9.4 %), a combined total of 24 (75 %).

The most abundant species in the whole survey was *Longitarsus dorsalis*, which is widespread but very local in SE England. It is easy to identify, being blackish with a yellow stripe along the outer edge of each elytron, and a yellow thorax. Its distribution within the Invertebrate Survey (Table 4) shows it to be active from March to late May (Survey nos. 1-4), absent in the summer, reappearing briefly in mid-December (no. 11). In February 2004 (no. 12) it was again abundant, but all the beetles caught were teneral, meaning they had only

just emerged, having overwintered as larvae or pupae. By the end of March (no. 13) only a few were teneral, so the peak of emergence had passed. No other beetle species showed such an early emergence.

Curculionidae (weevils) had a total of 15 species consisting of three *Ceutorhynchus*, four *Phyllobius* and three *Sitona*, all other genera contributinging only one species. The only species that was well represented in number of individual beetles was *Phyllobius argentatus*, a large species that was mostly caught in nets. Weevils are plant feeders (Morris, 1991) and like the Chrysomelidae they are associated with particular food plants, but the numbers of samples do not look hopeful for monitoring. Water traps may not be the best method of catching weevils. Vacuum sampling over short, herb-rich vegetation would probably be more productive.

Discussion

The beetle fauna revealed by the Invertebrate Survey was species-rich, but only a few species were abundant. None of the species were of great note or rarity, but reflected the varied habitats occurring along the Dyke, and the great variety of food plants available there. Only one species, *Longitarsus dorsalis*, seems to be associated with calcareous soils. This species has some potential for monitoring as it is easy to catch and to identify, but it may disperse too far and too fast to represent the ecology and flora of the Fleam Dyke itself.

Because of the varied environment, and the selectivity of the sampling methods (aimed at small, active insects), the actual numbers of beetles caught in the Invertebrate Survey are significant only as indicators of relative abundance, and of activity at different times of year (e.g. Tables 3 & 4).

Acknowledgments

Permission to collect in the S.S.S.I. was obtained from English Nature through the good offices of Donna Radley, who also assisted in obtaining the consent of the landowners. Russell Stebbings of the University Museum of Zoology, Cambridge, kindly carried out Survey 10 on 11 October 2003 while JPECD was away.

Beetles of the family Carabidae were kindly identified by Brian Eversham. All the rest were identified or confirmed by A.B. Drane.

Table 2. List of families of beetles collected on the Fleam Dyke during the Invertebrate Survey in 2003-04, and on some other dates; arranged in the order used in Duff (2012). Number of species recorded in each family. Number of species recorded only once, and %of total. Number of species recorded in the Invertebrate Survey, and % of total.

Name of family	No. of species recorded in the family	No. of species recorded only once		No. of species recorded in the Survey	
Carabidae	**19**	**13**	**68.4 %**	**11**	**57.9 %**
Helophoridae	**1**	**1**		**1**	
Leiodidae	**2**	**0**		**2**	
Silphidae	**2**	**1**		**2**	
Staphilinidae	**35**	**23**	**65.7 %**	**30**	**85.7 %**
Lucanidae	**1**	**1**		**0**	
Scarabaeidae	**5**	**2**		**4**	
Dascillidae	**1**	**1**		**1**	
Byrrhidae	**1**	**1**		**0**	
Elateridae	**5**	**1**		**4**	
Cantharidae	**4**	**2**		**2**	
Ptinidae	**1**	**1**		**1**	
Malachiidae	**1**	**1**		**0**	
Kateretidae	**2**	**0**		**2**	
Nitidulidae	**7**	**5**		**5**	
Phalacridae	**1**	**1**		**0**	
Cryptophagidae	**7**	**3**		**5**	
Byturidae	**2**	**2**		**0**	
Coccinellidae	**10**	**4**	**40 %**	**5**	**50 %**
Corylophidae	**1**	**1**		**1**	
Latridiidae	**6**	**3**		**5**	
Mordellidae	**1**	**?**		**?**	
Tenebrionidae	**2**	**1**		**2**	
Oedemeridae	**2**	**0**		**2**	
Pyrochroidae	**2**	**1**		**2**	
Salpingidae	**1**	**1**		**1**	
Scraptidae	**3**	**1**		**0**	
Cerambycidae	**4**	**3**		**0**	
Chrysomelidae	**32**	**14**	**43.8 %**	**27**	**84.4 %**
Apionidae	**2**	**1**		**1**	
Curculionidae	**15**	**7**	**46.7 %**	**12**	**80 %**
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Total no.	**178**	**96**	**53.9 %**	**127**	**71.9 %**

Table 3. Total numbers of beetles in the family Staphilinidae, sub-family Aleocharinae, not identified to genus or species, collected in the Invertebrate Survey. Columns are the sampling sites along the Dyke, with the Northern Part above and the Southern Part below. Rows contain Survey numbers in bold (for corresponding dates see Table 1) followed by the total numbers of beetles collected at each site, and overall.

Northern Part

	7-a	7-b	7-c1	7-c2	7A-d	7A-e	8-g	8-f	tr-h	carpk	Sum
1	-	-	-	/	-	-	-	-	1	-	1
2	-	-	-	/	-	-	-	1	-	-	1
3	3	-	-	/	-	-	8	6	5	-	22
4	1	-	1	-	-	-	-	2	6	-	10
5	-	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-	-
7	-	-	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	2	-	2
11	-	-	-	-	-	-	-	-	-	-	-
12	-	-	-	-	-	-	-	-	-	-	-
13	-	-	-	-	-	-	1	2	2	1	6
14	-	-	-	-	-	-	-	-	-	-	-

Totals	4	-	1	-	-	-	9	11	16	1	42

Southern Part

	road	9-n	9-m	10	11-k	11-crab	11steps	12	13	Sum
1	-	2	-	-	1	-	-	-	-	3
2	-	-	-	-	-	-	-	-	-	-
3	-	1	1	1	5	-	-	2	1	11
4	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
7	-	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-	-
9	1	-	-	-	-	-	-	-	1	2
10	1	1	-	-	-	1	-	2	-	5
11	-	-	-	-	-	-	-	-	-	-
12	-	-	-	-	-	-	-	-	-	-
13	2	4	6	2	-	1	-	-	1	16
14	-	-	-	-	-	-	-	-	-	-

Totals	4	8	7	3	6	2	-	5	3	38

Combined total										80

Table 4. Total numbers of *Longitarsus dorsalis* (Fabricius) (Chrysomelidae) collected in the Invertebrate Survey. Columns are the sampling sites along the Dyke, with the Northern Part above and the Southern Part below. Rows contain Survey numbers in bold (for corresponding dates see Table 1) followed by the total numbers of beetles collected at each site, and overall.

Northern Part

	7-a	7-b	7-c1	7-c2	7A-d	7A-e	8-g	8-f	tr-h	carpk	Sum
1	-	1	-	/	2	3	-	-	2	-	8
2	-	1	-	/	-	-	-	-	-	-	1
3	-	-	-	/	-	-	-	-	-	-	-
4	-	-	-	-	1	-	-	-	-	-	1
5	-	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-	-
7	-	-	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-	-
11	-	-	1	-	-	9	5	1	-	-	16
12	1	1	-	-	-	-	2	-	-	1 all teneral	5
13	-	1	1	-	1	1	-	1	2	4	11
14	-	-	-	-	1	-	-	-	-	-	1

Totals	1	4	2	-	5	13	7	2	4	5	43

Southern Part

	road	9-n	9-m	10	11-k	11-crab	11steps	12	13	Sum
1	-	1	1	-	-	-	-	1	-	3
2	-	-	-	1	1	-	-	-	1	3
3	-	-	-	-	-	-	-	-	-	-
4	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
7	-	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-
11	42	2	3	4	1	5	1	-	1	59
12	10	5	1	1	2	1	-	-	1 all teneral	21
13	17	2	1	1	1	2	-	1	1 3 teneral	26
14	-	-	-	-	-	2	-	-	-	2

Totals	69	10	6	7	5	10	1	2	4	114

Combined total										157

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Silver Barred Moth (*Deltote bankiana*) at Chippenham Fen

Michael Taylor

The Silver Barred is a rare moth in the British Isles (RDB3) inhabiting fens, marshes and peat bogs. It has a very restricted resident distribution, being found on Chippenham Fen and Wicken Fen in Cambridgeshire, and more recently on a small coastal marsh near Sandwich, Kent, with another colony near Dover. It is also known from Co. Kerry and Co. Cork, Ireland. During the 19th century it was found more widely on the wetlands of Huntingdonshire, Cambridgeshire and counties of south and east England, which may lead to short-lived colonies lasting one or two years.

History at Chippenham Fen

The moth was first recorded at Chippenham Fen in 1882, and from the little information available on population numbers from that time it appears to have been abundant. The Natural History of Cambridgeshire (Marr & Shipley 1904) gives *Bankia argentula* as it was then known as abundant at Chippenham but not so plentiful at Wicken. There is a suggestion that stock from Chippenham may have been used to introduce the insect to Wicken Fen (repeated in Heath & Emmet 1983), or more likely to boost the Wicken population, in the late 19th century/early 20th century. The Victoria County History (VCH) (Salzman 1938) states that it has been generally supposed that more recent (up to 1930) Wicken records are the result of introductions from Chippenham Fen by Solomon Bailey of Wicken. As records from the VCH give known records from Wicken prior to its discovery at Chippenham, citing Miller & Skertchly 1878, it is

clearly a boosting rather than an introduction there. It is reasonable to assume that it was present in much of the mid-19th century fens and Norfolk broads and was collected from the most famous sites during that period.

The first record on the CPERC database is from 1927, and the species has been recorded regularly since then, remaining very common at least until the 1960s. A report in Nature in Cambridgeshire (Anon., 1964) of a field meeting at Chippenham on 7th July 1963 noted that 'well over 100 specimens' were seen on the day. This is the year that the Fen was declared a National Nature Reserve by the Nature Conservancy, and at that time the reserve had considerably more woodland cover than it has today.

Natural England has numerous paper files relating to moth trapping on the Fen in the period 1970-1999 – unfortunately most are in the form of a simple species list, with no indication of numbers recorded or even the location of traps. However, the few that do contain this information are interesting, particularly in terms of changing abundance and distribution. In 1977, R.L. Harvey trapped for four consecutive nights (16-20 July, near the end of the flight period) in the central part of the fen (TL649693) and recorded 150+ Silver Barred. This is notable in that in another correspondence from that year, he states that the best and most reliable site on the fen is north of the Chippenham river, on the north meadows.

There have been no post-2000 records from Chippenham at all. In 1986, Ken Barton recorded a 'good number' while trapping near the reserve entrance. However, in 1987 Paul Waring only caught a single specimen during four nights trapping in July. In 1988 a letter from Paul Waring confirms the earlier view of R.L. Harvey that the north meadows are the most reliable site on the fen for the species. On 24 May 1989 Stephen Grimshaw reported flushing 18 Silver Barred along Pigeon and Baxter East rides (adjacent to current stronghold) in the afternoon – this would be early in the flight period. Finally, English Nature estate worker James Searle carried out a considerable amount of light trapping at various sites around the fen throughout 1999. He recorded Silver Barred in similar numbers and with a similar distribution to the current situation.

Since 2000 Silver Barred has continued to be regularly recorded at Chippenham, but there seems to have been a decline in numbers since the 20th century. In 2003 Kevin Warrington, then the English Nature reserve manager for the Fen set up a monitoring transect for the species, and this has continued until the present day.

Silver Barred at Chippenham 2000-present

The transect allows for the population to be monitored closely year-on-year in a systematic manner. A set route, divided into five sections, is walked weekly during the flight period, along the lines of a UKBMS butterfly transect, recording the individuals seen within a 5m cube around the observer. The moth is readily disturbed during the daytime, but generally only flies a short distance. All moths seen on each transect section are recorded.

The first transect is walked when the first moths have been seen – this can vary from year to year, between May 3rd and June 6th, with a mean date of May

21st. The last dates for sightings also varies considerably, between June 27th and July 22nd, with a mean of July 11th. The most moths seen on a single transect is 20, on 11th June 2014. Annual peak counts and dates are shown below:

year	Emergence	Peak count	Date	Total flight period (days)
2003	May 6	1	13/7/03	69
2004	May 16	4	9/6/04	59
2005	May 25	4	8/6/05	51
2006	Jun 6	1	6/6/06	36
2009	May 21	6	15/6/09	26 (incomplete data)
2010	May 24	11	7/6/10	45
2011	May 3	12	14/6/11	59
2012	May 22	11	26/6/12	60
2013	Jun 4	14	26/6/13	43
2014	May 16	20	11/06/14	53
2015	May 22	16	6/7/15	62
2016	May 23	12	14/06/16	36

The chart below shows the abundance index (total moths seen divided by number of transect walks) for Silver Barred at Chippenham between 2003 and 2016 (nb data for 2007 and 2008 have been lost)

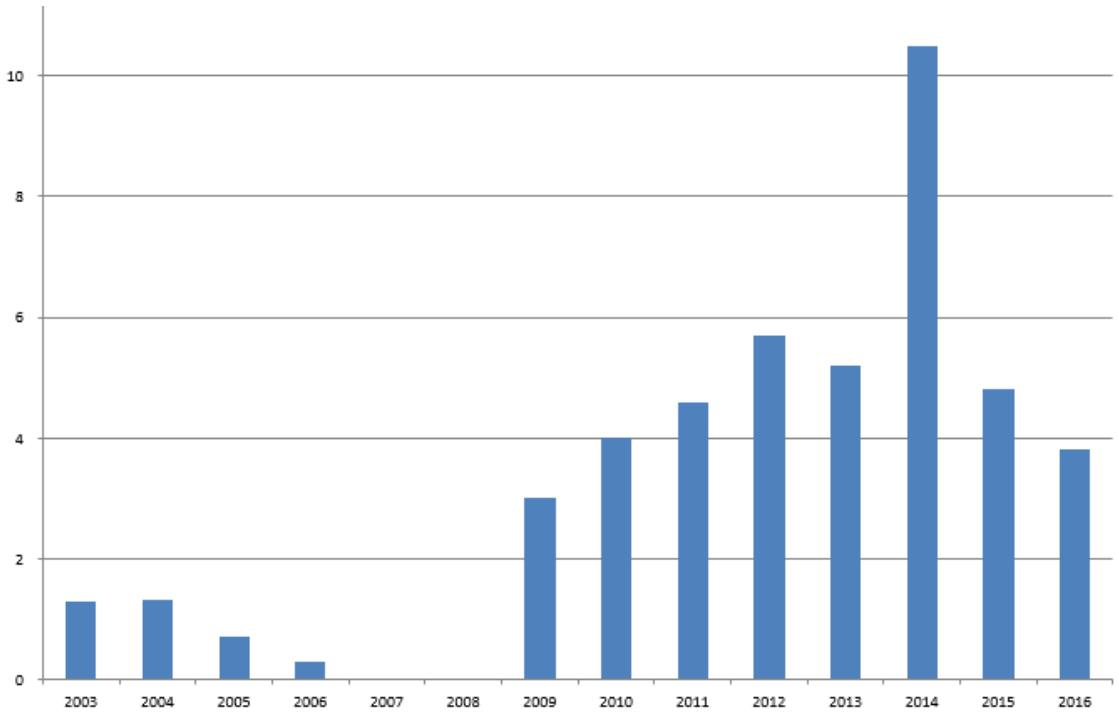

Fig. 1 Abundance index (from transect data) for Chippenham

As can be seen, numbers vary considerably from year to year, but overall since 2009 the population appears relatively stable, albeit at a much lower level than a century earlier, but with an apparent increase on the counts of 2003-6.

In addition, the Cambridge Moth Group, led by Louise Bacon and Vince Lea, carried out extensive light trapping at a number of locations on the fen in the period 2012-14. Traps in or near the current stronghold during the flight period recorded the species in small numbers. Trapping dates of 20/6/2012 and 25/7/2012 resulted in two and one individuals at Baxter East and the main crossroads respectively. Sessions on 12/7/2013 and 3/7/2014 had individuals at the same locations, no numbers were logged.

Notes on the ecology and distribution of silver barred at Chippenham

Currently the species has a rather restricted distribution on the Fen, as shown on a map (Fig. 2) of 2013 sightings (typical of recent years). The larval foodplants used on the Fen are not known, but on the continent Purple Moor-grass (*Molinia caerulea*), Smooth Meadow-grass (*Poa pratensis*) and Tufted Hair-grass (*Deschampsia cespitosa*) are known to be used. In addition the BRC insect larval host plant website also cites *Glyceria maxima* as larval foodplant. Most of these species are widespread at Chippenham, and so availability of foodplant alone does not appear to explain the moths restricted distribution. It is likely that this and other restricted species actually have microhabitat or climatic requirements which restrict their range within wider extents of common, available foodplants for larvae.

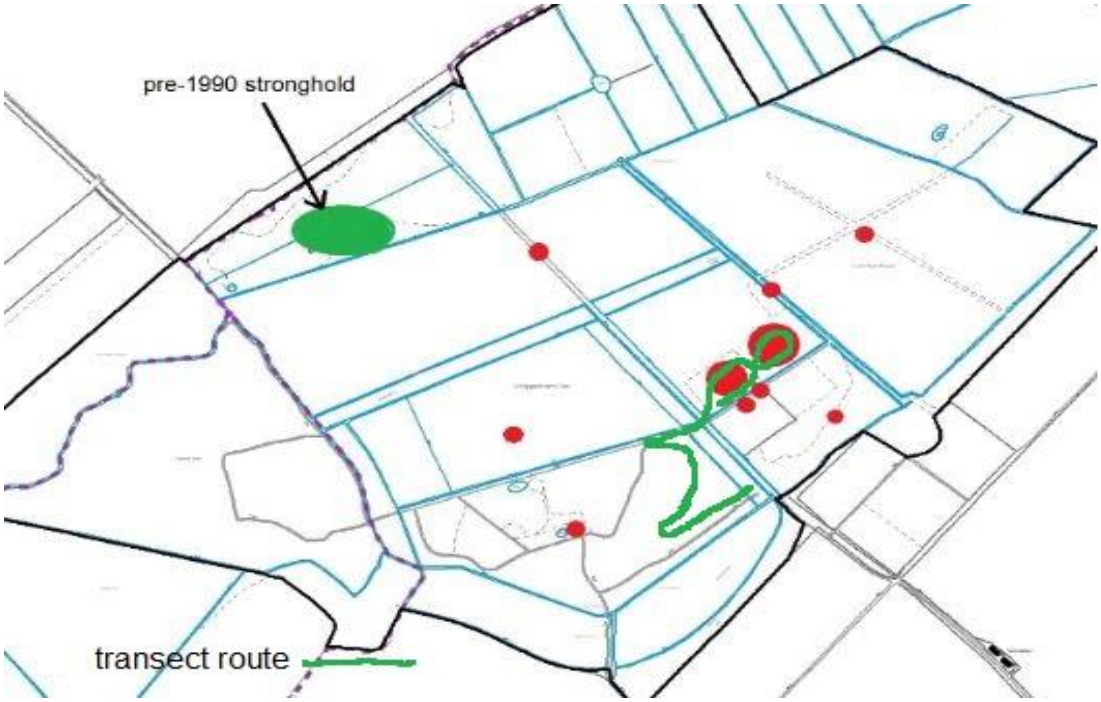

Fig. 2 Sightings of Silver Barred in 2013

The core of the Silver Barred population at Chippenham now is in an area of fen dominated by *Molinia* and Blunt flowered rush (*Juncus subnodulosus*), with some Reed (*Phragmites australis*) and Sedge (*Carex* spp). Since their arrival in 2001, this area has been solely managed by water buffalo grazing, usually for relatively short periods between July and September. Angrave (2015) surveyed the vegetation composition and structure in this area and found that it was characterised by the frequency and size of *Molinia* tussocks – unlike many other parts of the fen that are under different management regimes.

Discussion

From the, albeit scant, information available it seems safe to conclude that the species has declined in abundance significantly at Chippenham since 1980. This is in contrast to some other grass feeding lepidoptera – for example the Ringlet (*Aphantopus hyperantus*) is increasingly common. Also, there appear to be major fluctuations in the Silver Barred population from year to year. Further, it seems to have completely disappeared from its former stronghold on the fen, the north meadows.

One can only speculate on the factors affecting the moth population on the Fen. Increasingly unpredictable weather patterns, with a higher incidence of extreme events (for example drought conditions in the mid 1990s and the very wet year in 2012) may have had an impact on microclimates within the Fen. Changes in water levels, either through natural events or by manipulation of water control structures in the ditches, could also have had an effect.

Since Chippenham became a National Nature Reserve in 1963 management could also have had a significant impact, both positive and negative. Particularly since the 1990s there have been some major changes, notably increasingly mechanised cutting of fen vegetation, the re-introduction of grazing in the heart of the fen and major tree removal projects which have reduced woodland cover from nearly 70% to about 35% currently. One may have thought that increasing the area of open fen would be beneficial for Silver Barred by providing a greater extent of suitable habitat, richer in potential food-plants, as well as making it easier to survey such areas. To date this has not obviously been the case, possibly indicating the subtlety of Silver Barred habitat requirements.

Perhaps the most puzzling aspect of the history of the moth at Chippenham is the recent total disappearance from its former stronghold on the north meadows. We have little information on the management of these meadows pre-1960, but it is assumed that they were grazed, open meadows for a considerable length of time previously. In the 1970s the meadows were primarily cattle grazed, but during the 1980s and 1990s, as well as being grazed the meadows were frequently cut for hay, often on an annual basis. It seems possible that such frequent cutting might be unfavourable for the species in that it would prevent the formation of a tussocky vegetation structure – a structure apparently favoured by Silver Barred, at least as suggested by the current distribution on the fen. Also, frequent cutting may have favoured the proliferation of Blunt flowered rush on the meadows, at the expense of potential food-plant species.

Clearly, there is considerable scope for further study into the ecology of the Silver Barred moth at Chippenham Fen, and the management techniques that may best suit it.

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The arrival of Willow Emerald Damselfly (*Chalcolestes viridis*) in Cambridgeshire

Val Perrin, British Dragonfly Society Recorder

The Willow Emerald Damselfly (*Chalcolestes viridis*) (Plate 3, inside back cover) is a member of the Lestidae family of damselflies with a Western Palearctic distribution. On the near-continent it is also known as Western Willow Spreadwing. In this country the two longstanding resident Lestid species are the Emerald Damselfly (*Lestes sponsa*), which is widely distributed throughout the British Isles, but varies in numbers between sites, and the Scarce Emerald Damselfly (*L. dryas*), which is restricted to inland sites in western Norfolk and Suffolk, around the Thames estuary in Essex and Kent and western Ireland. Since 2002 a third *Lestes* species, the Southern Emerald Damselfly (*L. barbarus*), has been recorded most years in low numbers at Winterton Dunes on the Norfolk coast and at Cliffe Marshes in Kent.

Found throughout most of mainland Europe, the Willow Emerald has also been known from Jersey in the Channel Islands since the early 1940s, so that with a warming climate it was to be expected that it would at some time be found in England. The first confirmed adult Willow Emerald was in fact recorded in 1979 near Pevensey in East Sussex, although a single exuvia collected at Cliffe Marshes, Kent in 1992 was later identified as this species. However, no adults were observed at this site then or subsequently. More

recently a single adult female Willow Emerald was discovered near the Suffolk coast at Trimley in August 2007, but no further sightings were reported that year or the following year, apart from a probable record that has subsequently come to light from Flatford, on the Suffolk/Essex border. These records were however the forerunners of successful colonisation of this country, as many hundreds of individuals were then seen in 2009 in southeast Suffolk and nearby parts of northeast Essex. Included among these were records of teneral insects suggesting successful breeding here. The paucity of records in the previous year was probably due to the fact that this damselfly spends much time high up in trees, not a usual habitat searched for Odonata, and it was therefore probably overlooked. In 2009 there was a single record from Strumpshaw Fen in east Norfolk and in the years since then the Willow Emerald has continued to expand its range.

It was in early August 2012 that a report on a bird newsline mentioned a Willow Emerald in Cambridgeshire, on the Ouse Washes south of Sutton Gault. Despite searches here by the author shortly afterwards and again in late summer 2014, this record could not be confirmed. Searches at suitable habitat in one or two other wetland sites in the county in 2013 and 2014 failed to turn up any specimens, but in 2015 Bill Mansfield reported that he had found and photographed a single Willow Emerald at Roswell Pits, Ely on 12th September 2014. This was the first confirmed Cambridgeshire record.

In 2015, records of single Willow Emeralds came from three locations: a garden in Over in August, from Adams Road NR in Cambridge in September and East Barnwell NR, also in Cambridge, on several dates in September and October. Up to 10 were reported at Roswell Pits, but no formal record of these has been submitted to the British Dragonfly Society.

The next year (2016) saw a rapid increase in sightings of Willow Emeralds throughout Cambridgeshire. Rob Partridge visited Roswell Pits in February and found the characteristic oviposition scars on Crack Willow and Ash twigs overhanging water (Plate 4, inside back cover). Adults were seen from August to mid October, at 10 locations across the county. Breeding was recorded at five of these. The largest aggregation was seen at Quy Water near Anglesey Abbey with eight pairs and other males seen in September and 18 individuals in mid October, and this area clearly had a significant population as individuals were also seen at nearby Quy Fen. Oviposition was in an overhanging Ash tree, and the characteristic oviposition scars were clearly visible through binoculars 2-3m above the water. Ovipositing and/or mating pairs were also seen at Wicken Fen (two pairs 18th September), at a garden pond in Cardinal's Green, Horseheath on 20th September, where a dozen individuals were present through to mid October and two pairs at East Barnwell LNR in Cambridge on 15th September. A pair ovipositing was also seen at the Hampton Froglife reserve on 28th September. The other sites had fewer individuals recorded, but within the same date span. At Roswell Pits, up to five were seen between 15 and 28th August, three on the River Nene (Old Course), March on 9th October, and individuals were seen at Kings Dyke NR, Whittlesey on August 29th, Cambridge Botanic Gardens on 26th August and 28th September (three), and Woodwalton Fen on 2nd

October. The latest record was of a single individual at Wicken Fen on 30th October.

The habitats used by the Willow Emerald Damselfly are ponds, lakes and slow-flowing rivers where bordering trees and shrubs overhang the water. This is essential as the eggs are inserted directly, in pairs, either side of a central incision, below the bark of suitable branches. Although willows are frequently used, a wide range of other soft-barked trees and plants have been utilised. These oviposition scars persist for long periods and can be a useful clue to the presence of the species. Following egg hatching in spring the prolarva exits the plant tissue and drops into the water below. Larval development comprises 10-13 stadia (or instars) and lasts approximately 60 days. The larvae live among submerged vegetation and plant debris on the bottom of the water body. Adults emerge 2-3 months after the eggs hatch when larvae crawl up marginal vegetation, often within 40 cm of the water surface. Larvae are able to delay emergence if weather conditions become unfavourable and can also select emergence supports that offer some protection from rain. The adult damselflies are unusual amongst British damselflies, spending most of their time high up in trees, perching on exposed sunny areas, often bare twig ends, but also descend to bask on adjacent tall bankside vegetation. Adult damselflies rest with their wings part-open, as do most other Lestids. Males are territorial and defend vertical territories in trees slightly back from the water's edge while awaiting the arrival of females. After mating, oviposition takes place while still in tandem.

The flight season in this country starts in late June and lasts to early November, although peak flight times are mid-August to late September.

Elsewhere in the country, by 2016 Willow Emeralds had been recorded in Kent, Bedfordshire, Hertfordshire, Northamptonshire, Buckinghamshire and even West Sussex, so the species is clearly extending its range. It appears that this very welcome addition to Cambridgeshire's dragonfly fauna is here to stay.

Round-fruited Rush (*Juncus compressus*) at the Ouse Washes and elsewhere in Cambridgeshire

C. James Cadbury

Identification

Round-fruited Rush (*Juncus compressus*) is similar to Saltmarsh Rush (*J. gerardii*) but is best distinguished by the fruit. In Round-fruited Rush the capsule is rounded at the apex and protrudes beyond the light-brown, blunt tepals. In Saltmarsh Rush the subacute capsule scarcely exceeds the dark-brown, fairly acute tepals. A diagnostic feature is the anthers, which are 0.5-1.0mm, one or two times as long as the filaments in Round-fruited Rush, whereas they are 1-2mm and two to three times as long as the filaments in

Saltmarsh Rush (Stace 2010). Both species have grooved leaves that are gutter-like in cross section.

Status in Britain and Ireland

Round-fruited Rush may occur near the coast but grows in freshwater marshes, though it is tolerant of brackish conditions. In the *New Atlas* (Preston *et al.* 2002) it was recorded in 170 ten kilometre squares in Britain and only one in Ireland. The species is considered Vulnerable on account of a 34% decline in Area of Occupancy (Stroh *et al.* 2014). The BSBI included it in its Threatened Plant monitoring programme in 2011. Saltmarsh Rush is much more widespread, essentially a species of upper saltmarsh on the coast but also occurring in saline sites inland. In the *New Atlas* (Preston *et al.* 2002) it was recorded all around the coast, in 767 ten kilometre squares in Britain and 219 in Ireland.

Status of Round-fruited Rush at the Ouse Washes

A comprehensive survey was carried out at the Ouse Washes in 1992 (Cadbury, Halshaw & Tidswell, 1993) and an incomplete one in 2001 (Cadbury, Prosser & Wallace, 2001; Cadbury, 2003). This rush has been recorded from 24 monads (1-km. squares) between Earith at the south-west end and the Welney road on the north-east boundary of Cambridgeshire (vc29) that encompasses three 10-km. squares. A further five monads in one 10-km. square lie between the Welney road and Welmore in West Norfolk (vc28). The 24 monads represent 69% of the total 35 in the Cambridgeshire part of the Ouse Washes. There was only one monad with Round-fruited Rush in the Earith-Mepal section (Tables 1 and 2).

Ecology of Round-fruited Rush at the Ouse Washes

Most of the sites were beside ditches, but not on their banks, along tracks trampled by cattle or worn by the wheels of quad-bikes used by RSPB staff. In such situations the rush was often abundant. The upper, less flooded parts of the washes were favoured, though these areas are often inundated for periods in winter and early spring.

Distribution of Round-fruited Rush elsewhere in Cambridgeshire

Away from the Ouse Washes this rush has been recorded at 20 sites in 12 10-km. squares in vc29. The main locations are at Wicken Fen, Wicken and Kingfishers Bridge (five sites, TL56 and 57), in the vicinity of the Nene Washes including Bassenhally Pit (three sites, TL29, 30 and 39) and around Cambridge (six sites, TL44, 45 and 46), Table 3.

In West Norfolk (vc28) away from the Ouse Washes it has been recorded at only a very few sites (Beckett & Bull 1999). In West Suffolk (vc26) there are no recent records and only a thin scatter in East Suffolk (vc25) (Sanford & Fisk 2010).

Saltmarsh Rush occurs on Cambridgeshire's one saltmarsh at Foul Anchor on the River Nene, and a brackish seepage in the river's bank further upstream.

It was identified at a freshwater site SW of Guyhirn at the Nene Washes (TF389023) by A.C. Leslie in 2010.

Importance of the Ouse Washes

The Ouse Washes supports nationally important populations which may be the largest in Britain of three other vascular plant species besides Round-fruited Rush: Greater Water-parsnip (*Sium latifolium*) which is Endangered (Cadbury 2008), Tasteless Water-pepper (*Persicaria mitis*) (Cadbury 2011) and the Marsh Stitchwort (*Stellaria palustris*) (Cadbury 2012), both of which are Vulnerable.

Acknowledgments

Tim Barfield, Louise Halshaw, David Soden and Richard Tidswell are acknowledged for the very considerable efforts they put into the 1992 survey of ditches at the Ouse Washes. Likewise Mike Prosser and Hilary Wallace made a particularly thorough contribution to the field work, analysis and report for the 2001 survey. English Nature, the RSPB and the Wildfowl and Wetlands Trust all provided major support to the ditch surveys. Staff at the RSPB and Wildfowl and Wetlands Reserves at the Ouse Washes did much to facilitate the botanical survey. I am much indebted to Alan Leslie who contributed a number of records of Round-fruited Rush for sites away from the Ouse Washes. Elizabeth Green kindly typed the manuscript.

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Table 1

Monads with Round-fruited Rush at the Ouse Washes

		Total monads	**Monads with *Round-fruited Rush***
vc29	Earith – Mepal	9	1
	Mepal – Welches Dam	9	7
	Welches Dam – Pymore Viaduct	7	6
	Pymore Viaduct – Norfolk border*	7	7
	Norfolk border* – Welney Road	3	3
	Total	35	24 (68.6%)
vc28	Welney road – Welmore	9	5

(*County administrative border)

Table 2

Distribution of Round-fruited Rush at the Ouse Washes (monads)

Monads		
1	Earith – Mepal	TL4380(2001)
7	Mepal – Welches Dam	4481(2001), 4482(2001), 4582(2010), 4583(1997, 2001), 4684(2001), 4784(2001), 4785(2001, 2010).
6	Welches Dam – Pymore Viaduct	4786(2001), 4885(2011), 4886(2001, 2011), 4887(2001), 4987(2011), 4988(2001, 2006, 2010, 2011).
7	Pymore Viaduct – Norfolk border*	5088(2006), 5089(2001, 2011), 5189(2001), 5090(2010, 2011), 5190(2001), 5191(2001, 2006, 2010), 5291(2001, 2011).
3	Norfolk border* – Welney Road	5292(2001, 2011), 5391(2001), 5392(2001).
vc29, 24 (3 ten km squares)		
vc28, 5 (one ten km square).	Welney road – Welmore	5394(2001), 5495(1992, 2001), 5595(1992, 2001), 5596(1992), 5696(1992).

(*County administrative border)

Lichens in Mepal

Mark Powell, Louise Bacon and the Cambridge Lichen Group

Hornsey & Fletcher (1986) published 'The Lichen Flora of the Parish of Mepal' in *Nature in Cambridgeshire*. Their intention was to provide an account of the lichen flora of this Fenland parish to lay a foundation for subsequent work. As far as we are aware no serious lichen surveys have been undertaken since Hornsey & Fletcher's surveys, which were conducted during the period 1979-1983. Their paper presented their findings for seven sites which they considered to be representative of the major lichen-bearing habitats in the parish.

On 13th February and 10th December 2016 several members of the Cambridge Lichen Group (Louise Bacon, Andrew Harris, Mark Powell, Lewis Saunders, Paula Shipway and Catherine Tregaskes) attempted to re-survey Hornsey & Fletcher's seven sites. Due to access problems and the changes during the intervening three or more decades, it is only possible to provide a thorough comparison for three sites (Grove House, St Mary's parish churchyard and The Rookery). One other site was partially re-surveyed (Pumping Engine), while the remaining sites are either absent or so changed that any comparison would be meaningless. We extended our survey to include some areas within the parish of Mepal but outside the numbered sites, though most of the area to the west of the Old Bedford River was not visited.

In the following account, text and records in bold are taken from Hornsey & Fletcher's paper.

Site 1: Grove House (grid reference TL441813)

Situated by the New Bedford River, the house itself, being whitewashed, is of little lichenological interest, but the walls around the garden are of considerable age and support a reasonable lichen flora. Both the tops and the vertical faces of the walls were examined (1a and 1b respectively), and so was a north-facing inclined tile roof (1c) on an adjacent property.

Due to the kindness of the owner providing access, we could make a thorough survey of this site, including some mature sycamore trees and an old orchard. The tiled roof 1c was not resurveyed. Probably due to encroachment by ivy and deterioration, the garden walls are somewhat less rich than previously. The walls are made of old brickwork but the tops have been capped with cement, which has provided habitat for an interesting lichenicolous fungus (*Opegrapha hochstetteri* in ed.) which parasitizes *Verrucaria muralis*. *O. hochstetteri* is, yet, an undescribed species; its formal description is to be the subject of a forthcoming paper. Some lichenized species of *Opegrapha* are normally considered to be exclusively or primarily corticolous but do

sometimes turn up on shaded stonework and brick walls. The north-facing wall at the north end of the property has some quite extensive colonies of *Opegapha niveoatra* growing both on mortar and on brick.

One of the mature sycamore trees in the northern part of the garden provided one of the most interesting lichen communities in the parish. The shaded base supports a suite of Trentepohlia-containing lichens: *Anisomeridium polypori*, *Arthonia didyma*, *Opegrapha viridipruinosa*, *Porina byssophila* and *Strigula taylorii*. The presence of *S. taylorii* is particularly interesting since this species was apparently absent from our region until the past two or three years. In the following table column 2a indicates records from the mature sycamore trees while the records in 2b are from the orchard.

	1a	**1b**	**1c**	1a 2016	1b 2016	2a	2b
Amandinea punctata	**x**		**x**				
Anisomeridium polypori						x	
Arthonia didyma						x	
Arthonia radiata							x
Botryolepraria lesdainii					x		
Caloplaca arcis				x	x		
Caloplaca austrocitrina					x		
Caloplaca citrina		**x**					
Caloplaca decipiens	**x**	**x**	**x**				
Caloplaca dichroa				x			
Caloplaca flavescens		**x**		x	x		
Caloplaca flavocitrina				x			
Caloplaca holocarpa	**x**						
Caloplaca limonia					x		
Caloplaca oasis				x			
Caloplaca saxicola	**x**						
Caloplaca teicholyta		**x**	**x**				
Candelaria concolor							x
Candelariella aurella			**x**				
Candelariella medians	**x**		**x**				
Candelariella reflexa							x
Candelariella vitellina	**x**		**x**				
Catillaria chalybeia				x			
Cladonia fimbriata	**x**						
Cladonia pyxidata	**x**						
Diploicia canescens			**x**		x		
Diplotomma alboatrum					x		
Hyperphyscia adglutinata						x	x
Illosporiopsis christiansenii							x
Laetisaria lichenicola							x
Lecania cyrtella							x
Lecania inundata					x		
Lecania rabenhorstii					x		

Lecanora albescens					x		
Lecanora campestris	**x**		**x**	x			
Lecanora chlarotera							x
Lecanora crenulata	**x**						
Lecanora dispersa	**x**		**x**				
Lecanora expallens							x
Lecanora muralis	**x**		**x**				
Lecanora soralifera	**x**		**x**				
Lecidella stigmatea	**x**		**x**	x			
Lepraria incana	**x**						
Marchandiomyces aurantiacus							x
Melanelixia subaurifera							x
Opegrapha hochstetteri in ed.				x			
Opegrapha niveoatra					x		
Opegrapha viridipruinosa						x	
Opegrapha vulgata						x	
Parmelia sulcata							x
Phaeophyscia orbicularis	**x**		**x**				
Phlyctis argena							x
Physcia adscendens		**x**	**x**				x
Physcia caesia	**x**		**x**				
Physcia tenella							x
Physconia grisea			**x**				
Porina byssophila						x	
Psilolechia lucida		**x**					
Punctelia subrudecta							x
Ramalina farinacea							x
Ramalina fastigiata							x
Rhizocarpon reductum		**x**					
Rinodina oleae	**x**		**x**		x		
Sarcogyne regularis		**x**		x			
Strigula taylorii						x	
Taeniolella phaeophysciae							x
Verrucaria muralis		**x**		x			
Verrucaria nigrescens f. nigrescens	**x**		**x**		x		
Verrucaria nigrescens f. tectorum				x			
Verrucaria viridula	**x**			x			
Xanthoria calcicola	**x**		**x**				
Xanthoria parietina	**x**						
Xanthoriicola physciae							x

Site 2: Pumping Engine (grid reference TL442822)

In the grounds of this building there lies a large sandstone slab, the only major example of such a substrate in the parish. Two species, *Acarospora fuscata* and *Scoliciosporum umbrinum*, were confined to this site.

In the recent survey, we could not gain access to the grounds of the building and no evidence of the large slab was seen. Nevertheless, there are two large sandstone coping blocks on a trackside wall which support the species mentioned above. We also recorded species from a trackside brick wall attached to the Pumping Engine building.

		2016
Acarospora fuscata	**x**	x
Caloplaca austrocitrina		x
Caloplaca decipiens		x
Caloplaca teicholyta		x
Candelariella aurella		x
Candelariella vitellina	**x**	x
Diplotomma alboatrum		x
Lecania erysibe		x
Lecanora albescens		x
Lecanora campestris	**x**	
Lecanora conizaeoides	**x**	
Lecanora dispersa	**x**	x
Lecanora muralis	**x**	
Lecanora soralifera	**x**	
Lecidella scabra		x
Phaeophyscia orbicularis	**x**	x
Physcia adscendens		x
Physcia caesia	**x**	x
Physconia grisea		x
Rinodina oleae		x
Scoliciosporum umbrinum	**x**	x
Toninia aromatica		x
Verrucaria ochrostoma		x
Verrucaria viridula	**x**	
Xanthoria calcicola		x

Site 3: Fortrey's Hall **(grid reference** TL**445827)**

The disused house itself lies outside the parish boundary, but in the grounds there is a large concrete loading platform. This supported an interesting lichen flora on its upper (horizontal) surface.

We could see no sign of the loading platform and a subsequent search on Google Earth suggests that it no longer exists.

Site 4: Churchyard **(grid reference** TL**441810)**

The parish church of St Mary's dates from the thirteenth century, but it was extensively restored during the last century. Churches and churchyards have long been considered to be important lichenological sites and they are especially important in areas with an impoverished lichen flora. This point is amply demonstrated in Mepal because the church walls

and gravestones were found to support more species than any other location in the parish, some 34 species being recorded.

The recent survey produced a list of 90 taxa but some adjustment is required to make a valid comparison. Eight of our species are lichenicolous fungi and a further twelve were recorded from the bark of trees; neither lichenicolous fungi nor corticolous lichens were recorded in the previous survey. Further adjustment is necessary to take account of taxonomic advances. '*Caloplaca citrina*' as recorded in the earlier survey is now considered to comprise five separate taxa in Britain, four of which were found at St Mary's. Adjusting for these factors results in a modern list of 61. Even this revised figure fails to give a true picture of any changes in the lichens over time since many inconspicuous lichens are included in modern surveys and various lichens have been described as new to science in the intervening years.

Column 1 gives Hornsey & Fletcher's records, column 2a the 2016 records from the church and yard, while column 2b contains records from the extension churchyard.

	1	2	2a
Acarospora fuscata			x
Agonimia tristicula		x	
Amandinea punctata	**x**	x	
Arthonia apotheciorum		x	
Arthonia lapidicola		x	
Arthonia parietinaria		x	
Arthonia radiata		x	
Aspicilia contorta	**x**		
Aspicilia contorta subsp. contorta		x	
Aspicilia contorta subsp. hoffmanniana		x	
Bilimbia sabuletorum	**x**		
Buellia aethalea		x	x
Caloplaca arcis		x	
Caloplaca aurantia	**x**	x	
Caloplaca austrocitrina		x	
Caloplaca cerinella		x	
Caloplaca chrysodeta		x	
Caloplaca citrina	**x**		
Caloplaca decipiens		x	
Caloplaca dichroa		x	x
Caloplaca flavescens	**x**	x	x
Caloplaca holocarpa	**x**		
Caloplaca limonia		x	
Caloplaca oasis		x	
Caloplaca saxicola	**x**	x	
Caloplaca teicholyta	**x**	x	

Caloplaca variabilis		x	
Candelariella aurella f. aurella	**x**	x	
Candelariella medians f. medians	**x**	x	x
Candelariella reflexa		x	
Candelariella vitellina f. vitellina		x	x
Catillaria atomarioides		x	x
Cercidospora epipolytropa			x
Cladonia sp.			x
Collema cf. auriforme		x	
Collema crispum var. crispum	**x**	x	
Diploicia canescens	**x**	x	
Diplotomma alboatrum	**x**	x	x
Dirina massiliensis f. sorediata		x	
Haematomma ochroleucum var. porphyrium	**x**	x	
Hyperphyscia adglutinata		x	
Lecania hutchinsiae		x	
Lecania inundata		x	
Lecania rabenhorstii		x	
Lecanora albescens		x	x
Lecanora antiqua		x	
Lecanora campestris subsp. campestris	**x**	x	x
Lecanora chlarotera		x	
Lecanora conizaeoides			x
Lecanora crenulata	**x**	x	
Lecanora dispersa	**x**	x	
Lecanora expallens		x	
Lecanora hagenii		x	
Lecanora horiza		x	
Lecanora muralis		x	
Lecanora orosthea			x
Lecanora symmicta		x	
Lecidella elaeochroma		x	
Lecidella scabra		x	x
Lecidella stigmatea		x	
Lepraria incana s. str.		x	
Lepraria vouauxii		x	
Leptogium turgidum		x	
Lichenoconium lecanorae			x
Marchandiomyces aurantiacus		x	
Micarea erratica			x
Opegrapha mougeotii		x	
Opegrapha varia		x	
Parmelia sulcata		x	
Phaeophyscia orbicularis	**x**	x	

Physcia adscendens	**x**	x	x
Physcia caesia	**x**	x	x
Physcia tenella		x	
Physconia grisea	**x**	x	
Placopyrenium fuscellum	**x**	x	
Polycoccum pulvinatum		x	
Porpidia soredizodes		x	
Protoblastenia rupestris	**x**	x	
Psammina stipitata		x	
Psilolechia lucida	**x**	x	
Punctelia subrudecta s. str.		x	
Pyrenidium actinellum		x	
Ramalina fastigiata		x	
Rhizocarpon reductum	**x**	x	
Rinodina oleae	**x**	x	
Sarcogyne regularis		x	
Thelidium incavatum		x	
Toninia aromatica	**x**	x	
Trapeliopsis flexuosa			x
Verrucaria baldensis	**x**		
Verrucaria calciseda		x	
Verrucaria hochstetteri	**x**	x	x
Verrucaria macrostoma f. furfuracea		x	
Verrucaria macrostoma f. macrostoma		x	
Verrucaria muralis	**x**		x
Verrucaria nigrescens	**x**		x
Verrucaria nigrescens f. nigrescens		x	
Verrucaria nigrescens f. tectorum		x	
Verrucaria ochrostoma			x
Verrucaria viridula	**x**	x	
Vouauxiella verrucosa		x	
Weddellomyces epicallopisma		x	
Xanthoria calcicola	**x**	x	x
Xanthoria candelaria s. lat.		x	
Xanthoria parietina		x	x
Xanthoria polycarpa		x	x
Xanthoria ucrainica		x	

Site 5: The Rookery **(grid reference** TL**441811)**

Adjacent to the churchyard is an enclosed area supporting a population of mature elms, which seemed to be relatively healthy. This site provided the only significant habitat for corticolous lichens in the parish, and the trees were far enough from the main road (A142) for it to be valid to use their lichen flora on the standard qualitative scale for the estimation of

sulphur dioxide air pollution (Hawksworth and Rose, 1970). Sixteen species were recorded from this elm population, and most of these would be lost to the parish if the trees succumbed to Dutch elm disease.

Much to our surprise the mature elm trees survive to this day and are present in a sort of wood-pasture. The former survey did not record any of the former specialists of old elm trees and the sixteen species recorded then included no notable species. Lacking permission to enter the site on our first visit, we were restricted to examining three elm trees on the western edge where we recorded *Caloplaca ulcerosa* (sterile but extensive on one tree and present in smaller quantity on another), *Opegrapha varia* and *O. vulgata*. On our second visit, we examined most of the old elm trees and found that they supported a very limited number of common species. *Diploicia canescens* and *Hyperphyscia adglutinata* are frequent, especially in the lowest metre of the trunks. Otherwise the only lichens observed on the trunks are pycnidia belonging to the genus *Opegrapha*, most having the appearance of *O. varia*.

In the following table, only records from *Ulmus* are included. The recent records (column 2) are from the trunks only. It is not known whether Hornsey & Fletcher had access to branches and twigs during their survey.

	1	2
Amandinea punctata	**x**	
Caloplaca citrina	**x**	
Caloplaca saxicola	**x**	
Caloplaca ulcerosa		x
Chaenotheca ferruginea	**x**	
Diploicia canescens	**x**	x
Hyperphyscia adglutinata		x
Lecanora dispersa	**x**	
Lecanora expallens	**x**	
Lecanora muralis	**x**	
Lepraria incana	**x**	
Opegrapha varia		x
Opegrapha vulgata		x
Parmelia sulcata	**x**	
Physcia adscendens	**x**	
Placynthiella ulignosa	**x**	
Punctelia subrudecta	**x**	
Rinodina oleae	**x**	
Xanthoria candelaria	**x**	
Xanthoria parietina	**x**	

***Site 6: Wisteria House* (grid reference** TL**441808)**

This is a large, derelict house in Brangehill Lane which was built in the early nineteenth century. The house and walls around the grounds are of interest because they provide many north- and south-facing vertical walls.

Wisteria House and its site appears to have been redeveloped and no old walls were found.

***Site 7: Aerodrome* (grid reference** TL**447803)**

Last used in 1945, this has now fallen into disuse and much of the area has been given over to agriculture. Most of the buildings have, however, been broken up and provide an interesting substratum of flints and stones. Two species, *Verrucaria mauroides* and *V. mutabilis*, were confined to such substrata. In addition, a damp soil patch provided the sole specimen of *Collema tenax*.

The area examined in the former survey is now occupied by agriculture including relatively modern farm buildings. Even if access were to be obtained it is unlikely that any meaningful comparison would result.

Conclusion

Sites which remain in a similar condition over several decades are rather rare and churchyards are often the most stable. However, repeat surveys of whole parishes provide useful indications of the changes to lichen communities on a landscape scale. Advances in lichen taxonomy continue apace and the end is not yet in sight; this results in the need for adjustments to be made to account for splitting, lumping and newly described species. In general, lichen surveys are improving with time since they benefit from a more refined taxonomy, better literature and the hard-won experience of previous recorders. Nevertheless, individual recorders vary considerably in their competence and experience and this is difficult to quantify. Hornsey & Fletcher claim that "the whole of the parish has been thoroughly examined over the period 1979-1983" but, as far as records in the BLS mapping database suggest, very few additional species were found outside their numbered sites.

It is a great shame that more parishes had not been surveyed before the recent dramatic changes and this should act as a stimulus to people to conduct parish surveys in the forthcoming years to provide baselines for future lichenologists.

The wider parish in 2016

A142 road-bridge TL437811

The metal railings of the bridge are dominated by *Caloplaca holocarpa*, a species which is often found in abundance on this substratum. *Scoliciosporum umbrinum* is another species often to be found on metal and present in quantity on this bridge. Other species recorded were *Lecanora invadens* (a relatively recent addition to the British list due to the difficulty of the *L. dispersa* group), *Physcia caesia*, *P. dubia* and *Xanthoria elegans*. Where upright supports provide bird perching sites lichens more typical of twigs are present, in

particular *Physcia adscendens* and *Xanthoria parietina*. The remarkable ability of lichens to colonise harsh conditions is well illustrated by this thriving community growing in the extreme environment provided by bare metal.

1930 concrete bridge near The Three Pickerels TL439812

Thirty-one taxa were recorded from the upper surface of the bridge parapets. Of particular interest is the presence of an undescribed species of *Pronectria* (lichenicolous on *Physcia caesia*) present here at its fourth known site. Details and images of this species are given on the following website: http://fungi.myspecies.info/all-fungi/pronectria-sp-mp3952. On our second visit the pale orange patches of its *Acremonium* anamorph were also present.

Two species were recorded which are normally not considered to grow on concrete. *Rinodina calcarea* is normally found on old limestone gravestones while *Caloplaca obscurella* is normally a corticolous species.

Table of records from the 1930 concrete bridge (2016)

All taxa recorded on concrete of parapets

2442	*Caloplaca arcis*
239	*Caloplaca aurantia*
249	*Caloplaca crenulatella*
250	*Caloplaca decipiens*
2443	*Caloplaca dichroa*
271	*Caloplaca obscurella*
2461	*Caloplaca oasis*
281	*Caloplaca teicholyta*
291	*Candelariella aurella f. aurella*
296	*Candelariella medians f. medians*
1708	*Lecania rabenhorstii*
627	*Lecanora albescens*
635	*Lecanora campestris subsp. campestris*
646	*Lecanora dispersa*
1764	*Lecanora horiza*
661	*Lecanora muralis*
802	*Lecidella carpathica*
803	*Lecidella stigmatea*
2116	*Muellerella lichenicola*
1106	*Phaeophyscia nigricans*
1107	*Phaeophyscia orbicularis*
1114	*Physcia caesia*
2165	*Polycoccum pulvinatum*
1189	*Protoblastenia rupestris*
1801	*Rinodina calcarea*
1307	*Sarcopyrenia gibba var. geisleri*

1510	*Verrucaria nigrescens f. nigrescens*
2514	*Verrucaria nigrescens f. tectorum*
1511	*Verrucaria ochrostoma*
1526	*Xanthoria calcicola*
#N/A	*Pronectria sp.*

A cumulative list of Mepal lichens is available on the Nature in Cambridgeshire web site at www.natureincambridgeshire.org.uk/volumes/vol-59.htm

Reference

Hornsey, I.S. & Fletcher, A. (1986). The Lichen Flora of the Parish of Mepal. *Nature in Cambridgeshire* **28:** 40-49.

Cambridgeshire Amphibian Survey Report 2015

Steven J. R. Allain & Mark J. Goodman

Introduction

The Cambridgeshire Amphibian Survey 2015 was a continuation of studies carried out at a number of sites during 2013 and 2014; see Allain & Goodman (2015) for more information. In addition to survey sites we had previously visited in earlier years, three new sites were surveyed in 2015. These were Barnwell East Local Nature Reserve, Regatta Court (off Stanley Road) and Wandlebury Country Park. The survey sites all contain bodies of freshwater which were surveyed at night for signs of amphibians. From the 2014 study, we ascertained that five of the sites were suitable for further study; four of these five as well as the three new sites were surveyed throughout the spring and into early summer 2015. The new survey sites were discovered and subsequently surveyed by following up reports of amphibian sightings we had received from colleagues. Due to other commitments, Stow-Cum-Quy Fen was not surveyed in the 2015 season. Other potential new sites were also put on hold for the same reason.

This frequency of weekly site surveys helped create a more extensive synopsis of the populations of amphibian species inhabiting the various locations. On evenings when it was extremely windy or there was heavy rain, surveying did not take place because of the chance of causing disturbance to the amphibians and because of the potential risks to our volunteer surveyors. Our volunteers were all members of the Cambridgeshire and Peterborough Amphibian and Reptile Group (CPARG) and had been trained by the authors to locate and identify amphibians within ponds. Most of this training was completed in the field, as it is our preferred method of preparing volunteers.

The species focused on in this study were the most common of the native amphibian species found in Cambridgeshire, the Common Frog (*Rana temporaria*), the Common Toad (*Bufo bufo*), the Smooth Newt (*Lissotriton vulgaris*) and the Great Crested Newt (*Triturus cristatus*). Seven sites (Figure 1) were surveyed by torchlight and the presence of amphibian species was recorded, along with the occurrence of fish and the size of spawn clump numbers (Common Frog) and spawn strand numbers (Common Toad).

Survey locations and descriptions (see Figure 1)

Site 1: Barnwell East Local Nature Reserve (TL47935831)

Barnwell East is a local nature reserve (LNR) near Cambridge Airport; it has one body of water which is a reasonably sized pond. This pond has a decking platform allowing access to one area, which is where most of the surveying was concentrated. Accessible areas around the pond were also surveyed but the entire pond was not accessible due to overgrown vegetation. The rest of the site consists of a mixture of woodland, scrubland and open grassland. Due to the location of the pond it is susceptible to eutrophication which increases the amount of algae available for amphibian larvae.

Site 2: Cambridge City Crematorium (TL39906258)

The City Crematorium has a total of six ponds, of which we surveyed four on a regular basis. The four surveyed were the same as those which we have been surveying since 2013. These four ponds are concrete lined, two of which are 3 x 4 metres and the other two being 4 x 4 metres. Although they are all concrete lined with small areas of refugia in the corners, they support a high diversity of pond life. The drainage ditches that surround the main area of the crematorium were also surveyed as these tend to trap some amphibians on their migration back to their breeding ponds. The four ponds surveyed are also free of fish and are exposed to the elements due to a lack of tree cover.

Site 3: Cherry Hinton Brook (TL47715728)

Cherry Hinton Brook, as its name suggests, runs through Cherry Hinton, behind Cherry Hinton Hall. We focused mainly on the stretch between Burnside Road and the allotments just past St. Bede's Secondary School. This section is commonly known as 'Snakey Path'. The site had been surveyed in the previous two years, when toads and frogs were found in low numbers. Despite this we continued to survey the site due to the high numbers of toads present in historic records and from anecdotal reports. The brook is highly shaded by tree cover and an embankment, the latter of which is used by amphibians as a refuge.

Site 4: Chesterton (TL46485957)

This site consists of a man-made waterway that has been built behind a recently constructed block of flats on the old Phillips/Simocco site. This site had also been surveyed in 2014 when we found an abundance of Smooth Newts, Common Frogs and Common Toads. The site is not too far from the River Cam

or Logan's Meadow LNR. There is a lack of tree cover at this site but there is a high proportion of emergent vegetation which can make surveying the site challenging.

Site 5: Cottenham Moat (TL44936807)

Cottenham Moat was investigated further after the survey in 2014. In 2015 we continued to survey the site for amphibians. The moat is a broken 'U' shape which contains no fish and is sometimes covered by a film of duckweed and quickly overgrows. During surveys in 2014 we found mainly Great Crested Newts.

Site 6: Regatta Court (TL46685951)

Regatta Court is a small managed housing complex located by the River Cam, off Newmarket Road. The site has a single large concrete lined pond which is home to fish as well as amphibians. The site was surveyed after we received reports of large numbers of toads in the area. The pond backs onto Stourbridge Common LNR meaning dispersal for amphibians is relatively easy. The area is also a registered toad crossing site and so some of our time was spent helping toads cross the roads to their breeding pond.

Site 7: Wandlebury Country Park (TL49405340)

Wandlebury Country Park is the site of an Iron Age hill fort and is maintained by Cambridge Past, Present & Future (PPF). Wandlebury contains two ponds one being the 'Cherry Pond' which is on the main path around the ring and the second is the 'Dew Pond' which is in the gardens of the residence. Our efforts were mainly focused on the 'Cherry Pond' although we did make occasional visits to the 'Dew Pond' when the Ecology Officer was present. The Cherry Pond is used by Cambridge PPF for educational purposes, such as pond dipping, because of its high abundance of aquatic invertebrate and other pond life. This was the perfect indicator that the pond was an ideal candidate for amphibian surveys.

Methods - Survey Protocol

The survey protocol outlined here is the same as that used in previous years. The amphibian surveys were designed to meet standardised guidance protocols (Griffiths *et al.*, 1996; Sewell *et al*., 2013) and were carried out weekly (weather dependent) where possible. On arrival at the sites around dusk, we ran through the risks and subsequent risk assessment for each site with our volunteers. Once everyone was aware of the risks and knew what to look out for, one person among the group was elected to be the data recorder. They were given a clipboard with a data recording form and a pencil and from that point on they would be noting down any sightings other volunteers would be gently calling to them. When visiting a new site we visit in the daytime to assess the risks and identify areas where amphibians may be present. This aids us in helping to build a more comprehensive safety protocol for each site.

All of the sites were surveyed by shining strong torches (mainly 160 lumen torches) from the bank and into the water. The torches were directed to about 3m into the pond (if it was large enough) where they was used to detect amphibians at the water's surface. Closer to the bank, the torches cut much more deeply into the water and so more amphibians were likely to be detected below the water's surface. This method was reliable for detecting newts and other amphibians within ponds that had little vegetation or those that were shallow.

At sites where only a single body of water was present, these bodies were approached from a bottom corner closest to the point of entry, *e.g.* a footpath. From this corner, the perimeter of the body would be surveyed, including up to 3m away from the bank, in a clockwise direction. If not all of the bank was accessible, then all of the appropriate accessible areas were surveyed from the accessible points. At locations where there was more than one body of water, the ponds were surveyed so that the furthest ponds from the entrance were scanned first. This was to ensure we caused minimum disturbance to ponds which had not yet been surveyed. Any amphibians found within the 3m 'buffer zone' between ponds were also included in the counts.

At some sites where the vegetation grows close to the banks, or when the ponds are shallow due to evaporation, egg-searching was undertaken. This involves searching submerged vegetation for folded leaves which indicate the presence of newt eggs. Unfortunately no newt eggs were found despite surveys being spread over a long period. The eggs of Smooth and Great Crested Newts are easily distinguishable when examined. A 4 in 1 multifunctional environmental tester was used to gather water and air temperature data at the sites surveyed (when available).

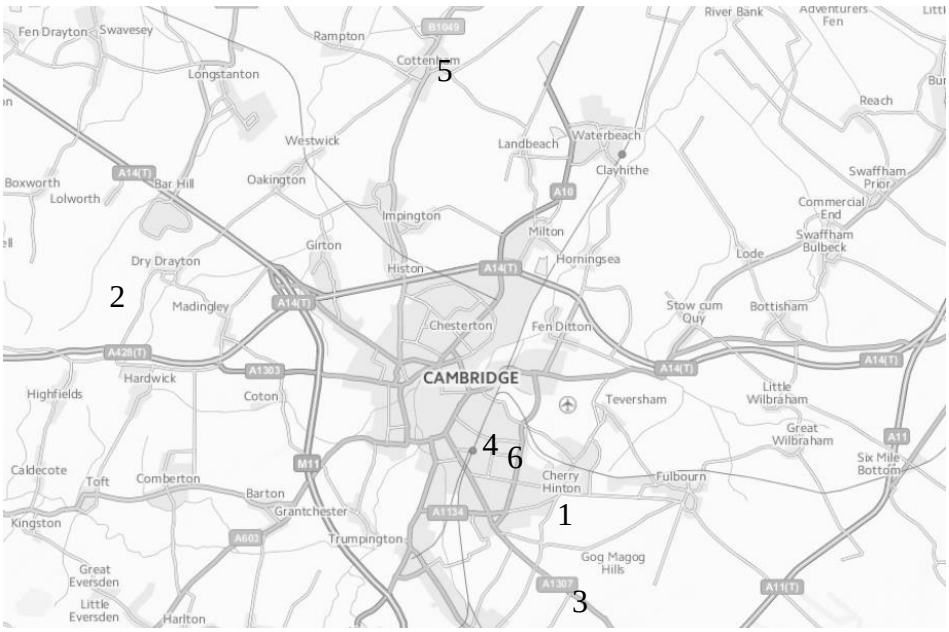

Figure 1. Map of Cambridge. Numbers indicate where the seven sites are located.

Results

Signs of amphibians were discovered at all seven of the survey sites in at least the form of adults. This was by either visual or auditory evidence of both frogs and toads, as well as visual evidence of newts. At some sites, spawn and larvae were also seen. Clumps of frog spawn were observed at Chesterton, Regatta Court, Wandlebury and Barnwell East LNR, with the clumps being in substantial numbers at Chesterton, Barnwell East LNR and Wandlebury. Unfortunately not enough environmental data were collected in order to see if there was any correlation between temperature and amphibian abundance. There was less frog spawn seen at Chesterton than in 2014 (roughly only 50% of the previous year's count). There were also fewer Great Crested Newts seen at Cambridge City Crematorium than in 2014. We saw more toads at Cherry Hinton Brook than in 2014, which helps to confirm our hypothesis that a large population of toads is still breeding at the site.

Peak Count Data

Date	Species	Peak Count	Air Temp (°C)	Water Temp (°C)
08/04/2015	Common Toad	19	N/A	N/A
30/04/2015	Smooth Newt	2	7.9	13.5

Table 1. Summary of data collected at Site 1, Barnwell East Local Nature Reserve.

Date	Species	Peak Count	Air Temp (°C)	Water Temp (°C)
19/02/2015	Common Frog	2	N/A	N/A
	Common Toad	4		
	Great Crested Newt	36		
	Smooth Newt	30		

Table 2. Summary of data collected at Site 2, Cambridge City Crematorium.

Date	Species	Peak Count	Air Temp (°C)	Water Temp (°C)
08/04/2015	Common Frog	1	N/A	N/A
08/04/2015	Common Toad	77	N/A	N/A

Table 3. Summary of data collected at Site 3, Cherry Hinton Brook.

Date	Species	Peak Count	Air Temp (°C)	Water Temp (°C)
07/03/2015	Common Frog	29	N/A	N/A
30/04/2015	Smooth Newt	26	5.1	8.9

Table 4. Summary of data collected at Site 4, Chesterton.

Date	Species	Peak Count	Air Temp (°C)	Water Temp (°C)
15/05/2015	Common Frog	2	12.9	14
	Great Crested Newt	14		
	Smooth Newt	12		

Table 5. Summary of data collected at Site 5, Cottenham Moat.

Date	Species	Peak Count	Air Temp (°C)	Water Temp (°C)
08/03/2015	Common Frog	10	N/A	N/A
05/04/2015	Common Toad	119	N/A	N/A
30/04/2015	Smooth Newt	32	7.8	11.5

Table 6. Summary of data collected at Site 6, Regatta Court.

Date	Species	Peak Count	Air Temp (°C)	Water Temp (°C)
21/03/2015	Common Frog	14	N/A	N/A
21/03/2015	Common Toad	6	N/A	N/A
25/05/2015	Smooth Newt	33	11.6	15.8

Table 7. Summary of data collected at Site 7, Wandlebury Country Park.

HSI Scores

The Habitat Suitability Index (HSI) is a scoring system that analyses 10 points of a habitat in order to establish whether or not that habitat is suitable for Great Crested Newts (Oldham *et al*., 2000). The scoring system works by giving the 10 points listed below a number between 0.01 and 1. The mean of these is then calculated to give the HSI of the pond or water body being studied.

- SI1 = The pond's/water body's geographical location.
- SI2 = The surface area of the pond/water body.

- SI3 = The permanence of the pond/water body.
- SI4 = The water quality of the pond/water body.
- SI5 = The total area of shading on the pond/water body.
- SI6 = The number of waterfowl on the pond/water body.
- SI7 = The occurrence of fish in the pond/water body.
- SI8 = The density of ponds surrounding the one you are studying.
- SI9 = The proportion of newt friendly habitat surrounding the pond being studied.
- SI10 = The total macrophyte cover in the pond/water body.

The equation used to work out the HSI for a pond using these 10 points is:
$HSI = (SI1 \times SI2 \times SI3 \times SI4 \times SI5 \times SI6 \times SI7 \times SI8 \times SI9 \times SI10)^{1/10}$

Location	Score	Rank
Barnwell East Nature Reserve	0.74	Good
Cambridge City Crematorium*	0.66	Above Average
Cherry Hinton Brook*	0.71	Good
Chesterton*	0.77	Good
Cottenham Moat*	0.81	Excellent
Regatta Court	0.70	Good
Wandlebury Country Park	0.88	Excellent

Table 8. Table showing the HSI scores and ranks of the seven locations surveyed. Scores were calculated using knowledge of the ecology and location of each pond. Locations labelled with an (*) indicates the HSI scores have been taken from the 2014 Cambridge Amphibian Report (Allain & Goodman, 2015). All figures have been rounded to two decimal places.

Discussion

2015 was a successful year in terms of our regular amphibian surveys. For example, we observed toad spawn *in-situ* for the first time since surveys began in 2013. The first location was Barnwell East LNR and it was later found at Regatta Court. Although no adult frogs were found at Barnwell East LNR we did find evidence for them in the form of frog spawn. The biggest surprise was to find amphibian larvae in the ‘Dew Pond’ at Wandlebury Country Park. The pond can be no more than two inches deep (due to a rip in the liner) yet common frog tadpoles were abundant. In the ‘Cherry Pond’ at Wandlebury Country Park, where survey efforts were focused, no toad spawn was seen but adults were observed in amplexus. Common Toad tadpoles were later observed in subsequent surveys and so it is likely the toads had concealed their spawn to protect it from predators and the harmful effects of UV radiation (Häkkinen *et al.*, 2001). Similarly no Smooth Newts were seen but the larvae and efts were found, and again it is likely that the newts concealed the eggs in thick submerged vegetation.

Despite an overall drop in Common Toad numbers nationwide, we observed indications of prolific breeding of the species at both Barnwell LNR and Regatta Court. No evidence of Common Toad or Common Frog breeding was observed at Cambridge City Crematorium, although the larvae of both Smooth and Great Crested Newts were found in small numbers. We hypothesise that the spawn from the anurans had become food for the newts before we began surveying. Amplexus of both Common Frogs and Common Toads has been observed on multiple occasions so breeding is taking place. If the spawn isn't becoming food for newts then the frogs and toads must be using an unknown body of water to safely deposit their spawn. This needs further investigation and will be the focus of our studies at the site in the years to come.

Although we recorded high numbers of toads at Cherry Hinton Brook, no spawn was observed. This may be because the majority of toads seen were male. Three Common Frog tadpoles were found in amongst the gravel of newly formed flow works even though we weren't able to detect any frogspawn, or pairs in amplexus. Frogspawn has been seen in the past at this site and there is no doubt that frogs successfully breed there, even with a high number of predatory fish present. Conversely no toads or toad spawn were seen at Chesterton although Common Frogs were present. A total of eighty-nine clumps of frog spawn were observed which is more than the number of frogs seen. Using this figure we can infer how many females have used the site, as they are limited to laying one clump of spawn per season (Reh & Seitz, 1990).

Cottenham Moat was too overgrown and suffered too much from the effect of eutrophication for us to perform extensive surveys. We are proposing an annual management weekend where the local community helps to clear the plant debris and litter from the moat. This will have to be completed during the winter months in order to comply with legislation concerning Great Crested Newts. We found this to be quite successful at Cambridge City Crematorium in early January 2016. For 2016 the surveys of the crematorium ponds were suspended in order for the ponds to recolonise and grow, as extensive amounts of vegetation were removed. Finally, Regatta Court has an extremely healthy population of Common Toads, Common Frogs and Smooth Newts even though the pond has been stocked with ornamental fish. Toads in the area have been saved from the roads and further afield – including the play park on Stourbridge Common. As with Cambridge City Crematorium, action needs to be taken to help amphibians that have fallen in to drains – the most probable solution would be to install amphibian ladders. This is a solution we will look into in the future.

Although the Palmate Newt (*Lissotriton helveticus*) does occur in Cambridgeshire, it only occurs in isolated populations towards the north of the county. Surprisingly we also came across a Grass Snake (*Natrix natrix*) during the evening whilst surveying Wandlebury Country Park in June. The snake was seen during an active search for amphibians hiding between the liner of the pond and the underlying earth of the Dew Pond. The snake was sheltering in a

cavity, and its presence was perhaps due to the warm temperatures and abundance of prey.

Across the sites, amphibians were seen to be breeding earlier than in previous years, with frogs and toads breeding earlier than newts. This may be linked to climate change and the higher frequency of warmer winters the region has been experiencing in recent times (Reading, 1998). At the end of the project all records were submitted to the Cambridgeshire and Peterborough Environmental Records Centre (CPERC). In 2015 we were also able to confirm the existence of a Midwife Toad (*Alytes obstetricans*) population in central Cambridge (Plate 5, back cover). In the future we wish to carry out a population assessment of Midwife Toads and swab the toads for the presence of the amphibian chytrid fungus (*Batrachochytrium dendrobatidis*). The fungus threatens amphibian species globally and so we wish to investigate whether or not the toads pose a risk to our native species as a disease vector.

Acknowledgments

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Introduced non-native amphibians and reptiles in Cambridgeshire 2010-2016

Steven J. R. Allain, Liam T. Smith & Gary J. Miller

Introduction

Non-native species threaten ecosystems globally (Vitousek *et al*., 1996) with those on islands more vulnerable (Reaser *et al*., 2007). This applies to areas such as Britain (Manchester & Bullock, 2000), where there is no natural method for repopulation or recolonisation if localised or national species extinctions occur (Green, 2003). These extinctions may occur through competition between native and introduced species, through disease spread by non-native species or through direct predation (Fritts & Rodda, 1998). Mainland areas of the Britain do not have the same level of extinction risk as its offshore islands but local extinctions can still occur especially if the habitat connectivity between the area of extinction and a source population is poor.

A number of non-native amphibian and reptile species have become established within the UK (Frazer, 1964; Lever, 2009). These mostly persist in small and isolated populations but climate change may enable some of these species to expand their ranges, requiring management plans to limit their dispersal. Two introductions thought to be attributable to accidental causes are the Aesculapian Snake (*Zamenis longissimus*) and the Common Wall Lizard (*Podarcis muralis*). Some non-native species have become established in the UK through deliberate introductions, including the Marsh Frog (*Pelophylax ridibundus*) (Zeisset & Beebee, 2003).

Cambridgeshire is not a heavily populated county with much of the landscape occupied by farmland. Despite this, several non-native reptiles and amphibians have been observed within the county. The records of these are reviewed here, together with a discussion of the probable sources of each introduction, and the threats that each might potentially pose to native wildlife.

As chairman of the Cambridgeshire and Peterborough Amphibian and Reptile Group (CPARG), SA has experience with surveying non-native species in Cambridgeshire. LS has been assisting SA with these surveys since 2013 and has other experience in this area too. In his last role, GM was manager of Cambridge Reptiles, Hardwick. During his time there GM kept detailed records of the non-native species which had been taken to him by concerned members of the public. Each of the species we have assessed had made their way into the Cambridge area, some of these were observed in the wild and others entered GM's care before this could happen. After entering the care of GM, each of the animals was successfully rehomed.

Amphibians

African Common Toad (*Sclerophrys gutturalis*)

This is a large toad that occurs in a range of habitats across sub-Saharan Africa. In late November 2015 a couple who had recently returned from Mauritius discovered a juvenile African common toad stowed away in their luggage. SA took charge of the toad shortly afterwards and whilst in his care the toad shed a number of parasitic worms before being passed onto Dr. John Wilkinson (Amphibian and Reptile Conservation Trust), who gave the toad a permanent home. Apart from the risk of spreading parasites, the toad is unlikely to have been a threat to our native species as a spell of cold weather would be expected to have been fatal if the toad had made it into the wild.

Common Midwife Toad (*Alytes obstetricans*)

This is a species of small terrestrial toad commonly found across the western Europe (Lever, 2003). It is unusual in that it breeds on land. (Plate 5, back cover) A population of this species was first discovered in Cambridgeshire by Baker (2007) and this has been monitored by CPARG since 2015. It is uncertain how or when this successfully breeding population became established but it is unlikely to pose a threat to the local native amphibian species except possibly as a disease vector of the amphibian chytrid fungus (*Batrachochytrium dendrobatidis*). CPARG is currently undertaking work to establish whether this fungus is present in that population.

Reptiles

Bibron's Gecko (*Pachydactylus bibroni*)

This species, which can grow to 20 cm (Branch, 1998), is endemic to southern Africa. Its dorsal surface is mainly brown with black crossbars that have a beaded appearance; the underbelly is a lighter brown to white. In 2012 a single individual found in a suitcase that had been brought from South Africa and was shortly after taken to GM who subsequently rehoused the animal. It is unlikely that this species would be able to survive in Britain due to the much colder climate.

Mediterranean House Gecko (*Hemidactylus turcicus*)

This small insectivorous species is tan in colour and grows to around 15 cm in length, and is native to the Mediterranean region, where they are a familiar sight (Lever, 2003). It has been successfully introduced to a number of countries outside of its range but is limited to habitats similar to those of its natural environment (Lever, 2003). In 2012, two individuals were taken to GM at Cambridge Reptiles by transport companies. The most likely introduction pathway is by the transport of goods since this species is not commonly handled by the pet trade. This gecko might survive in the wild in the warmer parts of Britain, especially if the climate continues to warm, since in other parts of its range it readily shelters in buildings.

Moorish Gecko (*Tarentola mauritanica*)

This species, which grows to around 15 cm in length is native to the western Mediterranean region and the Iberian peninsula (Lever, 2003). Their colouration changes throughout the day but they are generally grey or sandy in colour with occasional banding on the tail. This species has also been introduced into Asia and the Americas where it flourishes alongside human habitation. In March 2016 a young Moorish gecko was found in a shipment of furniture from continental Europe. The colouration suggested that this specimen had most likely originated from Montpellier.

White-spotted Gecko (*Tarentola annularis*)

This species, which is native to northern Africa, grows to around 15 cm in length, and looks superficially similar to the Moorish gecko. It occurs in the Americas as accidental imports or escapes from the pet trade (Lever, 2003). In 2013 three individuals were found with fruit at a supermarket. This species is unlikely to be a threat due to the vastly different environmental factors between the UK and Northern Africa.

Common Wall Lizard (*Podarcis muralis*)

This has a wide range across eastern, western and central Europe (Lever, 2003). This medium-sized lizard, reaching around 20 cm in length, is highly variable in colour and pattern, consisting of green, brown and grey with lighter stripes or reticulations. In July 2015 a specimen was reported from a local garden centre, possibly introduced with a delivery of furniture from France. It was seen occasionally for a few weeks before it disappeared, presumably unable to survive the weather conditions in Cambridgeshire, though populations have established in other more southerly parts of Britain.

Corn Snake (*Pantherophis guttatus*)

This non-venomous species, which is a popular pet in the UK, has a natural range in North America (Lever, 2003). It can reach six feet in length and is highly variable in colour. In 2014 the authors helped rehome three individuals that had been found in Cambridgeshire. The first two snakes had escaped captivity and were found on the streets of Cambridgeshire in July. The third specimen, which was approximately 2-3 months old, was found on a compost heap in Hemingford Grey in mid-August. Corn Snakes are often encountered in the wild as escapees but it is not known how long they can survive or whether they are able to breed in this country.

Red-eared Terrapin or Red-eared Slider (*Trachemys scripta elegans*)

This is another species native to the south-eastern United States that became a popular pet (Lever, 2003), especially in the 1990s following the Teenage Mutant Ninja Turtle craze (Langton & Herbert, 2011). It is not suitable as a pet because the animal grows quickly and becomes too large (its carapace can reach 40 cm) for most pet-owners. A number of unwanted animals have been released into local waterways around the country. In 2016 a population was found to

inhabit the pond on the Vision Park in Histon, although this population, which is now being monitored by CPARG, seems to have been present there since at least 2006, probably continuously. (Plate 6, back cover). There are numerous reports of this species found in the wild in Britain, though how many breeding populations exist is uncertain.

Records prior to 2010

Earlier records of non-native reptile and amphibian species are not numerous. Some non-native reptiles, such as terrapins, are hard spot due to their semi-aquatic lifestyle. They are easily seen when basking but when submerged they can be easily overlooked. Anglers, who visit waterbodies on a regular basis, are most likely to observe introduced terrapins as they spend many hours in suitable habitats. The records explored here have been verified by the Cambridgeshire and Peterborough Environmental Records Centre (CPERC).

There are records of Red-eared sliders in the Vision Park Pond in Histon dating back to 2006. We have confirmed their presence there during 2016 and presume that they are the same individuals since this species is long-lived (Lever, 2003). There is a 2003 record of a Red-eared slider from Little Paxton Pits but it has not been reported since. Additional records of other terrapins that may still persist in Cambridgeshire include an unknown species spotted at the Cambridge Science Park in 2007.

The most interesting record CPERC has regarding non-native reptiles is that of a European Pond Terrapin (*Emys orbicularis*) from Lattersey Local Nature Reserve dating from 1991. It is unlikely that this individual still persists as there are no subsequent records from the site. This individual may have been released in the aftermath of the Teenage Mutant Ninja Turtle craze, when many non-native terrapins were released into British waterways.

The only record of adult Midwife Toads before 2010 is the short report by Baker (2007), who confirmed their presence on the basis of their unique call. How these toads became established remains unknown. There is an unconfirmed record from 2014 of Midwife Toad tadpoles from a drainage ditch near Thorney.

Discussion

It is hard to assess whether or not a non-native species will become established and persist within the environment after an introduction has occurred. This uncertainty exists for a number of reasons such as the species' ability to adapt to the new conditions and find a niche within the new ecological system. Some species fail to establish, others establish but do not persist and then there are species that establish and thrive. An example of a species which once persisted but then was lost is the Common Tree Frog (*Hyla arborea*). In 1987 a localised population in the New Forest became extinct (Snell, 1991). Other populations, such as one in East London and elsewhere, have also since become extinct (Snell, 2006). Single sightings of them are now uncommon but can be attributed to escaped pets.

It is unlikely that the stowaway animals that we were able to intercept and rehome would become established in the wild. For a non-native species to become established, multiple breeding individuals need to come into contact with one another. This is much more likely to occur during an intentional release, instead of the odd individual making their way outside of their range by stowing away in goods.

Most of the species listed above have not caused serious ecological impact, and are unlikely to do so if they were to become established in the wild. One species, however, poses a much greater threat. The American Bullfrog (*Lithobates catesbeianus*) has been introduced to countries far beyond of its natural range, including the UK (Lever, 2003) though the species has not yet been reported from Cambridgeshire. The exported animals have been used to set up farms to cater for the demand for frog legs or to be sold in the pet trade. It is by this latter commercial use that the American Bullfrog was introduced to Britain. Bullfrogs were imported into the UK until 1997 when this practice was banned by EU legislation, in order to protect native European fauna. Unfortunately the Bullfrogs had already become established at a site in East Sussex. In 1999 an eradication program was initiated in order to remove the population whilst it was still localised (Banks *et al*., 2000). Due to its much larger size, the American Bullfrog is able to consume and compete with native amphibians, potentially leading to their local extinction.

Reptiles dominate the above list, most probably because they are hardier and more robust during transport compared with amphibians. A consequence of this is that not many exotic amphibian species have become established, although there are cases in other counties. The Alpine Newt (*Ichthyosaura alpestris*) is native to northwestern Europe and is the most successful introduced species of urodele in Britain (Wisniewski, 1989). The first recorded population became established in Surrey during the 1920s (Bond & Haycock, 2008). It has yet to be recorded in Cambridgeshire but it is just possible that they may exist in areas that are poorly surveyed, such as the fens. The overall distribution of the species is still poorly understood and it is unclear how much of a threat they pose to our native amphibian species (Beebee, 2007).

Common Wall Lizards are sufficiently common in the UK to form breeding populations but these occur only in the south of England (Gleed-Owen, 2004). The specimen from Cambridgeshire probably perished as it would be unlikely to be able to survive in its new environment. The other escaped reptiles mentioned above may have suffered the same fate. However, climate change is opening up new opportunities and some species, such as the Wall Lizard, have even been able survive in Britain by adopting a different reproductive strategy. In populations in southern England, where the temperatures are 5-10°C lower than in their native range, female lizards retain their eggs for longer and the eggs are present in the soil for shorter periods of time (While *et al*., 2015). This adaptation highlights the plasticity in some species allowing them to adapt to new environments. Conversely, climate change may favour introduced species at the expense of native species (Araújo *et al*., 2006).

Each of the animals that were in GM's care after their discovery (either as stowaways or escapees) were rehomed after a six week quarantine period (or after enough time has elapsed to give a parasite-negative stool sample). Faecal samples were checked for internal parasites since these could easily be transferred to native species, where they may be detrimental. The parasitic worms shed by the *S. gutturalis* have yet to be analysed and their threat evaluated.

Non-native species can also be vectors of fungal infections. In 2013 a species of chytrid fungus, *Batrachochytrium salamandrivorans*, caused a drastic decline in Fire Salamanders (*Salamandra salamandra*) in the Netherlands (Martel *et al.*, 2013). In subsequent laboratory tests the fungus was shown to be deadly to 41 of 44 Western Palearctic salamander and newt species (Martel *et al.*, 2014). The disease is believed to have been spread by Asian newts via affected native amphibians in the UK but careful monitoring seems sensible.

Future surveys are needed to establish a more complete overview of non-native species that may have been overlooked in Cambridgeshire and more attention needs to be paid to their potential introduction routes. In the case of reptiles and amphibians this is mainly through the pet trade or the shipment of goods. Pet owners need to be informed how to responsibly rehome a pet if it is no longer wanted. Releasing unwanted pets into the wild is illegal but some pet owners seem to be oblivious of this fact. In terms of the shipping introduction pathway, not much can be done except the implementation of more stringent screening protocols in areas where animals are likely to stowaway or come into contact with transportation vehicles.

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Nightingales at St Ives Meadow Lane pits 2012-2016 and in nearby areas 1994-2016

Tim Reed

Abstract

Nightingales (*Luscinia megarhynchos*) were surveyed each year at two pits at Meadow Lane, St Ives, Huntingdonshire between 2012 and 2016. Numbers of singing males on individual visits varied between two and seven in any year-adding c. 10% to the previously reported number of birds in the county. Earlier records suggest that Nightingales bred there from the late 1990s, but there were no records between 2006 and 2011. Variations in numbers from year to year are typical of central Ouse Valley gravel pit populations. The site may well be

important for other species, as Cetti's Warbler (*Cettia cetti*) colonised the area in 2015.

Introduction

The Nightingale is listed in Cambridgeshire Bird reports as an uncommon breeder, mainly in the west of the county of Cambridgeshire (Cambridgeshire Bird Report, 2013), with most recorded from former gravel pits (Bacon et al. 2013) including this site. Between 1994 and 2000, when detailed data began to be published in the Cambridgeshire Bird Report (Cambridgeshire Bird Club), numbers of singing males in Cambridgeshire varied from 58 in 1994 to a maximum of 117 in 1999. Between 2001 and 2013, numbers of singing males in the county varied annually between 52 and 90 (Cambridgeshire Bird Report 2013), although the 2012 BTO Nightingale survey estimated a minimum of 120 singing males in Cambridgeshire (Bacon et al. 2013).

Meadow Lane pits near St Ives (also known as the St Ives lakes carp fishery or St Ives Gravel Pits) is amongst a range of former gravel pit sites listed as supporting Nightingales in the Cambridgeshire Bird Report 1994-2014.

From birds heard on pre-dawn visits in May 2011, it was clear that the pits still supported singing male Nightingales. Surveys of Nightingales at Meadow Lane Pits were therefore undertaken between 2012 and 2016.

The site

The Meadow Lane pits were worked for gravel between 1961 and 1967 (Milne 1974), having previously been a mix of arable and pasture, bounded predominantly by Hawthorn (*Crataegus monogyna*) hedges. The western end of the pit to the north of Meadow Lane (Pit 1 TL327713) was worked by direct open excavation, forming a large open area of water. The eastern end was excavated by a strip system, leaving occasional baulks of gravel between the former excavated strips. These still survive. Although becoming eroded from wave action, the remaining baulks provide access into parts of the pit away from the southern boundary, and break up the area into small bays and lagoons, in contrast to the open area of water at the western end of the pit. The baulks are vegetated by a range of willows (*Salix* spp.) up to 12m tall, as well as smaller willows pollarded or coppiced to allow access openings for use by anglers on the highly-rated Carp (*Cyprinus carpio*) and Pike (*Esox lucius*) fishery. The site is accessible by public footpath. The main body of the western end is used by the Hunts Sailing Club. The remaining baulks stop access by boats.

Pit 2 (TL319707) is a single open waterbody, now to the south west of the guided busway from St Ives to Cambridge which follows the old railway line. Pit 2 differs from Pit 1 in having two wooded islands, with increasingly mature willows approximately 12m tall. Unlike the baulks in Pit 1, there is no public access on foot to the islands, so that all assessments rely on song and other calls from the pit margins. Almost all of the Pit 1 margins are used by fishermen, sometimes overnight, risking disturbance to the birds.

Methods

Each year between 2012 and 2016, between three and five visits to the site were made between the end of April and late May. Using the same route on each occasion (though route direction was switched between visits to reduce the possibility of directional bias on recording), survey visits took place in the early morning and late evening, plotting birds heard, or seen, on a 1:10,000 scale map using standard Common Bird Census (CBC) notations (Gilbert et al 1998), in line with the 2012 Nightingale survey methodology (Conway & Marchant 2012). On each visit the maximum number of singing males was recorded, and locations transferred to a summary visit map to identify potential territories using CBC methods (Gilbert et al 1998, Bibby et al 2000). Territories were estimated, based on at least two vocal registrations in close proximity at least 10 days apart.

Results

The maximum number of birds varied between years (Table 1), with numbers not dependent on number of surveys, or the number of evening (e) or morning (m) visits. In most years there were birds recorded only by single registrations, and as these were not counted as potential territories the minimum number of territories is lower than the maximum number of males on any one visit.

	Visit 1	Visit 2	Visit 3	Visit 4	Visit 5	Visit 6	Population estimate-minimum territories
2012	12. 5 (m) 6	13.5 (m) 5	17.5 (e) 6	20.5 (e) 2	27.5 (e) 1		5
2013	1.5 (e) 7	11.5 (m) 4	18.5. (e) 4				6
2014	29.4 (e) 0	3.5 (e) 2	4.5 (e) 3	14.5 (e) 3			2
2015	1.5 (e) 3	5.5 (e) 5	12.5 (m) 3	21.5 (e) 4			5
2016	6.5 (m) 1	9.5 (m) 0	10.5 (m) 2	14.5 (e) 4	20.5 (e) 1	9.6 (e) 0	2

Table 1. The dates (day.month), times of day (m = morning, e = evening) and maximum numbers of singing males recorded per visit and territory minima 2012-15

Discussion

Meadow Lane Nightingales 2012-2016

In Milne's report of his 1962 - 1971 surveys at Meadow Lane (Milne 1974) there was no mention of Nightingales. Instead, his breeding lists were dominated by species such as Coot (*Fulica atra*) using open water and Sand Martin (*Riparia riparia*) using the exposed gravel banks. He recorded no woody shrub cover.

Google Earth images show that by 1999 the edges of the baulks at the eastern end of Pit 1 were beginning to be dominated by willows, with the islands in Pit 2 fringed by willows, but with open centres. By 2008 scrub and willow cover had expanded on all sides of Pit 1, with the islands in Pit 2 almost tree covered, along with the pit margins. By 2012 no open areas were visible on the islands in Pit 2.

Apart from land at the western edge of Pit 1, no areas of the pits appear to have been managed, other than occasional localised cuttings of openings of 4-5m for fishing access. Once cut, these are kept open. The main body of Pit 1 is open water, and used for sailing. Land in the western corner is managed by periodic cutting of small areas of Aspen (*Populus tremula*) and willow, with cuts of c20m x 20m fringing the pit made annually on an approximately 6-year rotation. Areas cut in 2010 were re-cut in 2016.

There appear to be few clear patterns in areas used by singing birds between years. For example, the islands in Pit 2 supported at least one territory in 2012, 2013 and 2014, but a single registration in 2015, and none in 2016. Similarly, the western corner of Pit 1 supported a single bird in 2012 and held one territory in the same area in 2013 and 2016 in mature (5m) scrub willow, but had no birds in 2014 or 2015. Superficially, the area appeared little different in 2015 and 2016. Similar patterns of major switches between years in ostensibly similar habitat were noted at Little Paxton when the areas occupied in 1998 and 1999 were radically different (Cambridgeshire Bird Report 1999).

The most important area in all years was the eastern end of Pit 1. A meshwork of multiple willow-covered baulks, partly eroded through, and a smaller area of open water fringed with 10-15 m tall willows, this supported at least two territories every year, with territorial males counter-singing across the open water.

Even though numbers of singing males varied between years, the site appears to be important in terms of the annual Cambridgeshire Nightingale population. If the 2012 and 2013 numbers of singing males are compared with those published in the Cambridgeshire Bird Report for the same years, then 2012 held an additional 11% of singing males, with 9% in 2013.

Meadow Lane Nightingales 1994-2012

Cambridgeshire Bird Reports detail the general locations of singing male Nightingales in most years, but do not list all sites. For example, in 2014 it was noted that, in addition to specified sites, there were “singles at 14 further sites”. This, and the possibility of the absence of surveys, or of un-submitted records, means that it is uncertain whether the status of nightingales at Meadow Lane is fully represented in the Reports in all years. In addition, several of the reports refer to general locations such as “St Ives” (2005), or to the” populations along the disused railway track between St Ives and Fen Drayton” (1999-2003). As a result, it is uncertain if all of the 1999-2005 records (Table 2) refer to Meadow Lane Pits, or to nearby strips of fen woodland.

Assuming that the early records are from the Meadow Lane pits, the first records of singing males (1999) are in line with the development of willow shrub cover shown on Google Earth images for 1999. Except for 2001, singing males were noted between 1999 and 2005. After that, the status is unknown until the start of the current round of surveys in 2012. As there is no indication of the level of survey effort before the first records in 1999, or between 1999 and 2005, it is hard to be categorical about the trends in the number of singing

males over that period, but they generally follow those for Marsh Lane, 2 km away (Table 2).

Ouse Valley Nightingale populations

As Bacon et al (2013) noted, the former gravel workings along the Ouse Valley have become increasingly important for Nightingales, alongside a drastic decline in woodland populations, supporting c. 50% or more of the singing males in Cambridgeshire over the last decade or more (Table 2).

It is clear that the numbers of males reported vary, often substantially, between years at individual Ouse Valley sites (Table 2). For example, the normally large populations at Little Paxton dropped from 19-25 in 2010 to six in 2012, rising to 23 in 2013, and rose slightly to 24 in 2014. At the same time the Grafham population dropped from twelve to eight, fell to a minimum of five males, and rose to 14 in 2014. Similarly, males at Marsh Lane rose to a peak of 13 in 2008, dropping to eight in 2010, then to zero in 2011, before recovering to six or seven males in 2012-2014. In this sense, variation of up to 50% between years in 2012 and 2016 at Meadow Lane is typical of Ouse Valley populations.

It was noted earlier that patterns of spatial occupancy varied at Meadow Lane between years, with some core areas used in each year. The only readily comparable set of mapped data is for Little Paxton (www.paxtonpitsnaturereserve/wildlife/birds/star-birds/nightingales) which showed year-to-year spatial changes, and it was noted that "Their distribution at Paxton varies each year". As at Paxton, it is likely that some of the changes in occupancy at Meadow Lane are linked to the development of suitable density rotational scrub.

Conclusions

The Meadow Lane Pits 1 and 2 are important in terms of Nightingales within the county, contributing an extra 5-10% to existing annual estimates for Cambridgeshire. Patterns of rises and falls between years are in line with other Ouse Valley sites. The additional males at Meadow Lane confirm the importance of the Ouse Valley pit populations in Cambridgeshire. In addition, singing male Cetti's Warblers on the southern margins of pit 1 were recorded in both 2015 and 2016, suggesting that, with Reed Warbler (*Acrocephalus scirpaceus*), Sedge Warbler (*Acrocephalus schoenobaenus*), Blackcap (*Sylvia atricapilla*), Garden Warbler (*Sylvia borin*) and Hobby (*Falco subbuteo*), amongst other species noted on Nightingale surveys, the Meadow Lane pits may deserve a little more scrutiny in future.

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Year	No Males	No sites	St Ives Pits	Marsh Lane Pit	Woolpack Pit	Fen Drayton Lakes	Fenstanton Pit	Little Paxton Pit	Godmanchester Pit	Hemingford Grey pit	Needing-worth Pit	Buckden Pit	Grafham water	Comments
1994	58	16	0	0	0	0	0	14-23	0	0	0	0	9	
1995	65	18	0	1*	0	0	0	12-23	0	0	0	0	unknown	
1996	83	20	0	1	0	2	0	25	0	0	0	0	12+	
1997	73	20	0	1	0	0	1	22	0	0	0	0	12	
1998	87	24	0	2	0	0	1	26	0	0	0	0	15	
1999	11	34	1	3	0	1	0	25**	0	1	0	0	20	** distribution very different between years; 1999 Report states higher numbers in 1999 possibly linked to increased survey effort
2000	66-	27	1	0	0	1	0	25	0	0	0	0	2	
2001	52	15	0	0	0	1	0	23	0	0	0	0	1	
2002	72	22	4***	6	0	1-2	0	28-29	0	0	0	0	3	*** report refers only to "population of 5-6 along the disused railway track between St Ives & Fen Drayton". St Ives 5.5% of Cambs total in 2002; 5.2% 2003; 2.5% 2004
2003	96	30	5	6	0	3	0	28	0	0	0	0	13	
2004	83	19	2	3	0	4	0	28-29	0	0	0	0	6	
2005	90	26	1***	7	7	1	0	26	0	1	0	0	6	**** referred only to as "St Ives" in Report; presume Meadow Lane
2006	89	22	2	9	0	2	0	28	1	0	0	0	8	
2007	70	15	?	8	0	1	0	29	0	0	0	0	2	? uncertain if status reflects absence or no survey
2008	83	18	?	13	1	0	0	20+	0	0	0	2	8	? uncertain if status reflects absence or no survey
2009	64	13	?	11	0	1	0	21	0	0	1	0	12	? uncertain if status reflects absence or no survey
2010	46	15	?	8	0	0	0	19-25	0	0	0	1	4	? uncertain if status reflects absence or no survey
2011	56$^{\Delta}$	19$^{\Delta}$	+	0	0	2	0	10	4	0	0	0	7	+ no survey- but birds singing
2012	52$^{\Delta}$	16$^{\Delta}$	6	7	0	1	0	6	1	0	0	0	8	$^{\Delta}$ number excludes Meadow Lane survey data Meadow Lane population add 11.5% to Cambs population
2013	78$^{\Delta}$	18$^{\Delta}$	7	6	2	1	0	23	1	1	0	0	5	Δ number excludes Meadow Lane survey data; Meadow Lane population add 9% to Cambs population
2014	96$^{\Delta}$	20$^{\Delta}$	3	6	0	4	0	24	1	1	0	0	14	Δ number excludes Meadow Lane survey data; Meadow Lane population add 3.1% to Cambs population
2015	Np	Np	5	Np	Np	Np	Np	Np	Np	Np	Np	Np	Np	Np= Not yet published
2016	Np	Np	4	Np	Np	Np	Np	Np	Np	Np	Np	Np	Np	Np= Not yet published

Table 2. Numbers of male Nightingales at St Ives (Meadow Lane) pits 1994- 2016, with other sites in the Ouse Valley, and total number of males and sites each year in Cambs

Source: Cambridgeshire Bird Report 1994- 2014 & author's surveys at Meadow Lane 2012-2016

Early-purple Orchids and Muntjac Deer in a Cambridgeshire wood

Arnold Cooke & Martin Baker

Introduction

Raveley Wood is 5.6 ha in size and is owned and managed by the Wildlife Trust. Amongst other features, it is known for its display of spring flowers, including Early-purple Orchid (*Orchis mascula*). In north-west Cambridgeshire this species is "generally and widely distributed where there is woodland" (Wells, 2003). The Muntjac (*Muntiacus reevesi*) is an introduced species that began colonising woods in this area in the second half of the twentieth century (Cooke, 2013). This article draws together information from independent surveys on Early-purple Orchids and Muntjac that began in Raveley Wood in the mid-1990s.

Martin Baker first became aware of the orchids in Raveley Wood in 1985 and, over time, he realised that individuals were long-lived, flowering in the same place in successive years. On becoming warden of the wood in 1994, he was saddened that the number of inflorescences had dwindled to only eight. He decided to clear elm suckers (*Ulmus* species) that were shading the orchids and then survey the population annually to see whether numbers recovered and what happened in the longer term. The late Terry Wells advised that this was an opportunity to begin a unique study on this species – and since 1996 the same protocol has been followed annually.

By the early 1990s Muntjac occurred in local woods, with an especially high density in Monks Wood, which is about 4 km from Raveley Wood. Their browsing and grazing affected many conservation features in Monks Wood, including Early-purple Orchids. By the mid-1990s the only specimens known to be flowering occurred in one small deer-proof exclosure (Cooke, 2006). Since 1998, Muntjac numbers have been controlled in Monks Wood – and Early-purple Orchids have increased in abundance. Arnold Cooke initially studied Raveley Wood as a low impact site for comparison with Monks Wood (e.g. Cooke, 1997, 2006), but he has continued to survey deer and their damage in Raveley Wood. Studies here and in Lady's Wood, only 600 m to the north, now provide novel information on long-term changes of Muntjac in small woods.

The aims of this article are (1) to describe changes in populations of the two species, (2) to determine whether grazing on orchid inflorescences was related to Muntjac density and (3) to try to decide whether Muntjac affected numbers of orchids. The broader aspects of orchid ecology are not being considered at this stage.

The surveys

Early-purple Orchids occur in one small area of Raveley Wood measuring roughly 20×15 m. Moderately dense canopy cover of Field Maple (*Acer*

campestre) and Ash (*Fraxinus excelsior*) has evidently been sufficient to prevent colonisation by Bramble (*Rubus fruticosus*). The understorey is dominated by elm suckers. Cutting of sucker regrowth is undertaken at regular intervals as required. A grid of wooden reference posts was installed in 1996 and these were replaced with metal posts when the wooden posts began to rot. Orchids are typically surveyed at peak flowering during the last week of April or the first week of May by two teams, each of three or four recorders. Distances from posts to orchids are measured and triangulation enables the position of each orchid to be fixed. It is relevant to this article that orchids are recorded as vegetative or flowering and that each grazed inflorescence is noted.

A method of scoring signs is used as a means of monitoring how the deer population and the damage it causes change over time (Cooke, 1997, 2006). Muntjac deer scores are a measure of deer density: they are based on the frequency of encounters with deer and on the frequency of seeing dung, slots (hoof prints) and paths. Deer scores can range from 0 to 12. Damage scores are based on the frequency of browsing, breakage or fraying on woody vegetation, on the extent of browse lines and on the amount of grazing on ground vegetation. Damage scores range from 0 to 15. Scoring has been undertaken during February or March each year from 1994 until 2016, except in 1995 and 1999. Because scoring is carried out before Early-purple Orchids flower, grazing on orchid inflorescences is not part of the assessment. In addition to scoring, impact of deer is categorised by a related method into one of seven stages from no impact up to severe (Cooke, 2009); results are briefly referred to in this account.

Slugs and snails will graze orchids, especially the leaves (e.g. Wells & Cox, 1991). However, gastropods were rarely seen in the orchid plot and damaged plants had lost the entire flower-head, which is typical of damage inflicted by larger mammalian grazers. Rabbits (*Oryctolagus cuniculus*) are potential grazers of Early-purple Orchids (Revels, Boon & Bellamy, 2015) and they occur in the wood. As a measure of Rabbit density, numbers seen per hour during scoring visits were recorded from 1997 onwards. Signs of other species of deer were also recorded during scoring of Muntjac signs.

The surveys did not have fixed end-points, but neither author expected at the outset that recording would still be continuing in 2016.

Results

Information on orchids is summarised in Figure 1. Data for 1995 have been omitted from the graph because no attempt was made to record grazing, but eight inflorescences and 20 vegetative plants were counted that spring. Overall, from 1996 until 2016, there were significant increases in numbers of intact inflorescences and vegetative plants and a significant decrease in grazed inflorescences. The survey can be divided retrospectively into three time periods:

- 1995–2004, when vegetative plants increased significantly, but inflorescence numbers remained fairly stable despite an increase between 1995 and 1996. Grazing levels were variable, sometimes being high.

- 2005–2008, when numbers of vegetative plants varied considerably and numbers of inflorescences were higher than previously, but grazing levels were much lower. The fact that the first four months of 2005 and 2006 were comparatively dry while those months in 2007 and 2008 were approximately twice as wet may help to explain the high numbers of inflorescences in the last two years. Other than that, there were no clear environmental reasons for the fluctuations, such as the huge increase in the total number of plants in 2006.
- 2009–2016, when overall numbers of plants were very stable but numbers flowering varied. Little grazing occurred. Record numbers flowered in 2013 after a cold winter; however 2009/10 was also a hard winter but relatively few orchids flowered in the spring of 2010.

Deer and damage scores are summarised in Figure 2. Scores increased to a peak in 2001 as deer were colonising the wood. Impact from deer was "moderate" at its peak, declining to "low" by 2011. Orchids and deer signs were both recorded in 20 years (1996–1998 and 2000–2016). There was a significant relationship between percentage of orchids grazed and deer score (Figure 3). Less than 10% of inflorescences were grazed unless the deer score exceeded 4; then the level of grazing was variable, ranging between 0 and 64%. The relationship between grazing and damage score was similar, with very low levels of grazing unless the damage score was higher than 6 (Figure 4).

Signs of Roe Deer (*Capreolus capreolus*) were noted during scoring in five years (including the last three), with evidence of Chinese Water Deer (*Hydropotes inermis*) in a single year. The contribution of these two species to woodland damage was considered to be comparatively slight. Number of Rabbits seen per hour during scoring visits ranged from 0 (in four years) up to 4.2. However, the amount of grazing on orchids did not increase in years when the number of Rabbits was higher, suggesting that Rabbit grazing was not important in this context.

Discussion

Reasons for the decrease in deer and damage scores from 2001 (Figure 2) are unclear. The Wildlife Trust sanctioned deer control in the wood from the year 2000. Initially, an average of one deer per year was culled, which will have helped reduce deer density, but it seems that no deer were removed after 2004. While the introduction of stalking was followed by a reduction in scores, similar trends in scores were seen in nearby Lady's Wood, where there was no stalking. It is likely that browsing damage to woodland structure and species composition lowered the carrying capacity of both sites. Later, when the wood had recovered to some extent, substantial recolonisation by deer did not occur, perhaps because widespread control had reduced their density in the surrounding countryside.

The relationship between amount of grazing and deer score (Figure 3) indicated that there was a deer density above which grazing was elevated. At these higher deer densities, however, the amount of grazing was variable and only weakly related to density. Putman (2003) discussed the complex relationships between damage in woodland and deer density and concluded that they were usually of this type. The reason for some of the high variability in

grazing levels above the density threshold at Raveley Wood may be connected with the size of wood and with turnover of resident deer. The wood is smaller than the typical home range of a single Muntjac (Chapman & Harris, 1996), so grazing on orchids will be heavily dependent on the preferences of and opportunities for individual deer.

Figure 4 shows that grazing on orchids did not increase until a damage score of seven was reached. In years with intermediate damage scores, increasing amounts of browsing and fraying were noted on woody vegetation in February or March without any significant grazing on orchids being found later in the spring. So Early-purple Orchids were less susceptible than some palatable, woody species. Grazing levels on leaves and inflorescences of Bluebell (*Hyacinthoides non-scripta*) were recorded in Raveley Wood by Arnold Cooke in 1995 and from 1998 until 2005; the highest percentage of grazing occurred on Bluebells in 2000, the same year that grazing on orchids peaked.

Revels, Boon & Bellamy (2015) drew attention to the reduction of seed production because of deer-grazing in Bedfordshire woods. So did grazing by Muntjac affect orchids in this way in Raveley Wood? Development from seed to flowering in Early-purple Orchid can take up to eight years (Harrup & Harrup, 2005). Density of Muntjac increased up until 2001 because of colonisation. In terms of number of inflorescences grazed, the peak years were 1997–2001. However, there was some improvement in orchid numbers during this time, after the start of habitat management in 1995. If there was any impact from Muntjac, then it was more than compensated for by the management. After 2001, deer density decreased and the orchid population generally increased, but it fluctuated before reaching a more stable level in about 2009. While there was an inverse correlation between deer density and orchid numbers, this did not necessarily prove cause and effect: it could have been the result of different processes operating on the two species – culling of deer and reduced suitability of their habitat and continued management of orchids. There was no persuasive evidence that Muntjac impacted on this particular population of orchids, although they did reduce the number of flowers that could be seen by visitors, particularly during 1997–2001. It should be noted that deer impact peaked at a "moderate" level in Raveley Wood, whereas it reached "severe" in Monks Wood (Cooke, 2009).

Coppicing and clearance can lead to a flush of flowering orchids (Foley & Clarke, 2005; Revels, Boon & Bellamy, 2015). Permanency and signs of eventual stability have been features of the Early-purple Orchids during this study in Raveley Wood; they are considered to be the result of (1) regular management to control elm regrowth and (2) maintenance of a sufficiently dense tree canopy to prevent colonisation by Bramble. Elsewhere in local woods (e.g. Archers Wood) there have been examples of a boom in orchid numbers after clearance of woody vegetation, followed by a decline as competing species recover. A density of Muntjac high enough to control Bramble and woody regrowth would be expected to suppress or eliminate Early-purple Orchids, as happened in Monks Wood.

Some idea of the potential for Muntjac to have grazed Early-purple Orchids more widely in Cambridgeshire can be gleaned from Muntjac scores derived by Arnold Cooke over the last 20 years in woods managed by the Wildlife Trust. Out of the 19 woods without Fallow Deer that were visited, eight had Muntjac deer scores in the range 5–7 and one (Littless Wood at Grafham Water) had a higher score. Almost half of the woods had, at some time, a Muntjac score that was associated with elevated levels of grazing in Raveley Wood. Matt Hamilton of the Wildlife Trust has informed us that (1) most of their woods have Early-purple Orchids and (2) they were first seen in Littless Wood in 2008, when several instances of grazing were noticed and plants were subsequently caged. Thus, grazing is likely to have been widespread but rarely serious in the county and there has been a general decline in Muntjac impact since the year 2000 (Cooke, 2013).

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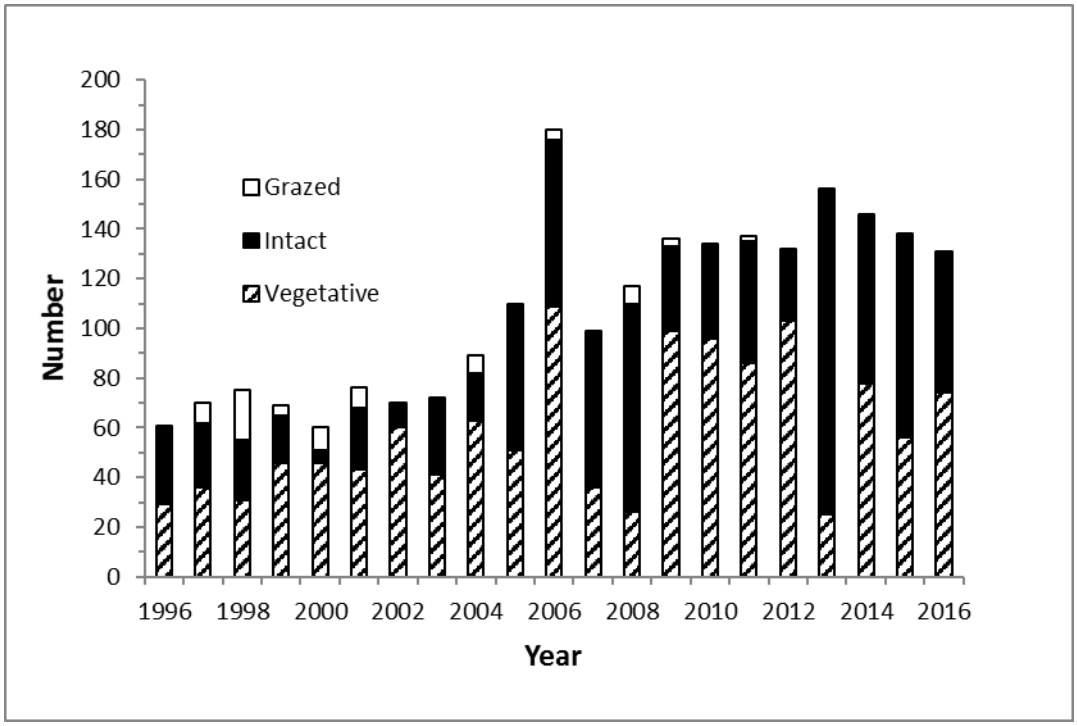

Figure 1: Number of orchids counted in 1996–2016: vegetative plants (hatched), intact inflorescences (black), grazed inflorescences (white)

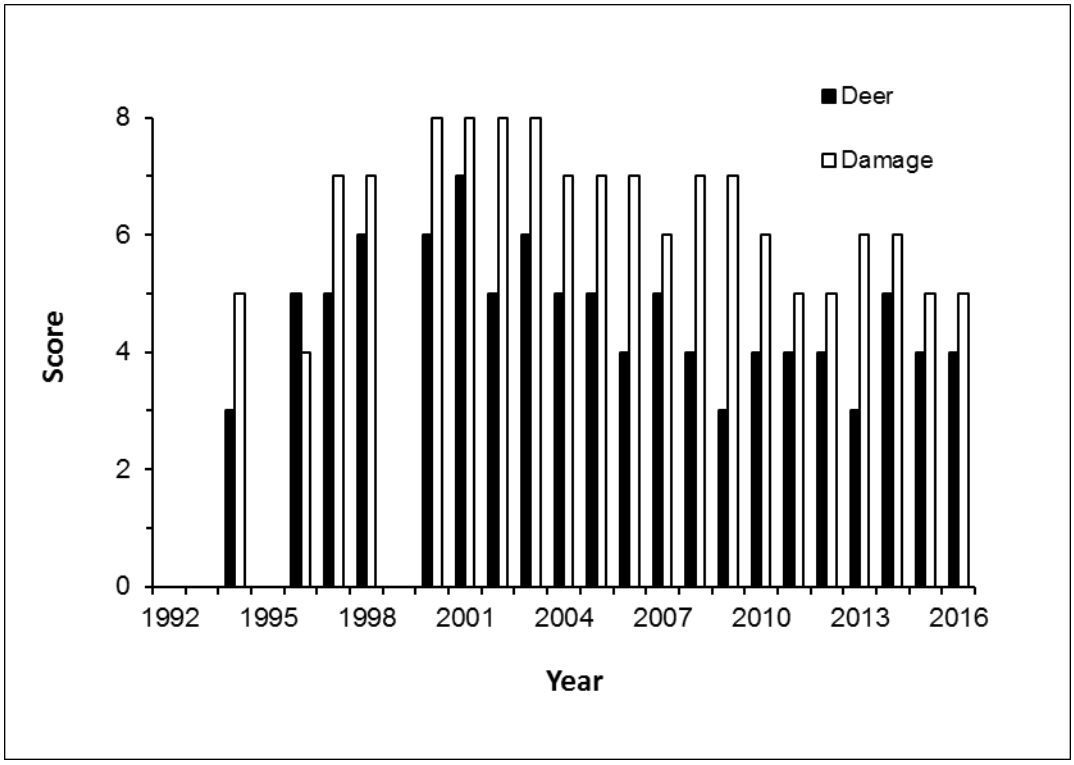

Figure 2: Muntjac scores in 1994–2016: deer scores (black bars), damage scores (white) (No scoring was undertaken in 1995 or 1999.)

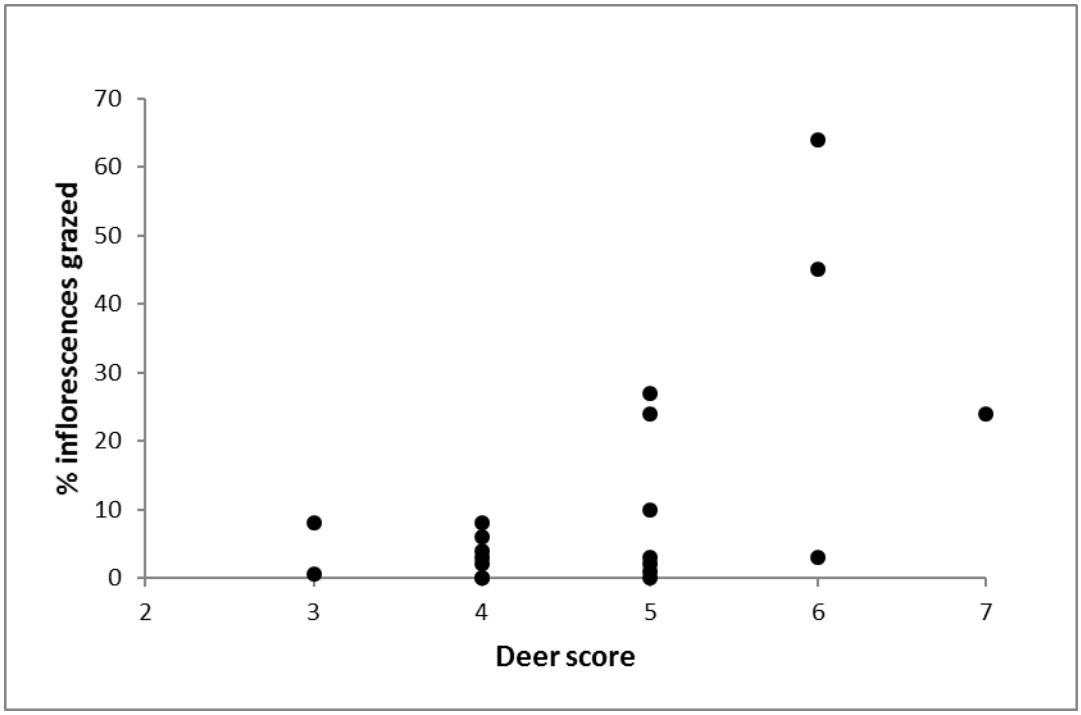

Figure 3: The relationship between the percentage of orchid inflorescences grazed and Muntjac deer score for the 20 years when both were recorded

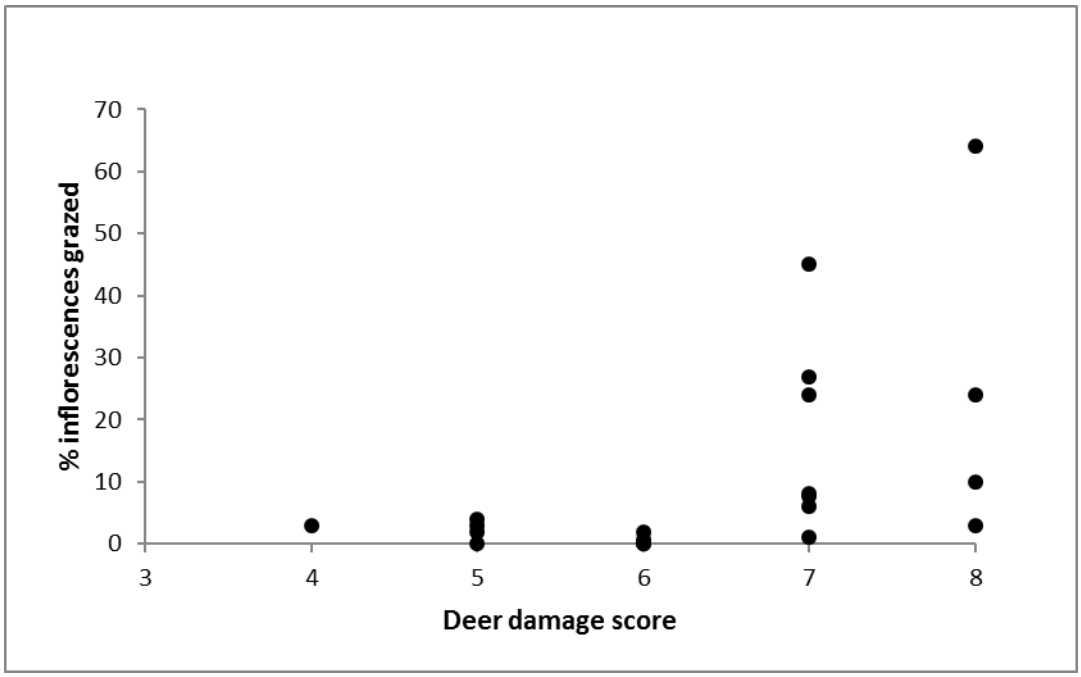

Figure 4: The relationship between the percentage of orchid inflorescences grazed and Muntjac damage score for the 20 years when both were recorded

Grantchester Meadows

A report on the CNHS field studies in 2016

Jonathan Shanklin

For its 2016 field studies the Cambridge Natural History Society re-visited the meadows along the Cam between Newnham and Grantchester, first studied ten years earlier. The area of study was increased to cover the three monads wherein the meadows lie in order to provide information for the NatHistCam project. In general the meadows have changed little since 2006, though one has suffered from further neglect, whilst another is in better condition. Altogether we recorded over 450 species of vascular plants during the year, but failed to find 100 previously reported.

Introduction

The Grantchester meadows were described in the report in *Nature in Cambridgeshire* (2008) and have changed little over the last ten years. We made some changes to the recording units for the 2016 field studies, simplifying them to include all parts of the three Ordnance Survey monads (grid squares) TL4355, TL4356 and TL4456 in order to provide more information for the NatHistCam project (Hill, 2016). We recorded in more detail Skaters' Meadow, Little Fenn, Grantchester churchyard and Cambridge Lakes; these are described further below. The land south and east of the River Cam owned by Trumpington Estates was not recorded. As has been the case throughout the CNHS surveys, the participants tended to concentrate on recording vascular plants, with only casual records being made of other phyla. If you would like to see a change in this balance do come along on future outings and add your expertise.

The vascular plant records are in the Botanical Society of Britain & Ireland (BSBI) database, those of the bryophytes in the British Bryological Society database and all the other records have been lodged with the Cambridgeshire and Peterborough Environmental Records Centre (CPERC). In this report species counts refer to counts of separate entries of taxa in the MapMate Taxa Library. A blog giving further details of the monthly visits is on the CNHS web page.

At the time of the previous survey, botanical records for common species were mostly recorded by site centroid, tetrad or even at hectad level. All species are now recorded with monad precision, resulting in many "new" records at monad level. Part way through the year there was a change in the botanical recording cards from the previously used standard BSBI forms that were arduously marked up by hand using Adobe software. Jonathan Shanklin developed software that allowed simple printing of site specific record cards that marked species previously seen with their date-class, and in the case of species

on the county Rare Plant List, the year of last sighting. The cards also flagged common species that had not yet been recorded.

The Skaters' Meadow complex

Skaters' Meadow itself is managed by the Wildlife Trust. It is a very good example of a wet grazing meadow, a type that has largely disappeared from the county. The meadow remained very wet until mid-summer. There was a hay cut, which was baled, though there was no aftermath grazing. The higher ground nearest the road is becoming richer in nutrients and the grass here is becoming ranker. The skating attendant's shelter has been renovated. Round-fruited Rush (*Juncus compressus*) and Fen Bedstraw (*Galium uliginosum*) together with some casual species were not re-found. In contrast many species were added, most notable being Common Sedge (*Carex nigra*). This is a scarce species in the county, and it was surprising that it had not previously been seen given that the site has a long history of botanical recording. Tubular Water-dropwort (*Oenanthe fistulosa*) was still present. In 2006 this species was classed as Least Concern on the GB Red List, but in the new England Red List (ERL) it is given as Vulnerable. Overall the Meadow has 38 "axiophytes" (species that are not too common and not too rare which are indicative of good sites) including species such as Slender Tufted-sedge (*Carex acuta*) and Ragged-Robin (*Silene flos-cuculi*).

The adjacent "Lamppost" meadow to the east is under separate management and has not been grazed for a few years; its condition is declining. We failed to re-find Pepper Saxifrage (*Silaum silaus*), but a little Marsh Ragwort (*Senecio aquaticus*) was still present. There is some Tubular Water-dropwort in the seasonal ditch in the field to the east, and the population could perhaps be increased if the management of the meadow was improved.

Riverside meadows

Once upon a time the meadows along the Cam must have been similar to Skaters' Meadow, but in the main there are now few species of botanical interest. They are still grazed, and indeed the most northerly of the meadows in Grantchester parish is now in slightly better condition than it was ten years ago. Although Little Fenn was recorded separately, it is little different to the adjacent areas, though the hedge to the west was sufficiently thick to allow growth of epiphytic liverworts, most notably *Cololejeunea minutissima*. County records of this recent colonist are concentrated in the Cambridge area, though this perhaps just reflects where its main recorder lives. The footpaths across the meadows continue to be well used by the ever-increasing population of Cambridge, and can become very muddy in wet weather. Other visible signs of pressure on the area include frequent remains of barbecue sites and vandalism of fencing to provide fuel for them.

Grantchester Churchyard

The churchyard is well-maintained and whilst there are no dedicated wildlife areas, there is good habitat within it. We never encountered a vicar scything the grass (more is the pity), but did spot the fake snow and plastic clematis that had been used during filming of the Christmas special episode of "Grantchester". The most unexpected plant species found was Least Pepperwort (*Lepidium virginicum*) growing on a recent grave. This had not been seen in the county since 1989, and here may have been introduced from a floral wreath. During the year 154 plant species were recorded from the churchyard, with 46 species added to the churchyard list, and 75 not re-found in the total of 229. The rather large proportion not re-found may reflect a change in recording practice after which it was decided to re-record species already found in the monad, however despite a good search Field Scabious (*Knautia arvensis*) and Hoary Plantain (*Plantago media*), both ERL Near Threatened (NT), were not re-found.

Cambridge Lakes

The Cambridge Lakes golf course was not part of the 2006 survey, and proved a most interesting place to visit after permission was obtained in the second half of the year. The course was constructed some 20 years ago on former arable land, with groves of trees and three lakes dividing the fairways. An old ditch runs across the western half, and this remains floristically rich, with plants such as Field Scabious and Agrimony (*Agrimonia eupatoria*). One of the small lakes near the club-house had proven to be too much of a hazard, and was turned into a rough marshy scrape by the addition of sugar-beet washings from British Sugar at Bury St Edmunds. In this there was a patch of Marsh Pennywort (*Hydrocotyle vulgaris*), last seen in the Cambridge area on "Trumpington Moor" in 1820. According to the course owner, it had been noted by one of the older lady golfers, who apparently exclaimed "Oh Fen Pennies, I haven't seen them since I was a child". Although not yet scarce in Cambridgeshire, the plant is in decline and is NT on the ERL. The only CNHS visit was primarily for lichens, although mosses and some vascular plants were also noted. Mark Powell found a couple of first county records, and after he left a patch of Dog Lichen (*Peltiger*a sp) was noted on the car-park verge. Further visits will be made in 2017 to complete the botanical survey of the site. To date 188 plant species have been recorded.

The River Cam

Attempts by volunteers and the Environment Agency have been made to eradicate two invasive species. Indian Balsam (*Impatiens glandulifera*) has been controlled, although it remains occasional on the river bank, particularly in hard to reach places. Floating Water-pennywort (*Hydrocotyle ranunculoides*) has spread enormously over the last few years, which have not seen particularly hard winters, and in places it now threatens to close the river to punters. There is no

great evidence of further decline in Pondweeds (*Potamogeton* spp.) in the river, though only two species were seen this year: Shining Pondweed (*P. lucens*) and Perfoliate Pondweed (*P. perfoliatus*), both of which are in decline in England.

Monad TL4356

In addition to the Grantchester meadows and the northern part of the "Lamppost" meadow, this monad also includes Grantchester Road, which has a permissive path running alongside it, the River Cam, arable fields, a college sports-ground and allotment gardens, though these were only briefly visited. 96 "new" species were recorded, bringing the total for the monad to 245, close to the median of Cambridge monads. Rye Brome (*Bromus secalinus*) was recorded from the margin of a wheat field crossing this and the adjacent monad to the south. Although given a GB status of Vulnerable, and NT on the ERL, it seems to be on the increase with a total of 18 recent records from the county.

Monad TL4456

In addition to the major part of Skaters' Meadow and Cambridge Lakes, this monad includes land belonging to Trumpington Estates, Latham Road, the A1134, the River Cam and playing fields. 195 "new" species were recorded, giving a total for the monad of 346, with 28 not re-found. Species not re-found included Shining Pondweed (*Potamogeton lucens*) seen in the River Cam in 2009 and Water Dock (*Rumex hydrolapathum*) seen on the Trumpington Estates land in 2005, where it is likely to be still present. Common Cudweed (*Filago vulgaris*), ERL NT, but common in the county, is present in the grounds of the Perse Girls' School playing fields.

Monad TL4355

In addition to the Grantchester meadows and churchyard the monad includes the village, River Cam and arable land. Not surprisingly this semi-urban monad had the highest species total with 450, though two (Greater Water-parsnip *Sium latifolium* and Pennyroyal *Mentha pulegium*) have not been seen for over a century. The BSBI DDb has a record of Dwarf Elder (*Sambucus ebulus*) from 1958, however this is not listed in the Cambridgeshire Flora Records. One interesting find in the village was Glabrous Whitlowgrass (*Erophila glabrescens*), which was definitively recorded for the second time in the county, although it is probably more frequent than suggested by its current status of "County Rare". Alan Leslie found Slender Rush (*Juncus tenuis*) in the car park of the Orchard Tea Rooms. It is an American alien that arrived in the country in 1795. It is perhaps becoming more frequent in the county and is now present in seven monads. 147 species were "new" and 111 were not re-found.

Other phyla

We made records, mostly casual and non-localised, of fungi, mosses, liverworts, dragonflies and damselflies, butterflies, moths, other invertebrates, birds, and other vertebrates. These have been lodged with CPERC. The fungal foray in October produced few records, largely on account of a very dry autumn up to that point. A few Field Mushrooms (*Agaricus campestris*) were taken home to eat! There is Ash Die-back (*Chalara fraxinea*) in the study area and it will be interesting to see how this will have progressed when the study is next repeated. Seven-spot Ladybirds (*Coccinella 7-punctata*) were the most frequently recorded insects, largely because of recording for the National Ladybird Survey. On New Year's Day we found 68 of them on a bench in Grantchester churchyard. In the spring the churchyard was buzzing with several species of Bee, including the Hairy-footed Flower Bee (*Anthophora plumipes*) and its cuckoo (*Melicta albifrons*). Small Tortoiseshell butterflies (*Aglais urticae*) were seen from April to October. The most frequently noted birds were Mallard and Wood Pigeon; 40 other species were noted. Mole hills were often seen, but the moles themselves were not. Signs of Water Voles (*Arvicola terrestris*) were seen.

Acknowledgments

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Further Reading

The blog describing the monthly visits and giving some details of additional species seen can be read at http://www.cnhs.org.uk/grantchester.htm

For background on monads see for example http://www.bto.org/volunteer-surveys/birdatlas/methods/correct-grid-references

References

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How does your nature smell? Odour and Natural History identification in Cambridgeshire

Toby Carter

"So, do you think this might be Scentless Mayweed?" was the question as a flowering plant was given to me. As sometimes happens in these circumstances I took the name to be a challenge and promptly filled my lungs in an attempt to

prove the name wrong. When I had finished coughing, choking, yes and slightly retching, the comment that followed was “Oh, so probably Stinking Mayweed then. I couldn’t tell because I don’t have much of a sense of smell”. This led me to ponder on a couple of questions. Firstly, why did it not occur to me that a plant labelled ‘scentless' was probably called that because of a relative that wasn’t and secondly, just how important was a sense of smell for a naturalist in Cambridgeshire? The first has led to a lesson learned, and the second has caused me to ask that question of a number of experts.

To the mammalogist it is useful for a definitive identification of otter spraint and apparently helps to warn you that the Cairngorm reindeer herd are resident in Barton.

I didn’t think the world of moss needed a sense of smell but apparently a bryologist finds it useful as an early indicator of the presence of *Lophocolea heterophylla*.

An amateur malacologist will find it useful to positively identify the Garlic Glass-snail (*Oxychilus alliarius*) and differentiate it from other glass snails such as *O. cellarius*. Apparently the smell is emitted after they have been provoked, leaving aside the obvious questions of how one provokes a snail, and how many need to be provoked before you find a garlic snail.

It is of course the worlds of the botanist and the mycologist that benefit most from having a sense of smell to aid identification. Few will forget their first encounter with a Stinkhorn (*Phallus impudicus*) or their visit to the Cambridge Botanic Gardens for the flowering of the Titan Arums (*Amorphophallus titanum*) in 2004 and 2015.

Strong smelling plants and fungi can often be identified from their names. For instance in the plants there is Stinking (Cocklebur, Goosefoot, Hawksbeard, Mayweed/Chamomile, Iris or Tutsan), Fragrant (Agrimony or Orchid), Scented (Mayweed) or Musk (Mallow or Orchid). The scientific specific names can also give the game away with *graveolens* meaning strong-smelling, *foetida*, *foetens (mushrooms)*, *foetidum (mushrooms)* or *foetidissima* for fetid and *rancida (mushrooms)* for, well, rancid. *Pungens* and *aromatica* are also specific names associated with flora but not in Cambridgeshire.

It is useful to be familiar with a range of smells for botanical and mycological identification, for instance Houndstongue (*Cynoglossum officinale*) can be challenging to identify if you don’t know what mouse droppings smell like and familiarity with the smell of billy goats can help to confirm an identification of Lizard Orchid (*Himantoglossum hircinum*). Other smells useful to know are farinaceous or mealy, sometimes subdivided into 3 smell types: strictly farinaceous, cucumber farinaceous and rancid-oily-fishy farinaceous. There is also fishy or shrimp-like, rancid or foetid, foul, phenolic, aniseed, green corn, bleach, swamp gas or coal tar, apricots, almonds and, of course, garlic (Kuo, 2006).

It also seems that people who can identify trees can do so when blindfolded, even though they don't realise they can, having assimilated the smells of the trees as part of their knowledge. So a sense of smell is very useful for natural history identification in Cambridgeshire, even if we don't always realise it.

Sources

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Vascular Plant Records 2016

A.C. Leslie

The records listed below are mainly a selection of those made in the county during 2016, but in a few cases come from earlier years if it is only now that the plants have been determined or reported. They continue to demonstrate a number of trends that have been apparent in recent years, such as the continuing spread of 'maritime invaders' along our road system and the discovery of yet more sites where a flora more typical of sandy ground has been left as a legacy of building and development work. We can probably expect more of this to come. The flow of new aliens also continues, none more surprising than the grass *Sporobolus indicus*, which seems well naturalised on a road verge just north of Great Chesterford. Other plants which are not considered natives in the county, such as Wall Bedstraw (*Galium parisiense*), Four-leaved Allseed (*Polycarpon tetraphyllum*) and *Pastinaca sativa* subsp. *urens* continue to turn up in new localities and are clearly actively spreading. Trying to understand how such species are dispersed is one of the intriguing challenges for the field botanist to unravel.

It is pleasing though to be able to report some positive news about a few native plants. Chief amongst these must be the discovery of an entirely new site for the Fen Dandelion (*Taraxacum palustre*), one of the few dandelions that even non-taraxacologists can deal with! It is encouraging too to learn that *Potamogeton praelongus* may, like *P. compressus*, be extending its range again in the county, as both have been found in Bevill's Leam in the north-west of the county. It is also now clear that the Nene Washes is probably the best area we now have for Early Marsh Orchid (*Dactylorhiza incarnata*) which is now reported from at least eight individual washes, several with over 100 flowering plants and one with about 300! It is perhaps no coincidence that these, and other

new discoveries listed below, come to light at a time when there is much increased recording being undertaken in the Fens, as part of the project to produce a Flora of the whole of the Fenland area in eastern England.

Maritime plants feature in these records not only on our roadsides, but in the more traditional environs of the tidal areas of the Nene and the North Level Main Drain in the far north of the county. The new records show how it is always worth revisiting areas with a known interesting flora, as plants respond to changing conditions. In this case the recent lack of grazing on the saltmarsh at Foul Anchor may have led to the, hopefully temporary, disappearance of Slender Hare's-ear (*Bupleurum tenuissimum*), but may also have allowed a plant of Greater Sea-spurrey (*Spergularia media*) to be rediscovered there after many years' absence of any records. Indeed it has been a good year for the latter species, as dredging work resulted in plants being found not only on dredged mud on the banks of the North Level Main Drain behind Foul Anchor, but also on the banks of the Nene a considerable distance upstream of Wisbech, where it has never been recorded before. In this latter site it was growing with numerous young plants of Common Saltmarsh-grass (*Puccinellia maritima*) (again a first upstream of the town), and Sea Aster (*Aster tripolium*) which was last reported above Wisbech by Babington (1860). Seeds of these species must be arriving in the tidal waters.

The records below also show new evidence that our populations of eyebrights (*Euphrasia*) and bent grasses (*Agrostis*) may be more complex than we thought. Indeed in the latter case this has long been suspected, but now we have more evidence of this and they almost certainly occur more widely. The determination of these grass hybrids is not easy and even the BSBI referee, Tom Cope, admits that to some extent determining them is educated guesswork, but there does seem good evidence from their morphology and the fact that they are mostly pollen and seed sterile. Records for these sorts of hybrids (and the eyebrights) need to be backed up with specimens and preferably a referee's determination.

Last year I mentioned the suspicious occurrence of Wild Candytuft (*Iberis amara*) in sites with no previous history in the county and several further sites have come to light in 2016. In one case, on a trackside above the Great Wilbraham chalk pit, it was accompanying a large population of Deptford Pink (*Dianthus armeria*), a species for which there are no previous records in the county. These are treated here as probable deliberate introductions, as is the appearance in the same year of Deptford Pink in Coploe Hill pit and Wild Candytuft in the pits at Cherry Hinton. It is not proposed to list further details of these records below. Nor does it seem appropriate at this stage to do more than mention that an increasing range of native and alien plants is being sown in the countryside: there is, for instance, a large population of Woad (*Isatis tinctoria*), in an area clearly sown with a variety of 'wild flower seed' just beyond the north-west end of the Fleam Dyke (this included yet more Wild Candytuft!). In the author's opinion these sorts of introduction are unwelcome and uncalled for. On the one hand, how can one be concerned about the spread of plants like Indian Balsam (*Impatiens glandulifera*), New Zealand Pigmyweed (*Crassula helmsii*) and Floating Pennywort (*Hydrocotyle ranunculoides*), but condone the

deliberate introduction of an even wider range of plants, whether native or alien? How would it be, for example, if the Woad started to sow itself over the adjacent recently cleared slopes of the Fleam Dyke? The debate is of course a complex one and there can be surprising elements in the equation, not least the discovery last year of Corn Gromwell (*Lithospermum arvense*), being grown as a field crop to the south of Melbourn: apparently the seeds are the source of a valuable oil!

The records below have been contributed by at least 14 individuals and three Societies, come from twenty 10km squares, which are well scattered over the county, and include records made in every month of the year except February. Thank you to all those whose records are listed and to everyone who has contributed records over the year. Whether mentioned here or not all records are valued and appreciated. We are especially fortunate to have such a long and fascinating recorded history of the flora in Cambridgeshire, and this is because, over the centuries, individuals have not only been out in the field to make observations, but have written them down and in many cases preserved evidence for their records in herbaria. We need to maintain these traditions, not only for our own benefit, but for future generations of botanists.

Acer campestre var. *leiocarpum* A glabrous-fruited variant of Field Maple has been widely included in new tree plantings in recent years and has been regarded as an introduction in the British Isles. However, such plants can be found amongst apparent native populations in our boulder clay woods, e.g. Pickmore Wood (TL6558), Comber's Wood (TL6557) and Basefield Wood (TL6556), as noted on a CFG excursion on 10 October 2016. In each case it was growing with more numerous trees of var. *campestre*, with hairy fruits. The earliest known glabrous-fruited specimen from the county is one in Herb. C.M. Lemann in **CGE**, collected from Stretham in 1833.

Agrostis capillaris x *gigantea* (*A.* x *bjoerkmanii*) (a) Alleyway immediately south-west of Travelodge building, Newmarket Road, Cambridge, TL46405887, A.C. Leslie, 17 August 2014 (**CGE**), (b) gravelled track at north-west margin of Borley Wood, Linton, TL5748, A.C. Leslie (CFG excursion), 9 August 2015 (**CGE**). Both records confirmed as probably this hybrid by T.A. Cope. We have two previous records, at Upware in 1939 and at Chippenham in 1855, both with specimens in **CGE** determined by P.J.O. Trist. Probably overlooked elsewhere.

Agrostis capillaris x *stolonifera* (*A.* x *murbeckii*) (a) A large patch, at track edge along arable margin, south of Addenbrooke's Hospital, Cambridge, TL4654, A.C. Leslie, August 2014 (**CGE**, conf. T.A. Cope), (b) sown headland strip at edge of arable, south side of Oakington Road, north-east of Westwick, TL42496562, A.C. Leslie, 19 July 2014 (**CGE**, det. T.A. Cope), (c) probably more frequent than both parents in north-west end of meadow, beside road from the Balsham Road to Chilford Hall, Linton, TL5648, A.C. Leslie, 3 August 2014 (**CGE**). This is a selection of recent records for a probably widely overlooked hybrid, but one which can be hard to separate from some variants of *A. stolonifera* in particular, as well as other hybrids. Plants may have both rhizomes and stolons, intermediate ligules and fruiting panicles of intermediate form. As the second of these records suggests, this may sometimes be incorporated in sown mixtures.

Agrostis castellana (a) One patch, on trackside off north side of Barton Road, Harecroft Field, west of Wisbech, TF4409, A.C. Leslie (CFG excursion), 18 July 2015 (**CGE**, conf.

T.A. Cope), (b) one plant, on sparsely vegetated ground on north side of new lake, west of guided busway branch to Addenbrooke's Hospital, Cambridge, TL4555, A.C. Leslie, 5 July 2015 (**CGE**, conf. T.A. Cope). This is an alien grass, known as Highland Bent, and a native of southern Europe, but as yet with very few other Cambridgeshire records and perhaps overlooked; included in some seed mixes and apparently now self-sowing: the Wisbech site was not a sown verge.

Agrostis gigantea x *stolonifera* (a) One plant, on surface soil-stripped, former arable field, between Histon Road and Huntingdon Road, Cambridge, TL4460, A.C. Leslie, 7 September 2014 (**CGE**, conf. T.A. Cope), (b) two clumps, in open fen field, compartment 10, Chippenham Fen, TL64916921 A.C. Leslie, 26 July 2014 (**CGE**, conf. T.A. Cope), (c) one plant, eastern edge of new lake, west of guided busway branch to Addenbrooke's Hospital, Cambridge, TL45475525, A.C. Leslie, 2 August 2015, (**CGE**, conf. T.A. Cope), (d) a large patch, at ride margin, in an area recently cleared of conifers, southern arm of Borley Wood, Linton, TL58244784, A.C. Leslie, 5 August 2016 (**CGE**, det. T.A. Cope). First v.c. records for this hybrid, which may be overlooked. Usually found with both parents and producing stolons and rhizomes; it is usually sterile, but the plant near the guided busway was fertile. Most have at least partially closed fruiting panicles, but in the plant from Borley Wood they remained open.

Aira praecox Locally frequent in dry sandy turf by new building (Eden View), Hilton Park Care Home, Bottisham, TL55166015, A.C. Leslie, 8 July 2016. Evidently introduced here during building and landscaping works and accompanied by other species of sandy ground such as *Aira caryophyllea*, *Carex arenaria* and *Medicago minima*. It is a rare grass in the county, still occurring as a native at Gamlingay, Hildersham Furze Hills and on the eastern sands.

Anisantha tectorum Locally frequent at edge of barley field, Doddington, TL38289076, J.D. Shanklin, 3 July 2016. Drooping Brome is locally abundant on the eastern sands and has regularly occurred as an alien in and around Cambridge, but this seems to be the first record from the Fens.

Aster tripolium Two plants, on piles of dredged mud, above the south-east side of Nene, near Nettle Bank, south-west of Wisbech, TF417052 and 418052, L.M. Saunders, October 2016, one plant with no ray florets, the other with just a few rays in each head. Although Babington (1860) noted this species 'above and below Wisbech', it had not been recorded above the town since that time.

Calystegia pulchra x *silvatica* (*C.* x *howittiorum*) A large colony, climbing through shrubs and trees, on roadside bank in front of abandoned buildings, south-west side of Outwell Road, Boyces Bridge, south-east of Wisbech, TF49720560, L.M. Saunders, 4 July 2016, shown to ACL on 9 July (**CGE**). First v.c. record for an uncommon hybrid, which here was recorded as having large flowers (up to 75 x 80mm), soft pink externally with white midribs, inside soft pink with a white throat, the white extending up the midribs; the stems, petioles and pedicels are all glabrous, the pedicels with a raised line, but not winged; bracteoles broadly overlapping.

Carex rostrata A large vegetative colony (with no flowering stems), in a heavily shaded, shallow, peaty ditch, North Jerusalem Wood, compartment 9, Chippenham Fen, TL64566937, first seen here 2 May 2014 (by A.C. Leslie) and determined as *C. nigra* (see Leslie, 2015), but a CFG excursion on 15 July 2016 re-examined the plants and redetermined them as *C. rostrata*. This is like *nigra* in its far-creeping habit and in having stomata largely restricted to

the upper surface of the leaves, but has distinctive thick, spongy leaf sheaths. It was last recorded on the Fen in 1913 and this is one of only two extant colonies in the county.

Dactylorhiza incarnata Nene Washes (a) Wash no.38, TL28989921, c.300 flowering plants, (b) Wash no.46, TL29649937, c.217 flowering plants, (c) Wash no.47, TL29729938, c.150 flowering plants, (d) Wash no.52, TL30019941, c.112 flowering plants. These records all made by Jonathan Graham, 25 May 2016, and represent subsp. *incarnata*. This must now be the best area for this species in the county, as there are other recent records made by local RSPB staff (C. Kitchin *et al*.) from Washes no.36, 39, 48 and 54, as well as recent records in this region from Whittlesey and Ring's End. Most of our other populations of Early March Orchid are dwindling, so these buoyant populations are good news indeed.

Erinus alpinus Numerous plants, along top of tall brick garden walls of 10B The Lane, beside 10 Church Street, Great Shelford, TL45995192, A.C. Leslie, 17 November 2016. A rare alien in Cambridgeshire, the only other extant colony being on the front wall of the grounds of Sidney Sussex College, in Cambridge, which was first recorded in 1977.

Erophila glabrescens (a) West margin of pavement, near junction of High Street and Cambridge Road, Girton, TL42216237, J.D. Shanklin, 3 March 2016, (b) locally frequent at corner of Stulpfield Road and Coton Road, Grantchester, TL43025572, CNHS excursion, 6 March 2016. This variant of Whitlowgrass was listed for v.c.29 by Filfilan & Elkington (1998), but subsequently they could not provide the details of the record(s) on which this was based. Subsequent records supplied by Jonanthan Shanklin and Lewis Saunders have reported it from Elsworth, Barton, Burwell and Wisbech. Specimens from two sites in Wisbech (collected by Lewis Saunders), have been confirmed by Prof. Elkington.

Euphrasia arctica x *nemorosa* Scattered plants, in chalk grassland on north-east face of vallum, Galley Hill, Devil's Ditch, TL58316453, A.C. Leslie, August 2015, det. C. Metherell. First v.c. record for this hybrid, one parent of which (*E. arctica*) has not been recorded in the county. The identities of some eyebrights along this part of the Ditch have long been a puzzle, although those on the race course section further south-east are generally good examples of *E. pseudokerneri*.

Euphrasia confusa x *nemorosa* Locally frequent in grassland on slightly raised area (the "chalk bank") at south-west end of compartment 2, Chippenham Fen, TL64306958, A.C. Leslie, August 2015, det. C. Metherell. Second v.c. record for another example of a hybrid where one parent (*E. confusa*) has not been recorded in the county. In previous years, when far fewer plants were present at this site, they had been referred to *E. pseudokerneri* (Leslie, 2015); the latter determination must therefore be regarded as doubtful, although they did have slightly larger flowers and more acuminate bract teeth than the plants seen by Metherell. Previously recorded from the old airfield at Waterbeach.

Galium parisiense Numerous patches, over a large area of old sand pit, below the south-east side of B1085, just north of Dane Hill Cottages, Kennett ("Kennett pits"), e.g. TL68956901, A.C. Leslie, 17 June 2016; last reported from these pits in 1975. This delicate annual has also been reported in several new sites in 2016: from the Cambridge Science Park (ACL) and on the Newmarket Road Park and Ride site (J.D. Shanklin), in both cases in bare areas round the base of lamp posts.

Herniaria glabra One plant, on a bare area of a huge sandy soil bank, on the north side of the Kennett pits site, TL69106912, A.C. Leslie, 17 June 2016. This area had been spread with top soil from a recently reopened area of the pits and is supposed to be maintained to benefit

the flora. On this occasion it could not be refound in old workings in another area of the pits, where it was last reported in 2007.

Heuchera sanguinea One small, but flowering plant, on churchyard wall, St Mary's church, Ely, TL53858029, C.R. Stevenson, May 2016. A rare alien in the county, this being our first record since 1987 and perhaps the only one to have been clearly derived from seed. At one time a common garden plant, valued for its narrow panicles of pinkish red flowers: largely replaced now by a huge range of garden hybrids.

Hydrocotyle vulgaris Marshy depression, Cambridge Lakes golf course, Trumpington, TL44895633, J.D. Shanklin, 7 June 2016. Growing with *C. helmsii*, on the site of a former lake which was filled in with soil from the British Sugar factory at Bury St Edmunds, and with some additional landscaping. Marsh Pennywort was formerly much more common in the county, but is now a very local plant. It perhaps only a coincidence that it was noted on Trumpington Moor by Ray (1660), and whilst the site was still being listed by Relhan (1820), there is considerable doubt as to whether this was based on personal observation by Relhan, or merely a repetition of Ray's record.

Juncus acutus Five tussocks, in elongated road run-off pit, along the south side of A428, just east of Caxton Gibbet, TL29956070, B. Hedley, 20 May 2016, (conf. ACL, 11 June 2016, **CGE**). First v.c. record for Sharp Rush, which is a very local coastal native in southern Britain, with the nearest native site to us being on the north Norfolk coast. It seems an unlikely maritime invader and might perhaps have been introduced with other plants considered to have been planted here after the pit was first created, e.g. *Ranunculus flammula* and *Caltha palustris* (fide Nick Millar). It is offered by a few nurseries.

Lavandula dentata Two self-sown plants, one of which had flowered, at junction of pavement and the base of the low brick wall of front garden, 45 New Square, Cambridge, TL45535865, A.C. Leslie, 29 July 2016. First v.c. record for a plant from south and east Spain (and the Balearic Islands), occasionally grown in more sheltered gardens and with distinctive strongly toothed leaves. The parent is in the adjacent garden. The self-sown plants have been present here for several years.

Lepidium virginicum Three plants, on new grave in the extension to Grantchester churchyard, TL43245546, J.D. Shanklin (CNHS excursion), **CGE** (coll. ACL, 7 July). A rare alien in the county, formerly recorded by Graham Easy in the 1970s/1980s, on railway sidings, often where associated with corn silos, and last reported by the railhead corn silo at Newmarket in 1989. In this case it may owe its origin to the use of this species as dried fruiting material in floral tributes.

Malva pusilla Common on headlands of wheat and bean fields (TL5984 and 5985) and sparingly by harvested wheat (TL586861), in fields just south-east of Littleport, J.O. Mountford, August 2016. This small-flowered mallow appears to be naturalised in this area, from where it was previously reported in both 2005 and 2009.

Malva verticillata (a) Two plants, at arable edge of extensive sown strip, beside the south-west side of footpath (site of the former Heydon Ditch), north-west of Heydon, TL42254175, A.C. Leslie (CFG excursion), 15 May 2016, **CGE**, the site is v.c.19, in Cambridgeshire; a later search of the extensive sown strips on both sides of the path yielded no further plants, (b) front gardens of 81 and 124 Victoria Road, Cambridge, TL448595, C.D. Preston, 2 January 2016, originally determined as *M. parviflora*, but a plant in the garden of no. 81 (23 July 2016, ACL), which had fully mature fruit, was definitely *M. verticillata*, whilst plants seen later in the year in the garden of no. 124 also seem best placed here, although they had

sharper-edged fruits when fresh (less so when dry), but incomplete ridging over the back of the nutlets. The plants had been known to CDP on Victoria Road for at least a year prior to this record. This is another small-flowered mallow, and is a rare alien for which we have no other recent records.

Medicago polymorpha Scattered over bare areas on what had been an uncultivated and winter wet field between the river and Middle Fen Bank, Ely, TL558803, T. Inskip, 2016, shown to a CFG excursion by the finder on 5 June 2016 (**CGE**). A rare alien in the county, the only other recent records being on waste ground by Ashwell & Morden station, and on a field trackside at Impington. The plants at this Ely site varied from having strongly spiny to almost smooth fruits. The area may have had waste soil spread over it.

Melampodium montanum One plant, self-sown in courtyard of The Tram Depot, The Kite, Cambridge, TL458584, J.D. Shanklin, 29 September 2016, det. A.C. Leslie. First v.c. record for a sprawling yellow-flowered composite, originally from Mexico and central America, now popular as a hanging basket or window box plant. Not apparently cultivated at this site in 2016.

Moehringia trinervia Bank of the Cat's Water, east of Powder Blue Farm, west of Thorney, TF250056, J.D. Shanklin, 30 April 2016. A new site for a plant otherwise very rare in Fenland, although formerly more frequent further south in the Chatteris, Coveney, Linwood and March region. Present in this site with *Anemone nemorosa* and other woodland plants.

Parapholis incurva Abundant on many verges along the A505, from near Chuck-a-Bush Farm, to the west of the M11 junction, south of Whittlesford, e.g. TL47394711, 46894691, A.C. Leslie, 12 June 2016, with a few on the eastern verge at the south end of Hill Farm Road. Other colonies of this maritime invader are known from the A505 at Royston, as well as in several places on the A14, and on the A11.

Pastinaca sativa subsp. *urens* (a) a population of up to 200 plants, at top of north bank of guided busway, on the east side of the bridge over the railway, just west of Addenbrooke's Hospital, Cambridge, TL45855509, A.C. Leslie, 31 October 2016, (b) numerous plants, at south-east end of layby on north-east side of A14, and spreading into unploughed areas in adjacent arable field, south-west of Oakington, TL39156340-39106344, A.C. Leslie, 22 September 2016, (c) several plants, on southern verge of A14, south of Stow cum Quy, TL52075977, J.L. Sharman, 7 October 2016. Further evidence for the spread of this alien variant of parsnip, which is now known to be widespread along the East Anglian coast, from at least Harwich to Great Yarmouth, and coming inland along roads and railways.

Picea abies (a) One self-sown plant (c.12" tall), at edge of new glade on the sand lens in Gamlingay Wood, TL24195346, A.C. Leslie (CFG excursion), 28 April 2016, (b) one self-sown plant (c.3ft tall), at base of oak tree, north-east side of ride in north-east part of Ditton Park Wood, TL668573, A.C. Leslie & D.J. Barden, 5 May 2008. Although previously recorded at a number of sites, all such records of Norway Spruce are believed to have been of planted origin. It has also been planted in both the woods named above.

Polycarpon tetraphyllum (a) Scattered at edge of pavement, Champneys Walk, Cambridge, TL43985769, J.D. Shanklin, 30 August 2015, it is also associated here with brick-paved front gardens/drives, (b) several plants, between paving blocks, West Cambridge site, Cambridge, TL42475891, J.D. Shanklin, 19 September 2016, (c) abundant in fairly recently brick-paved front garden of 9 Cromwell Road, Cambridge, TL46785807, A.C. Leslie, 9 October 2016. An indication that this rare native of south-western England is continuing to be introduced in new

areas within the city: the association with paving is surely significant. It has not, so far, been found elsewhere in the county.

Potamogeton praelongus Locally frequent along south side of Bevill's Leam, near Chapel Bridge, TL29039420, J. Graham & P.A. Stroh, 29 July 2016. This pondweed was formerly more widespread in Cambridgeshire and has become very local. It has not been recorded in the Leam before and was growing here with *P. compressus*, which is fast expanding its range in the north-west of the county. There were records for *P. praelongus* in this region from Coates, in the late nineteenth century, and at Benwick in 1955.

Puccinellia maritima Numerous young plants, scattered over at least 100 yards along the top of recently reprofiled muddy bank on the south east side of the Nene, near Nettle Bank, south-west of Wisbech, TF41890533, A.C. Leslie & L.M. Saunders, 9 July 2016. The first time this maritime grass has been recorded upstream of Wisbech: it is still frequent along the Nene at Foul Anchor, our only other extant site. Mostly growing under vegetatively regenerating *Phragmites*, so whether it persists here will be followed with interest.

Rubus polyanthemus Several large patches, surrounding the east end of flooded gravel pit, north-east side of A142, between Mepal and Chatteris, TL42738277, A.C. Leslie, 16 June 2016 (**CGE**). A rare bramble in the county, most frequent on the greensand at Gamlingay, with a few other records around Newmarket and Chippenham.

Rubus rudis A large clump, on a grave, west side of Mount Pleasant cemetery, Wisbech, TF46391059, A.C. Leslie & L.M. Saunders, 9 July 2016 (**CGE**). Second v.c. record for a pretty and distinctive bramble (in series *Radulae*), previously recorded only by the village pond at Parson Drove. Rare in East Anglia, but frequent in parts of the Midlands just to the west.

Salicornia ramosissima At least twenty plants, scattered along the muddy margin of the north side of the North Level Main Drain, just north-east of the pumping station, Foul Anchor, TF46301795, A.C. Leslie & L.M. Saunders, 9 September 2015. It was growing here with *Juncus ranarius*, which had previously only been seen on the other bank of the Drain. Our previous records for glassworts have always come from the banks of the Nene on the other side of Foul Anchor, but the drain at this point is also tidal.

Salvia forsskaolii Several young plants, self-sown on to grass verge on south-east side of road, just south-west of church, Heydon, TL43143988, A.C. Leslie (CFG excursion), 15 May 2016. Derived from a large naturalised population under trees in an adjacent garden. Our first record for a large-leaved herbaceous perennial from Bulgaria and Turkey, which has large violet blue flowers. The site is v.c. 19, in Cambridgeshire.

Scirpus sylvaticus In dry canal, West Cambridge site, Cambridge, TLc.42275880, J.D. Shanklin, 30 August 2016. Clearly an alien here, but perhaps a chance introduction in an area where a range of waterside plants seems to have arrived with other plantings. There is one other, probable native record, which is not well-known: by the Stour near Sipsey Bridge, south-east of Burrough Green, TL656540, N. Holmes, 12 September 1979; it would be good to have confirmation of this latter site and to ensure it is on the Cambridgeshire side of the border, which runs along the river in this area.

Silene uniflora One large plant, forming a mat at least 1m wide, in central reservation of A505, just south-west of roundabout junction with the Duxford Road, south of Whittlesford, TL46864688, A. Arbon, 2016 (**CGE**, coll. ACL, 12 June 2016); Ashley Arbon reports that he has known it there for 3-4 years. Third v.c. record for Sea Campion and the first record for it

as an apparent maritime invader; formerly along the tidal Nene and also recently recorded as a garden escape.

Spergularia media Despite deliberate searches for this species on several occasions in its old haunts at Foul Anchor there had been no sightings of the Greater Sea Spurrey along the tidal Nene since 1992. Remarkably in 2016 we had three reports: (a) one possible large plant, on lip of the west side of the river, Foul Anchor, TF46581740, N.P. Millar, 6 June 2016 (confirmed by ACL & L.M. Saunders on 9 July, (b) on recent dredgings on north side of North Level Main Drain, just east of pumping station, Foul Anchor, TF46381790, J.D. Shanklin, 23 July 2016, (c) one plant, at top of recently reprofiled muddy bank on south-east side of the Nene, near Nettle Bank, south-west of Wisbech, TF41840530, A.C. Leslie & L.M. Saunders, 9 July 2016, this last site being the first time this species has been recorded upstream of Wisbech.

Sporobolus indicus At least 61 plants of varying sizes, scattered unevenly along a narrow verge between road surface and adjacent pavement, between Great Chesterford and the M11 bridge on the Ickleton Road, TL50044278-50194280, A.C. Leslie, 11 December 2016 (**CGE**). It has clearly been here for a while and is not associated with other aliens or any sown mixtures. First v.c. record for a tropical American alien, otherwise only known to be naturalised in Jersey.

Symphytum x *perringianum* (considered to be *S. orientale* x *S.* x *uplandicum*) One plant, in cultivated border along the west side of St Mark's churchyard, Barton Road, Cambridge, TL44175745, C.J. Cadbury, July 2016. The recorder considered that it had not been planted at this site. This hybrid has only ever been found in this one area of Cambridge and formerly occurred on a number of roadsides, but may otherwise now only occur on the other side of the road from the churchyard.

Taraxacum palustre Three plants, along the north-east side of Soham Meadow Wildlife Trust reserve, TL61137279, C.D. Preston & J. Graham, 15 April 2016, the latter subsequently revisited the site and assessed the population to consist of c.12 plants. An entirely new site for the Fen Dandelion, which was formerly scattered over the southern half of the county, but which has died out in all other sites, although it may still persist in very small quantity at Wicken Fen (where ultimately rather unsuccessful attempts have also been made to bolster the population with new plantings).

Trifolium subterraneum Numerous patches, scattered along the edge of mown verges, on the main axis of Meadow Lane, Duchess Park, Newmarket, TL65916250-65976240, J.D. Shanklin *et al*., 14 May 2016, with a few more on verge on south side of another branch of Meadow Lane nearby. Otherwise only known at Gamlingay (where it is native), but here in Newmarket it is presumed to have arrived with soil or sand, perhaps used in the construction of the kerb or the brick-paved road surface. *Ranunculus parviflorus* was also found in one place on these verges.

Verbascum speciosum Several plants, on gravelly ground next to storage containers used by the grounds maintenance staff, beside South Cambridgeshire DC offices on the business park, Cambourne, TL314601, N.P. Millar, 7 September 2009, spreading in subsequent years on to a rubbish pile and onto rough verges, still around in July 2016, N.P. Millar (**CGE**). A rare alien in the county, grown in gardens and clearly naturalised at this site.

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Bryophyte records

M. Burton and C.D. Preston

In addition to the records from our normal programme of fieldwork, this year there are several historical records from v.c. 29 which have come to light as a result of a review of specimens undertaken by C.D.P. and Mark Hill in preparation for a forthcoming bryophyte flora of Cambridgeshire. With the enthusiastic help of Christine Bartram, we made a thorough search in CGE for specimens collected by J.S. Henslow in the 1820s and 1830s. This has allowed us to reinstate *Bryum pseudotriquetrum* var. *pseudotriquetrum* and *Scorpidium revolvens* to the county list. In addition, two specimens from the Henslow era collected by 'L.J.' suggested that Leonard Jenyns (1800–1893) had collected mosses in the county, and in following up this lead we discovered that there was a small but interesting collection of bryophytes from the county in Jenyns' herbarium at the Royal Literary & Scientific Institution, Bath (BTH). This includes two hitherto unrecorded *Sphagnum* species. Other collections hitherto unknown to Cambridgeshire bryologists are held at Saffron Walden (SWN), where there are a few specimens collected by W.L.P. Garnons between 1825 and 1837, and at Leicester (LSR), where there are over 40 packets from the herbarium of L.J. Sedgwick collected in the early 20th century and transferred from Uppingham School in 1980. Although there are no particularly surprising records amongst these, the Leicester specimens do allow us to identity the recorder 'A.C.S.', a contemporary of Sedgwick known for decades only from his initials, as A.C. Sturdy. We thank Rob Randall and Matt Williams for their kind assistance at Bath, Sarah Kenyon for similar help at SWN and Geoffrey Hall for photographing the LSR packets for us.

Mosses

Bryum pseudotriquetrum var. *pseudotriquetrum* **29:** Gamlingay, TL25, 29.5.1838, Mus. Henslow, CGE, det. M.O. Hill. This fine fruiting specimen, which was not known to Proctor (1956) or Whitehouse (1964), provides the only confirmed record of the dioicous var. *pseudotriquetrum* in the county. A vegetative specimen collected at Gamlingay on 27.4.1827 doubtless represents the same taxon. Only the synoicous var. *bimum* has been found in Cambridgeshire in recent years.

Cirriphyllum crassinervium **31:** ditch bank, Honeyhill Wood, Kimbolton, TL087677, C.D.P., 11.3.2017. The second record from Huntingdonshire since 1960; the only earlier record (1928) is from Kimbolton.

Hennediella stanfordensis **29:** paths shaded by trees, Girton College, Cambridge, TL426609 & 425607, M.O. Hill, 26.3.2017. The only previous records of this alien moss have been from Whittlesford and Trumpington, south of Cambridge; the allied *H. macrophylla* is established in Cambridge city.

Hylocomium splendens **29:** patch about 1 m across in grassy area, with *Brachypodium sylvaticum*, *Clinopodium vulgare*, *Myosotis arvensis*, *Thymus pulegioides* and *Veronica chamaedrys*, Sixteen Acre Plantation, Newmarket, TL66306210, M.O. Hill, 14.5.2016. This species, which is common in northern and western Britain, was last seen in the county at Wicken Fen in 1999.

Leptobarbula berica **29:** female plants with *Hygrohypnum luridum* on damp brick at east end of north side of Elm church, TF470068, C.R. Stevenson, 13.9.2016, conf. C.D.P. The first record of this uncommon species from the north of the county.

Orthotrichum pumilum **29:** fruiting plants on hawthorn in a thin strip of woodland along the south side of the railway line across Coldham's Common, Cambridge, TL472585, C.D.P., 5.3.2017, BBSUK, det. T.L. Blockeel as the segregate species *O. schimperi*. Although there have been a few new records in scattered sites in recent years, *O. pumilum sensu lato* remains a nationally rare species; this is the first Cambridgeshire record.

Orthotrichum striatum **29:** Madingley, J.S. Henslow, 16.3.1821, CGE, det. M.O. Hill & C.D.P. In the absence of any known specimens, the early records of *O. striatum* from the county have been assumed to be the much commoner *O. affine*, but this newly discovered voucher is indeed *O. striatum*, as labelled by Henslow. Like several other *Orthotrichum* species it has (re-)colonised the county in recent decades.

Plagiomnium elatum **29:** with *Samolus valerandi* near Great Nine Wells, Thriplow, TL4547, G. Crompton, 7.9.1958, and at Fen Wood, Thriplow, TL4547, S.M. Walters, 5.7.1959, both CGE, det. M.O. Hill. This species is well-known in the calcareous fens at Wicken and Chippenham, but this is only the second known site further south in the county (it is certainly extinct in the other locality, at Bassingbourn). The Thriplow specimens came to light during a revision of specimens of *Plagiomnium affine* collected in Cambridgeshire, many of which proved to be misidentified.

Pleuridium acuminatum **29:** Gamlingay, TL25, 27.4.1827, Mus. Henslow, CGE, det. M.O. Hill & C.D.P. This fruiting specimen predates by over a century E.W. Jones' 1934 record from Half Moon Plantation, Newmarket, which has previously been considered the first county record.

Pseudephemerum nitidum **29:** fruiting plants on muddy track, White Wood, Gamlingay, TL214519, M.O. Hill & C.D.P., 1.12.2016. This is the third site (and second extant locality) in the county for this ephemeral species of moist acidic soils; all three sites are in the Gamlingay area.

Racomitrium lanuginosum **29:** horizontal concrete surface near ground level, north side of Sawston Hall, TL4849, I.M. Turner, 27.10. 1984, CGE, det. M.O. Hill. This was originally identified as *Grimmia trichophylla* (Whitehouse 1985) but a recent re-examination of the specimen, kindly traced by Ian Turner and donated to CGE, shows that it is *R. lanuginosum* with an unusually short hair-point. This is only the second record of *R. lanuginosum* from the

county, but it was probably a casual occurrence as we were unable to refind the plant when we revisited Sawston in 2001.

Scleropodium cespitans **29:** with *Hypnum cupressiforme* and *Pseudocrossidium hornschuchianum* on shaded, mossy edges of tarmac path, Oakington churchyard, TL414648, R.H. Carter, 26.3.2017. This is only the second record from tarmac in Cambridgeshire, although in some other areas of Britain the species has spread more extensively on this substrate.

Scorpidium revolvens Gamlingay, TL25, J.S. Henslow, 27.4.1827 (vegetative) & 4.4.1829 (fruiting), CGE, det. M.O. Hill. These specimens confirm that the Gamlingay plant was *S. revolvens sensu stricto* rather than the segregate S. *cossonii*, and they allow the species to be restored to the county list (albeit as an extinct plant). It is in long-term decline in England.

Sphagnum papillosum **29:** Gamlingay Bogs, TL25, L. Jenyns, 24.8.1824, BTH (as *S. cymbifolium*), det. M.O. Hill. This fruiting specimen and *S. teres* (see below) were collected on an exploratory visit to Gamlingay by Jenyns and Henslow which is documented in Jenyns diary (see the extracts published by Crompton 1997). Jenyns noted that he found two *Sphagnum* species, although he initially called this one *S. latifolium* rather than *S. cymbifolium*. *S papillosum* is a species of peat bogs. There is no other record from the county.

Sphagnum teres **29:** Gamlingay Bogs, TL25, L. Jenyns, 24.8.1824, BTH (as *S. cuspidatum*), det. M.O. Hill. *S. teres* generally grows in somewhat more base-rich habitats that *S. papillosum*. This specimen is the only evidence of its former occurrence in the county.

Tortella inclinata **29:** open patch in chalk grassland, Devil's Dyke, TL61236203, C.D.P., 11.2.2017, det. M.O. Hill. This is a welcome rediscovery of the species on the Devil's Dyke, where it was first reported in 1911 and last seen in 1998.

Ulota crispula **31:** on *Cercis siliquastrum*, Diddington Churchyard, TL190660, J.D. Shanklin, 29.10.2016, BBSUK, det. M.O. Hill & T.L. Blockeel. This small epiphyte has recently been recognised in Britain, following a revision of the *Ulota crispa* aggregate. This is the first Huntingdonshire record; it has not yet been recorded in Cambridgeshire.

Liverworts

Cephaloziella divaricata **29:** frequent scattered small patches on granite hoggin at edge of birch canopy, with *Barbula convoluta*, *Ceratodon purpureus*, *Didymodon insulanus* and *Pogonatum urnigerum*, near Criminology Department, Sidgwick Site, Cambridge, TL442579, C.D.P., 15.12.2016, conf. D.A. Callaghan. This tiny calcifuge has colonised the site where *Pogonatum urnigerum* was first recorded in February 2015 (the *Pogonatum* patches are now larger than they were then). The only other record of *C. divaricata* since 2000 is from railway ballast at Stanground Wash Nature Reserve.

Nowellia curvifolia **31:** in small quantity on a well-rotted conifer trunk in mixed woodland, Honeyhill Wood, Kimbolton, TL079674, C.D.P., 11.3.2017. Not seen in Huntingdonshire since it was discovered, new to the county, by Kevin Walker in Monks Wood in 2006.

Pellia epiphylla **29:** fruiting plants growing with *Atrichum undulatum* and *Polytrichastrum formosum* on wet soil on woodland floor, White Wood, Gamlingay, TL214520, M.O. Hill & C.D.P., 1.12.2016. The third site in which we have found this calcifuge *Pellia* since 2000.

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Francis Willughby and John Ray – a partnership re-examined

C.D. Preston

Thousands of tourists visit the Wren Library at Trinity College annually; it must be Cambridge's best-known secular building. How many, I wonder, notice the portrait busts, on either side of the entrance, of Francis Willughby (1635–1672) and John Ray (1627–1705)? Not many, perhaps, for on entering the room the visitor's eyes are naturally drawn down its length to the statue of Byron and the stained glass window ('Fame introducing Bacon and Newton to George III') on the far wall over 150 feet away. The busts of Willughby and Ray are, however, well worth a look. Although not sculpted by Roubiliac until the 1750s, they are fine portraits. They also commemorate perhaps the greatest partnership in British natural history.

The basic facts of Willughby's and Ray's lives are well known. Ray was a young Fellow of Trinity when Willughby entered the College in 1652 as a Fellow Commoner, one of a group of rich young men who, although undergraduates, shared some of the privileges of the Fellows. Unlike most of his class he was "from his Childhood addicted to study" and clearly struck up a particular friendship with Ray. He assisted him in the research for his first book, *Catalogus plantarum circa Cantabrigiam nascentium*, and after this was published in 1660 the two went on an exploratory tour of natural history sites in the north of England and the Isle of Man. When Ray felt obliged to resign his fellowship in 1662 it was Willughby who assured him that "I shall be verie glad of your constant company and assistance in my studies and must again desire you by no meanes to part with your Bookes". Further travels followed, including a long tour of Europe, and Willughby then provided Ray with a home at Middleton in Warwickshire. It was from Middleton that Ray wrote his British

plant catalogue, *Catalogus plantarum Angliae, et insularum adjacentium* (1670), dedicated to Willughby as his friend and patron.

When Willughby died in 1672, aged only 36, he left Ray with an annuity which was sufficient to enable him to devote the rest of his life to study. Ray completed books planned by Willughby on birds (*Ornithologiae libri tres*, 1676, translated as *The ornithology of Francis Willughby* in 1678) and fish (*De historia piscium*, 1686) and he was working to incorporate Willughby's work on insects into a *Historia insectorum* when he died. (This book was eventually published in 1710.) When Ray dedicated *The wisdom of God*, a work of popular theology, to Willughby's sister Lady Lettice Wendy in 1691, he did so "First, because I owe it to the Liberality of your Honoured Brother, that I have this leisure to write any thing".

For generations, naturalists and historians have tried to identify the particular contributions of Willughby and Ray to their joint works. Several nineteenth-century ornithologists regarded Ray's contribution to *The ornithology* as minimal. However, Charles Raven took a very different view in his biography *John Ray* (1942). Raven managed to convince himself that Ray had been unjustly neglected. Whether this was actually the case seems doubtful, in view of the Roubiliac bust (1750s), Gilbert White's well-known tribute to "our countryman, the excellent Mr. Ray" (1771), the foundation of the Cambridge Ray Club (1837) and the national Ray Society (1844), the publication by the latter of his *Memorials* (1846), *Correspondence* (1848) and *Further correspondence* (1928), Ray's inclusion in the stained glass portraits of college worthies in Trinity College chapel (1870s) and the (admittedly slight) biography *John Ray* written by the Cambridge Professor of Botany, Albert Seward in 1937. However, Raven was right to suggest that there was no adequate biography of Ray and his work filled this gap. His meticulous research pieced together the details of Ray's life and travels from the surviving evidence in his publications, and all later students of Ray have benefited from this work. However, the evidence was then marshalled to support Raven's case that Ray was manifestly superior to his predecessors and contemporaries, especially those from Britain. In highly readable prose he assessed the early modern naturalists as if they were undergraduates in his charge. Some, such as John Gerarde, were dismissed with contempt; the great fame of Gerarde's *Herball* (1597) clearly irritated Raven. Willughby was treated with respect but damned with faint praise; his contributions to the zoological works were but "a few incomplete memoranda" (p. 308) and with superb anachronism Raven concluded that "the evidence makes it certain that Ray was a scientist of genius and probable that Willughby was a brilliantly talented amateur" (p. 336).

In 2012 I was asked to join a team of historians brought together by Tim Birkhead (University of Sheffield) to re-examine the work of Francis Willughby. As a natural historian I was very lucky that the real historians in the team proved so welcoming to an outsider. The group meetings were immensely

stimulating and the friendly atmosphere no doubt encouraged contributors to write up their work with a promptness which is not always a feature of collaborative projects. The results of the studies are now available in a recently published book *Virtuoso by nature*, edited by Tim Birkhead. Individual chapters describe and analyse Willughby's life and domestic context, his education, his unpublished studies of chemistry and mathematics, his travels and his library, the approach of Willughby and Ray to classification, the two great folios *Ornithology* and *Historia piscium* and the quarto *Historia insectorum*. The final chapter deals with his legacies.

One of the major differences between the research reported in *Virtuoso by nature* and that of earlier scholars is the range of source material on which we were able to draw. Raven's biography was based almost entirely on Ray and Willughby's books and their published correspondence. It was not just that Raven was unable to consult distant archives because of the wartime conditions under which he wrote the biography. The existence of much of the archive material was unsuspected, or its importance was under-estimated. Sources which the Willughby team have been able to study include a rich set of materials maintained by his descendants, the Lords Middleton, as part of a much larger family archive, much of which is now deposited at Nottingham University. The support of the current Lord Middleton was a vital factor in developing the plans for the current project and in its eventual completion. Richard Serjeantson makes extensive use of Willughby's surviving commonplace book to investigate the books he read when studying in Cambridge, and a late 17th-century catalogue allows William Poole to discuss the family library, although its notable books were unfortunately sold in 1925 and the whereabouts of most of them is currently unknown. Sachiko Kusakawa shows how drawings of fish surviving in the archive were amongst those used to illustrate *Historia piscium*. The hasty yet characterful pen and ink drawing of the Snipefish *Macroramphosus scolopax*, "found at Genoa and drawn by Mr Bacon" (Nathaniel Bacon, another member of the party), brings us close to the rapid observation and recording which must have been necessary as the party made their way through Europe. Some biological specimens survive, including an extensive collection of dried plants and a cabinet containing a large collection of fruits and seeds and a smaller but equally important collection of fossils, birds' eggs and miscellaneous zoological specimens. Some of these can also be shown to have been collected on the European travels. Dorothy Johnston uses the family papers to describe the complex legal case in which Willughby was involved at the time of his death. They throw no light on the reason for his widow's choice of Sir Josiah Child as her second husband, for he appears to have had absolutely nothing to recommend him other than his immense wealth, but they do document the bitter disputes which followed this marriage.

Other relevant materials continue to be discovered in unexpected places – three sets of notes made by Ray during the European tour have recently come to

light. The losses of Willughby material are, however, as frustrating as the survivals are precious. Virtually nothing survives, for example, of Willughby's original manuscripts on insects. Even the manuscript Latin translation of Bishop Wilkins' *An essay towards a real character, and a philosophical language* (1668), prepared by Ray and incorporating a revised classification of insects by Willughby which Ray held in high regard, a document formerly held by the Royal Society which might be expected to have survived, cannot now be traced.

Neither the published books nor the material in published archives allow us to reconstruct in any detail how Willughby and Ray worked together. However, many of the surviving materials suggest a close working partnership. Even though Ray clearly took the lead in their botanical work, the plant specimens collected in Europe are usually annotated by both Willughby and Ray, showing that they worked together to identify them after their return from the continent. The view that Ray was the pre-eminent figure, supported financially but not intellectually by Willughby, seems no more credible than the view that Ray made little or no contribution to the zoological works.

The newly explored archival material (unlike the books by Ray and Willughby) allows us to form an impression of the characters of the two men and to hazard a guess at the qualities each brought to their partnership. Willughby was clearly driven by an intense curiosity. His interests were wide-ranging, even encompassing sports, games and pastimes. (His surviving *Book of Games* was dealt with in an earlier book and is not treated in detail in the current publication.) His writings give the impression of being dashed off hastily, his use of capital letters is bizarre and his annotations to plant specimens are remarkably scruffy. A favourite technique was to list the queries which one imagines were constantly bubbling up in his mind, prefaced by Q. His desire to make the most of his opportunities is apparent from the letter in which he tried (unsuccessfully) to persuade his reluctant friend Peter Courthope to join him on the European journey. Willughby assured him that "we are sufficiently assured against poverty" but "time and youth are not to be bought". It is natural to imagine that only his early death prevented him from completing the many projects on which he was engaged, but maybe this is a doubtful assumption. Even if he could have set aside the distractions of estate management, litigation and family life, would he have had the mental discipline to take any of them through to publication? By contrast, as Richard Serjeantson writes, "Everything Ray touched (quite literally) reveals his tidy mind and regular habits ... Willughby appears to have been fortunate in having Ray as his posthumous editor". But the cautious Ray was no less fortunate in his friendship with Willughby, whose energy, enthusiasm and intellect were surely as important to the partnership as his wealth.

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BOOK REVIEWS

Birds of the Nene Washes. Privately published Dec 2016. Jonathan P Taylor. ISBN 978-0-902038-318

It is rare to find books which are an analysis of the bird populations for one specific site; something more often the realm of the plant enthusiast.

The Nene washes is an internationally and nationally important site for breeding and migratory waterbirds, and has national, European and international designations to protect it.

The book opens with a short history of the Nene washes and a delightful hand-drawn map to help orientate the reader. The introduction tells us why we have washes such as the Nene and Ouse, and their biological importance, before taking us on a quick tour of a year on the Nene Washes.

Jonathan spent 20 years managing the site and getting to know its birds, and the main part of the book is essentially a systematic list of the birds recorded there since documentation started mostly with Cambridge Bird reports in the 1920s but also other sources for early years.

It is not a dull systematic list. It is packed full of statistics, trends in the breeding and wintering numbers of each of the very regular and significant species, and is a well-presented summary of a huge amount of data from a large amount of fieldwork by bird surveyors. Graphs and bar charts are used to good effect to show trends over time for many of the regular and well-monitored species. The more interesting species get much longer narratives. These species include natural colonists such as the Little Egret, and the Crane, but also covers the re-introduction of Corncrakes to what is the only site in England. The text is interspersed with photographs and nice little vignettes of some species, my favourite being the sketch of spoonbills which does seem to capture their pose especially well.

Not a book that will appeal to everyone, but every birder should read it (and visit the washes). Top marks to Jonathan for the significant amount of time and energy this compilation of knowledge this has clearly been.

Louise Bacon

A John Clare Flora. M.M. Mahood. Trent Editions, Nottingham. 2016. Paperback. xvi+224 pp. ISBN 978-1-84233-159-0. £15.

From the daffodils of Ullswater to the autumnal leaves of Vallombrosa, poets have frequently made reference to plants. Few, however, have provided many localised plant records, let alone illustrated the landscape changes which have shaped the present distribution of so many species. John Clare of Helpston (1793–1864) is an outstanding exception. Botanists have made use of Clare's work to provide records (especially first county records) for the Northamptonshire flora, basing their interpretations on the pioneering work of G.C. Druce and a later paper by Frank Perring. However, as can so easily happen when students draw on work from other disciplines, they have continued to use these now rather dated sources, failing to notice that the scholarly study of Clare's work has moved on.

In this book the literary critic Molly Mahood catalogues all the plants mentioned by Clare, drawing on recent critical editions of his poems, prose and letters; one particularly important source is *The natural history prose writings of John Clare* (1983) by Margaret Grainger, 'whose work on Clare as naturalist has not had the attention it deserves'. Over 400 wild and cultivated plants known to Clare are listed in taxonomic order, with an explanatory text which varies in length from one or two sentences to the four pages she devotes to *Primula*. Mahood proves to be a reliable guide to the identification of Clare's plants – she deftly sidesteps many potential traps and if she does sometimes strain a little too hard for an identification, she always notes in these cases that the matter is doubtful. She also explains Clare's remarks about the plants, setting them into the context of his life and times.

Clare's father was a farm labourer and Clare made good use of the little schooling his parents could afford for him. Otherwise he pursued his apparently innate and very determined desire for knowledge either alone or with one or two like-minded friends. Any notion we might have that Clare's knowledge of plants was typical of an age in which people lived closer to nature is dispelled by his remark that *Leucanthemum vulgare*, 'ox-eye is ... I believe the only flower, almost, that the shepherd, ploughman and milkmaid know by name, among the summer multitude'. His botany was learnt from the miscellaneous books which he gradually encountered. Most were pre-Linnaean works, and his great friend Joseph Henderson, head gardener at Milton Hall near Peterborough, had some trouble in persuading him to moderate his loathing of Linnaeus' 'Dark System'. Clare's botany had its limits, however, and amongst the groups he never mastered were the umbellifers, which usually appear as 'kecks' or 'hemlock' in his work.

The concentrated treatment of Clare's plants in *A John Clare Flora* brings out his remarkable powers of observation, both of the plants themselves and on the animals that relied on them. These included the nightingale nesting on the stump of a coppiced hawthorn, the dunnock snug in the clipped box tree and the wood pigeons busily feeding on ivy berries. He appears almost hypersensitive to

his surroundings, delighted to welcome the first spring flowers and cheered by the Michaelmas daisies 'in such a mellancholy season as the end of autumn'.

Clare's rage at the destruction of so many of the sites he had known as a child in the agricultural improvement which followed in the wake of enclosure is well-known. He lamented the effect of 'the plough that destroyer of wild flowers' in eliminating *Pulsatilla vulgaris* 35 years before Babington's reference to the restriction of such species to 'the very few banks which are too steep for the plough' in *Flora of Cambridgeshire* (1860). The destruction of ancient oaks precipitated Clare's most famous denunciation of enclosure which 'like a Buonaparte let not a thing remain', a phrase which also reveals that his opposition came from the conservative rather than the radical end of the political spectrum.

With one foot in the world of the working-class labourer and the other in that of literary and educated folk, Clare was particularly well-placed to report on the local names of the plants of Helpston and the superstitions surrounding them, both subjects of particular interest to him. He also noticed fashions in garden plants, so that golden-rod was included amongst the 'Flowers in my time that every one woud praise, Tho thrown like weeds from gardens now adays' – thus it came to be a naturalised member of our flora. Clare helped Anne Baker with her *Glossary of Northamptonshire words and phrases* (1854) but sadly he never published the works of local natural history that he himself planned from time to time.

I was rather apprehensive when opening this book, expecting something like those rather tired products of religious devotion or bardolatry with titles such as 'Plants of the Bible' or 'Shakespeare's Flowers'. In fact it is an excellent work, fresh, readable and learned, throwing light not only on the botany but also on the life of the immensely talented and ultimately tragic figure of John Clare.

C.D. Preston

A Tale of Trees. The battle to save Britain's Ancient Woodlands. Derek Niemann, Short publications Nov 2016 (ISBN: 9781780722757)

Although covering the whole of Britain, there is a very strong Cambridgeshire element to this book, and for those not familiar with Derek's style, you will find yourself immersed in a narrative whilst absorbing the facts and issues painlessly, with no prior knowledge needed.

The historical narrative, opening with a quick overview of the first few thousand years, cuts swiftly to the mid 20th century, where the battle begins. Interspersed between each chapter of the history is a piece on Waresley Wood, where Derek spends much time either surveying or enjoying the wildlife, or working with the voluntary warden on practical tasks. This means we spend a night listening to the nocturnal woodland creatures, admire the bluebells, get to grips with woodland bird populations and their changes since the 1970s, and meet Graham the warden, as well as the owner/managers of the private part of the wood adjacent to the Wildlife Trust section.

Waresley Wood is central to the narrative, too, and early on we encounter Terry Wells witnessing the grubbing out of part of Waresley on his way to work – one of the events central to the knowledge and legislation we now have to protect what remains, and what was in fact in place at that time, as the wood was already a SSSI.

The book brings to stark focus the mentality of post-war Britain, where all land needed to be productive and woods and scrub were seen purely as unproductive wastes to be dealt with and improved. Improvement either meant converting the land to conifers (perceived as faster growing, higher yielding and more uniformly useful than the mixed broadleaved trees of the ancient wood), or removal entirely for use as arable land. This was mostly achieved by chainsaw and bulldozer, but the more horrifying means of achieving obliteration was the use of 'Agent Orange' to remove woodlands from the Rockingham Forest in the 1950s, before it became the defoliant of choice in the Vietnam war a decade later. Some of the more nature-aware foresters did by this time start to realise what damage they were doing and begin to object, but with virtually no success.

How many of us knew that the early motorway routes deliberately went through woodlands – partly 'to give the motorist something to look at' and partly because they were deemed to be useless land – the numbers of woods damaged or destroyed are high – the M1 went through 33 ancient woods in 189 miles, the early bit of the M2 through 15 in 25 miles! The figures for the first six motorways are all equally grim.

The book is not totally focussed on lowland England – Scotland's woods were an equal target and chapters on the Caledonian pine are not out of place, and the successes there of the RSPB in saving them is rightly highlighted.

The narrative history works, as Derek's approach to piecing together the tale was to use interviews with as many people involved as possible – from foresters involved in the early years destruction to those within conservation organisations and government bodies, and use this as the means to bring this difficult subject to life.

Many of you will know several of the people and sites mentioned – at times it felt as if Derek had been following me around the country as so many of my favourite places feature, be they in England, Scotland or Wales.

Oliver Rackham finally makes an appearance about two thirds in, Hayley Wood a while earlier, at the point in the story where conservation charities are starting to come under pressure to actually do something about protecting what remains of the ancient woodlands, as it was becoming increasingly clear that the Forestry Commission was interested in solely that, forestry, at an industrial scale, and not at all in the damage being done. The work in different woods at the same time by Rackham and Peterken shows just how much there still was to work out in the 1970s and '80s, and how Oliver's books did start to change opinion, as did the hard work of George Peterken on classifying and cataloguing the ancient woods into the inventory we still have today.

The book finishes by looking at some of the problems our ancient woods face now, in an era where the legislation and knowledge of their value will protect much of what is left. Many of these problems and threats were highlighted by

Oliver Rackham and others, the browsing damage by deer and squirrels, the issues of a changing climate and weather patterns, and the threats from diseases such as Chalara.

Despite some very bleak chapters, and a feeling of complete frustration at the intrasigence of the officials in clearly rigged meetings where change for the better was trying to be enacted, I thoroughly enjoyed reading this book, and the Waresley Wood explorations do help lift the mood – it would be a far bleaker read without them. I had to wait a whole 15 months to read this from the point I knew it was being written, but it was well worth the wait and I recommend it to you all.

Louise Bacon

Cambridgeshire Mammal Atlas. (2016) Cambridgeshire Mammal Group. 92 pp.

Like the provisional atlas published in 2005 (Bacon, 2005), this publication covers Cambridgeshire (v.c.29), Huntingdonshire (v.c. 31) and the Soke of Peterborough (part of Nortrhamptonshire (v.c. 32)). It comprises a short preface, two pages on the geology, habitats and climate of Cambridgeshire, followed by forty-two accounts of the county's mammals. Each account has two pages. The first has (ususally) one large photograph of the species (occasionally two smaller ones) with notes on size, weight and life-span, and a smaller photograph of some other aspect that may aid identification (tracks, feeding signs etc, with sonograms for the bat species). The text has notes on identification, general information, and a brief description of the UK distribution. The second page is the distribution map, black dots printed over a light toned Ordnance Survey map of the county showing large towns and roads. A brief account of the county distribution appears above each map. After the maps a 'quick guide' to mammal identification (by means of silhouettes), a glossary, a (non alphabetical) species index and a page of acknowledgments complete the atlas.

The photographs are rather variable in quality, but most of them are useful, except perhaps the ones of shrew droppings, which to my eyes could be bits of almost anything, and there is nothing in the text to suggest how they might be used to aid identification.

There is no indication of how much effort has been put into recording each species. The map of the Water Vole, for example, suggests that, if one goes by the number of records, it is the commonest vole. I have little doubt that the abundance of records of this species is because there has been a great deal more attention paid to it.

Some analysis of the types of records for each species would have been helpful. I imagine that many, if not most of the Badger records are from road casualties, but I might be wrong, and knowing such information would enhance the value of the maps.

It seems, from the maps, that few records have been made in the Ouse Washes area, I wonder why this is. A composite map of all species records would have shown other poorly recorded, or poorly mammal-populated areas.

These points aside, this atlas is a very useful publication; Cambridgeshire naturalists should own it, and perhaps try to 'fill in the gaps' for the next edition!

This review is based on a printed copy of the atlas. I cannot find any details about how to obtain a paper copy, but the website of the Cambridgeshire Mammal Group (www.cambsmammalgroup.org.uk) has the atlas available digitally.

Henry R Arnold

A natural history of Cambridge (NatHistCam)

Mark Hill

Introduction

In the last issue of Nature in Cambridgeshire we announced a new project, based on an 8-km square centred on the junction of Mill Road and Covent Garden. Our aims are two-fold.

- Create a snapshot of the flora and fauna of Cambridge City and its immediate environs in a historical context.
- Increase public awareness of the diversity of plants, animals and fungi in the city.

We plan to publish a book for the general naturalist, along with articles in journals such as *Nature in Cambridgeshire*, together with blogs, tweets and articles in the local press.

The years 2017-2019 are the main period of recording, but for some species groups with existing long-term records, notably vascular plants and bryophytes, we shall report on the period 2010-2019.

Progress

The project at present has three main components, monthly surveys, a survey of gardens and ongoing recording by local experts.

Monthly surveys started in January 2017 with a survey of Mistletoe. Counts of records are shown in Figure 1a. These are only approximate because multiple occurrences are often diffuse. The preference of Mistletoe for urban areas is obvious. However, we had no records from Cherry Hinton and Trumpington, and need to do a check next winter to see if this absence is real. We also promoted the Cambridgeshire Bird Club Blackcap survey. These are a principal vector of Mistletoe seeds, and from December to March were recorded in 28 locations in the study area. In February we counted Rooks' nests. Future surveys include Hedgehogs, Moles, Large Red Damselfly, Wool Carder Bee, Snakes and Lizards, Muntjac, Egret and Heron, Ivy Bee and Bee Orchids in lawns.

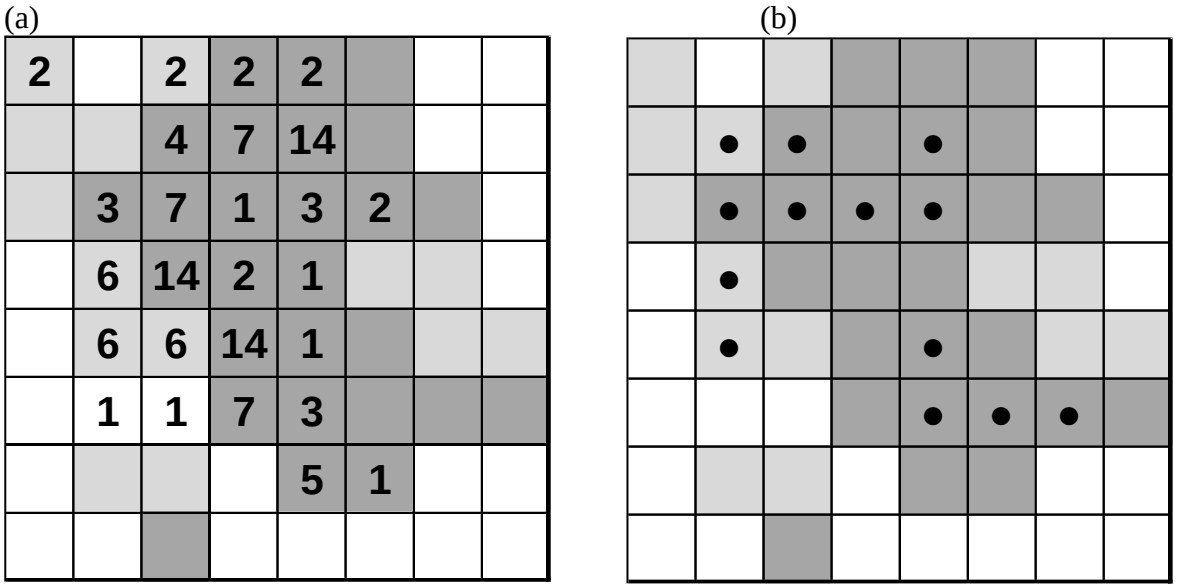
The second main strand of recording is a survey of plants and animals in Cambridge gardens. This will last for three years, with about 20 gardens

recorded per year. We will record vascular plants, bryophytes, mammals (including bats) and birds seen by householders and recorders.

For the third strand of recording we shall make use of existing data, supplemented by visits to interesting sites. For example the bryologists visited Girton College in March, and found 58 species. Botanically, the current building boom has resulted in large imports of soil and soil seed. We now have several sites within the city supporting a small Breckland flora.

For further information, visit our website www.nathistcam.org.uk. If you can offer a suitable garden, or could lead one of our monthly projects or could start an altogether new recording scheme please let us know.

Figure 1 (a) Number of reported occurrences of Mistletoe and (b) 1-km squares with gardens that are signed up for the garden survey. The degree of urbanization is indicated by three intensities of grey; 1 km squares of the 8-km square area are shown individually.



Weather notes from Cambridge University Botanic Garden for 2016

Pete Michna (pm252@cam.ac.uk}

2016 was a warm year with monthly average temperatures higher than the 1971-2000 mean except for March, April and November. There were 34 air frosts compared with the average of 46, although March, April and November had slightly more air frosts than average. Measured rainfall was 529.8 mm

which was 27.1 mm lower than average. Six months had noticeably lower rainfall than average but this was almost compensated for by a very wet June. After a mild winter, spring came early, then hung around with a cool March and April. Late spring and early summer were wet enough to cause problems in the vegetable garden with slugs and snails. Summer continued into a long autumn with good autumn colour.

January was pretty nondescript with many damp days and rainfall close to the average; the wettest day only gave 8.5 mm. The night of the 18th was the coldest of the winter and of 2016 with an air minimum of -4.6°C and -10.5°C on the grass; the maximum temperature for the 18th was +2.9°C, the coldest of the year. There was a dusting of snow on the 17th which lasted long enough for my children to walk to school in it.

There was a near gale (Beaufort Scale 7) on the 1st **February**. Temperatures were a little above average but rainfall for the month was about half the average. There was another dusting of snow on St Valentine's Day.

March was a little wetter than the average. The night of the 27th was very windy with the 28th recording another near gale, the notes reading "raining, windy, horrible", in fact quite like March is supposed to be. The highest temperature was 14.9°C, cooler than the warmest day in January (15.7°C).

April temperatures were about average. The month was a bit wetter than average with 50 mm of rain. There were a couple of thundery days mid-month and the last air frost of the spring on the night of the 30th (-0.6°C).

May was another slightly wetter than average month with 15.4 and 12.4 mm recorded on the 30th and 31st to make up for mostly light patchy showers. The month was warm; the last ground frost was on the night of the 14th (-3.2°C).

June was very wet with 120.4 mm of rain, most of which fell during the second half of the month. The afternoon of the 24th saw a thunderstorm which included a heavy, very local, damaging hail shower. The wettest 24 hour period of the year was recorded on the morning of the 25th (25.1 mm)* and two other days saw over 20 mm of rain. On the other hand, temperatures were unremarkable with only the 6th warmer than 25°C.

July temperatures were mostly unremarkable except for a week mid-month when maxima exceeded 25°C, with two days reaching over 30°C. Rainfall was low with only scattered showers except for 14.8 mm on the 12th.

August temperatures continued so-so except for another two-day spell reaching over 30°C which brought up the monthly average. Again, rainfall was below average with dry spells and a few showery days.

The hottest day of the year fell on the 13th of **September** with a maximum of 32.4°C, unpleasantly hot and humid; the rest of the month was warmer than average, too. Yet again rainfall was below average.

October temperatures were nearer the average; the first ground frost of the autumn was recorded on the 2nd. Yet again the month was rather dry with the only significant rain (7.7 mm) recorded on the 16th.

November was wetter although most rain fell in light showers; the highest daily reading was 10.4 mm. Temperatures were a little lower than average; the first air frost of the winter was recorded on the morning of the 1st.

December maximum daily temperatures were milder than average but the nights were slightly cooler. The month was fairly dry except for 18.3 mm of rain recorded on the 10th. Christmas Day was mild and breezy, just right for a walk!

*Rainfall is recorded at 9.00 GMT for the previous 24 hours.

Month	Mean max temp °C		Mean min temp °C		Highest temp °C	Lowest temp °C	Rainfall (mm)	
	month	*diff*	month	*diff*			month	*diff*
January	8.9	+1.8	2.7	+1.4	15.7	-4.6	44.4	+0.1
February	9.2	+1.4	2.0	+1.0	14.2	-4.0	23.9	-8.9
March	10.3	-0.3	2.1	-0.6	14.9	-4.0	47.6	+7.5
April	13.0	0.0	3.9	-0.1	16.5	-1.3	50.0	+7.3
May	18.7	+1.8	8.3	+1.6	27.0	-0.6	47.6	+3.3
June	20.3	+0.5	11.6	+1.9	25.7	7.6	120.4	+66.6
July	23.7	+1.1	13.3	+1.4	31.5	7.5	29.5	-12.2
August	24.2	+1.7	13.3	+1.6	31.0	8.8	30.6	-17.7
September	22.3	+3.3	12.9	+3.2	32.4	5.8	39.6	-12.7
October	15.8	+0.9	7.4	+0.6	19.9	0.7	15.2	-39.1
November	9.9	-0.5	2.7	-0.8	15.3	-4.5	57.0	+5.3
December	9.8	+1.9	2.1	0.0	14.8	-4.2	24.0	-26.6
Total rainfall for year							529.8	-27.1

The *diff* columns show the differences between the 2016 value and the 1971-2000 mean.

Plate 3 Willow Emerald (*Chalcolestes viridis*). See article on page 19

Plate 4 Willow Emerald oviposition scars on twig. See article on page 19

Plate 5. A male Midwife Toad (*Alytes obstetricans*) carrying a clutch of eggs. See article on page 44

Plate 6. Red-eared Terrapin (*Trachemys scripta*) from Histon. See article on page 44