Nature in Cambridgeshire

No 50 2008

Plate 1. The slug *Testacella haliotidea* from Wandlebury (Photograph by Harold Taylor)
See article on page 48.

Plate 2. The hoverfly *Volucella inanis* at Fowlmere (Photograph by John O'Sullivan)
See article on page 67.

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Cover Illustration. Grester Water-parsnip (*Sium latifolium*). Photograph by C. James Cadbury

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EDITORIAL

We have had further generous donations to Nature in Cambridgeshire's finances. Thanks to all those who have contributed; particular mention must be made of James Cadbury and The Wildlife Trust.

The journal has reached a milestone this year – our fiftieth edition. In celebration we have a bumper issue, not least because we include a complete index to all fifty issues. We hope that readers will find this useful. We are very grateful to all those involved in the preparation of the index, particularly Toby Carter and Jane Bulleid. The index will also be available on our website, which is currently being redesigned.

In this fiftieth edition we are fortunate to be able to include two review papers by Norman Moore. The first describes the changes he has noted in Cambridgeshire wildlife over the past sixty years, and the second describes the early history of the research station at Monks Wood, which, as many will already know, is to be closed by NERC, as part of a cost-cutting exercise, at the beginning of 2009. This second article is the text of a talk delivered by Norman to staff at Monks Wood in early 2008.

We are also fortunate in this issue to have a beautiful illustration by a new, talented artist, Lucy Hulmes (see page 22). We hope to see more of her work in future issues.

Botanical subjects this year include a review of the local populations of Great Water Parsnip, a survey of the aquatic plants of the Cambridge commons, and Part III of Hilary Belcher and Erica Swale's new Algal Flora of Cambridgeshire.

Invertebrate subjects include an article describing the discovery of a new species of Plume-moth in the county, one on invertebrate survey work in Eversden Wood and one detailing the finding of an uncommon carnivorous slug.

Amongst the vertebrates we cover the extraordinary discovery of a fish in a tree, and details of the most recent survey of Otters in the county.

Members of the Cambridge Natural History Society have contributed several papers, including three covering aspects of the early history of the Society and of this journal.

We also have obituaries and book reviews, and the regular sections on vascular plant and bryophyte records, and the second invertebrate records paper.

John Kapor has contributed details of the Cambridge weather records, and we have, as promised last year, a paper comparing John Clarke's records with the Botanic Garden's records. We also include a paper on phonological records in the county

Changes in wildlife and their habitats in Cambridgeshire 1940 – 2008: a personal account

Norman W. Moore

I first visited Cambridge in 1932. With my parents I stayed with two zoologists: Harold and Maud Brindley. Maud was a remarkable woman - she studied anthropology in pre-revolutionary Siberia, she was a writer of children's books and an outstanding ornithologist and field naturalist. The following year she sent me four Swallowtail pupae from Wicken Fen. To my delight they hatched successfully and joined my collection of butterflies.

I spent the summer of 1940 serving in Dad's Army in East Sussex while the Battle of Britain took place overhead. In October I came up to Cambridge to study for the Natural Sciences Tripos. One of the first things I did was to visit Maud Brinkley who told me about the delights of Cambridge Sewage Farm, the Washes and Fulbourn Fen. I visited the Secretary of the Bird Club and asked if I could be a member: "Yes, but would you take over from me as Secretary?" I used my secretaryship to organise two cooperative surveys; one on the birds of the Washes and another on the birds of the Cambridgeshire woodlands.

Throughout my times in Cambridgeshire I have kept notes on the birds, mammals, dragonflies and butterflies that I have seen. Below I summarise my observations in the main habitat types.

1940 – 1942

When walking along the ancient dykes the neighbouring fields contained many chalkland weeds including Cornflower and Corncockle. Stone Curlews were much in evidence and Red-backed Shrikes nested in the hedges. Dingy and Grizzled Skippers were present.

Much of the clay land of Cambridgeshire and Huntingdonshire consisted of relatively small grass fields surrounded by thick Hawthorn hedges. Cowslips abounded.

Most of the ancient woodlands were either managed on a coppice-with-standards rotation or had been so managed recently. Nightingales were abundant and Wood Warblers occurred sparingly. I never saw any deer.

The wetlands were confined to the rivers, the washes and the dykes. The dykes were usually well filled and full of water weeds. Lakes were virtually confined to the one in Wimpole Park and some clay pits near Cambridge. As a result Great Crested Grebes and Tufted Duck were rare breeders and I saw no Gadwall or Canada Geese outside the Breck. I never saw Black-tailed Skimmers anywhere in the county and Common Blue Damselflies were much rarer than today. Noctule Bats were a frequent sight in the evening. Extensive marshes occurred at Wicken, Adventurers Fen and Fulbourn Fen. I visited Adventurers Fen on 16th October 1940 and saw a Peregrine Falcon there. When I next visited on 26th January 1941 the Fen had been drained.

The Cambridge Backs had a rich bird fauna. On 7th May 1942 I heard a migrating Corncrake calling by the river. Black Redstarts bred on four or five Colleges and also on the old Chemistry Laboratory.

1947 – 1948

After five years in the army I returned to Cambridge in 1947 to study for Part II of the Natural Sciences Tripos. Max Walters and I met for the first time.

In my absence the reclamation of old pastures had continued, but in general Cambridgeshire and its fauna had changed relatively little. Cambridge Sewage Farm continued to attract many waders and Black Terns on migration. Black Redstarts still sang from College roofs.

Stone Curlews were still abundant. On 12th October 1947 Richard Adrian and I counted 93 in a field of roots south east of Swaffham Prior and there were more. There were still Red-backed Shrikes on the ancient dykes. There were still Red Squirrels at Hildersham as well as a population of the Scarce Green Damselfly; a species now extinct in Cambridgeshire. There were Swallowtails at Wicken. The most significant habitat change was the presence of water-filled gravel pits at Fenstanton and, I think, elsewhere.

1950 – 1959

In the 1950s I lectured in the Zoology Department at Bristol University and later joined the Nature Conservancy based in Dorset. Therefore I was absent at the crucial early stages of the development of the Wildlife Trust and the publication of Nature in Cambridgeshire.

1960 – 2008

In 1960 I moved to Cambridge to head a Nature Conservancy research group at Monks Wood that was to study the effects of pesticides and other pollutants on wildlife. We moved to Swavesey where we have lived ever since.

In the 1960s industrialised farming increasingly altered the Cambridgeshire countryside, most strikingly on the clay lands; pastures were ploughed to grow cereals, most hedges were removed. The numerous farm ponds were no longer required for livestock and so were filled in. The human inhabitants of villages were no longer mainly engaged directly or indirectly with agriculture but were increasingly commuters to Cambridge and beyond.

Despite the huge changes there were singing Corn Buntings on roadside hedges and Common Whitethroats in song flights, and Skylarks sang over the fields. Tree Sparrows were common. However, dieldrin and other agricultural chemicals killed many Wood Pigeons and game birds, and Sparrowhawks disappeared as a result of eating contaminated prey. Increased road traffic caused numerous bird and mammal casualties. The county was colonised by Collared Doves.

The chalk flora of the ancient dykes and the Roman Road deteriorated rapidly following the outbreaks of myxomatosis in the 1950s. There were few Stone Curlews left in Cambridgeshire and I saw no Red-backed Shrikes. The flora of woodland suffered increasingly from the cessation of the coppice-with-

standards rotation, but Nightingales were still relatively common and deer absent or rare. However, in recent years Muntjac have increased greatly and they are having severe effects on the woodland ground flora and on the scrub layer, which seriously affects Nightingales and other species dependent upon scrub. Control of deer is difficult but must be undertaken.

Later in the period there were exciting developments in the wetlands. Although the Swallowtail became extinct at Wicken, and Snipe and Yellow Wagtails declined, Black-tailed Godwits colonised the Washes and Marsh Harriers became regular breeders. The gravel pits became increasingly important for Little Ringed Plovers and the maritime species Shelduck, Oystercatcher and Common Tern. Inland breeding Cormorants became numerous. Most species of dragonfly increased including Black-tailed Skimmers and Common Blue Damselflies on the pits, Hairy Dragonflies by the dykes and Scarce Chasers by the rivers. However the Variable Dragonfly declined.

The huge diminution of the House Sparrow population was a striking event. But right at the end of the period the new town of Cambourne became a much richer habitat than the farmland on which it had been built.

To conclude, to the non-naturalist most of Cambridge looks fairly similar today to its appearance in the 1940s, except for the clay lands that have changed completely. But for the naturalist it has changed fundamentally; the farmland has become largely devoid of birds and everywhere the scarcer species have become even scarcer. These include summer migrants such as Swallows and Spotted Flycatchers, whose declines may have been at least in part due to events outside Britain. On the other hand, the wetlands have become increasingly rich in birds and dragonflies.

The increasing success of the Wildlife Trust and other organisations managing nature reserves in the county is extremely heartening. In particular the restoration to wetlands of large areas of farmland in the Fens is an outstanding achievement. The Wicken Vision and the Great Fen Project, which will eventually be linked by the RSPB's proposed reserve on the site of old gravel workings on the Ouse, are very exciting developments.

The restoration of chalk grasslands on the ancient dykes and Roman Road is being extremely successful: the abundance of Chalkhill Blues and Lizard Orchids on the Devil's Dyke is wonderful. Increasingly also woodland reserves are being returned by the Trust to coppice-with-standards rotations.

The first signs of global warming are clear to see: Little Egrets are now a common sight in the wetlands. The Small Red-eyed Damselfly, a 'new' British species is rapidly colonising the country and the Lesser Emperor Dragonfly, another 'new' British species, is increasingly recorded. Global warming presents us with a huge challenge. All our endeavours will come to little unless climate change is addressed effectively, nationally and internationally. If this is achieved we can all be delighted with the progress made in the last few years and can look forward to the future with hope.

The Early Days of Monks Wood 1960-1963 – The background and planning research on pesticides etc. A personal view

Norman W. Moore

Introduction – the Background

I was the first person to be appointed to what was to become Monks Wood Experimental Station, so I thought you might like to hear about its growth in the early days. It was conceived in 1959, born in 1960 and by the end of 1963 was a thriving growing child based in this building. I should make clear that a lot of other things were going on at Monks Wood other than work on pesticides but I shall stick to my own experiences.

To understand its early days we have to remember that it was set up by the newly created Government conservation body the Nature Conservancy, which was inaugurated just after the war, and had two branches:

1. **The Conservation Branch** which established NNRs, notified SSSIs and promoted nature conservation generally.

2. **The Research Branch** which ran ecological research stations: initially Merlewood in the Lake District and Furzebrook in Dorset and later Speyside in Scotland and Bangor in Wales. Their work consisted of the study of ecological processes and was only indirectly concerned with nature conservation.

The Nature Conservancy was essentially a new scientific organisation staffed largely by scientists. For example before joining the Nature Conservancy in 1953 I had been a lecturer in Zoology at the University of Bristol.

There was much interplay between the two branches. Many of the Conservation Branch officers were based on the research stations and many members of the Conservation Branch did research, for example when I was the Regional Officer for South West England, based at Furzebrook and covering an area from Hereford to the Isles of Scilly, I published papers on the ecology of the Dorset heathlands and on the behaviour and ecology of dragonflies.

Just after the war there were still as many working horses as there were tractors but in the 1950s it became obvious that new human activities were beginning to have huge effects on wildlife, notably the introduction of myxomatosis to control rabbits and the ever-increasing use of fertilisers and pesticides on farms. For the first time, such biological issues began to be discussed in the newspapers. The Nature Conservancy realised that it must do research on the effects of these new forces so it could advise about mitigating the damage being done to wildlife. Accordingly it was decided by Max Nicholson, the Director-General of the Nature Conservancy, and his Principal, Bob Boote, that the Nature Conservancy should set up an Experimental Station, in addition to the stations of Furzebrook and Merlewood, to do applied research and advise about the problems. I was told in 1959 that I must change my job and

become head of a research section to study the effects of pollutants, notably pesticides, on the environment.

Early in 1960 I changed my job while I was still based on Furzebrook and finishing my regional duties there (e.g. on helping to save Berry Head, a famous botanical site in Devon, from being destroyed by new quarries). I was a member of the Working Party set up to decide where the station would be and what, roughly, it would do. It was chaired by Dr I. Thomas of the Pest Infestation Control Laboratory at MAFF, along with Eric Duffey, the Regional Officer for East Anglia, and Derek Ovington, who like me were both to head sections at Monks Wood. Harry Thompson of MAFF, an expert on rabbits and myxomatosis, was also a member of the group.

We met nine times. Our first job was to select the location of the Experimental Station. There were strong political reasons for having it in easy access of the Nene Reserves (Monks Wood, Wood Walton, Holme Fen and Castor Hanglands) as politicians were complaining that the Nature Conservancy had acquired these places but didn't make use of them. So, when a site adjoining Monks Wood NNR became available it was decided that that was where the Experimental Station should be.

In 1960, I began to plan what subjects we should do research on. The effects of pesticides or of fertilisers or serious industrial pollutants like cadmium and mercury or changing agricultural practices in general were the main candidates.

Pesticides seemed to be a priority because huge numbers of dead birds and mammals were being picked up in fields following the use of pesticides. At first the main culprits appeared to be highly toxic organophosphate insecticides, which were widely used in those days. I sought advice – notably from Charles Elton, head of the Bureau of Animal Population at Oxford and father of modern animal ecology. He drew my attention to a paper in an obscure Californian journal on the indirect effects of an organochlorine insecticide TDE on fish and their predators Western Grebes in Clear Lake. In Britain there was increasing evidence that mass kills of birds were following the use of very toxic persistent organochlorine insecticides, notably dieldrin, to control wheat bulbfly in cereals.

Remember this was before the publication of *Silent Spring*. None of us had heard of Rachel Carson. Nevertheless I was convinced that our priority should be to study the effects and causes of the persistent organochlorine insecticides; my decision was confirmed when Derek Ratcliffe reported breeding failure in peregrine falcons. He gave us an egg to be analysed and it was shown to include DDE, the metabolite of DDT. This convinced us of food chain problems as well as direct effects. We thought this was highly significant and he and I wrote a short joint paper about it.

As head of the section I had to decide on the overall plan for our work, although of course each member of the team planned the details of his own work. Working conditions were very flexible in those days. For example when Max Hooper later joined me to work on genetic aspects of our work he made it clear that what really interested him most was hedges. I was sympathetic because I had myself noted the great losses of hedges in recent years and had written a short paper about it. I knew that hedgerow loss was a major

conservation problem and so agreed that Max should concentrate on it. It is difficult today to realise how free we were in those days to choose what to work on, and to take risks. For example I had become aware of analytical work in Denmark showing that PCBs might prove to be a hazard to wildlife and so we started work on them. This bore fruit: Monsanto, the main producers of PCBs, were so worried about our findings and the similarity of PCBs to DDT and their build up in the environment that they sent a delegation to Monks Wood, and in the course of an afternoon they agreed not to sell those products which could get into the environment, in all Western Europe. Thus both the research and its successful application had been achieved entirely by our own actions. This shows the advantage of being able to choose bits of work with no certainty of success, to see if they were worth pursuing. All this was in the future; back in 1960 I had moved from Furzebrook to live near the site of Monks Wood. We had nowhere to work because though Monks Wood had been planned we didn't have a lab. For a time Alistair Worden of Huntingdon Research, whom I knew through the Mammal Society, gave me the use of a lab at their headquarters in Huntingdon – actually in the house in which Oliver Cromwell was born. I was still the only person of Monks Wood and did much of my work in the spare bedroom at our house in Swavesey: it **was** Monks Wood! To it at the end of 1961 I welcomed Brian Davis, my first member of the Toxic Chemicals and Wildlife Section. He was staying at Holywell, north of the Ouse, and there was no ferry there. I did a lot of canoeing around that time and I remember picking him up with his suitcase in my canoe, ferrying him across the river, putting the canoe on the roof of the car and taking him home to Swavesey. He stayed with us and we had our meetings in our spare bedroom. After that we were based at a dentist's surgery in St Ives, along with Derek Ovington and his woodland team. It wasn't very suitable for chemical work so we borrowed a lab from Cambridge University for Colin Walker, who was our chemist, to do his chemical analyses. Eric Duffey and our director Kenneth Mellanby had less commodious accommodation – they were in a hut at Monks Wood that got appallingly cold in winter. But we all had somewhere to work.

By the end of 1963 when we moved to Monks Wood we had been joined by Mike Way, Max Hooper, Don Jefferies, Ian Prestt, Colin Walker, Shirley Hawkins, and Philippa Nathan (now Harding). Shortly after we were joined by Jack Dempster and Frank Moriarty, and Frank Perring joined Monks Wood to head the Biological Records Centre.

Right from the start I became involved in committee work with other organisations. In 1960 I became a member of the Wildlife Panel run by MAFF, and later in 1962 I represented the Nature Conservancy at the monthly meetings of the Scientific Subcommittee of the Advisory Committee on Pesticides and continued with them until 1983 when I retired. This was a tough assignment as I was frequently at odds with the members from MAFF, ARC (Agricultural Research Council) and MRC when we assessed hazards that new pesticides might cause to human beings, domestic animals and the environment. Once Dr Gunn of ARC, a formidable character who disliked intensely any efforts to

control DDT for environmental reasons, introduced me to his wife thus "Dr Moore and I are each other's *bêtes noirs*!"

Naturally the conflict of interest between the undoubted value of pesticides to preventative medicine and agriculture and changes to the environment attracted much media interest. However much we agreed that DDT had saved the lives of millions of people the media liked to describe the problem as a battle between hard headed practical agricultural chemists in labs on one side and airy-fairy environmentalists wandering around in fields on the other. This was hard to bear when we took a balanced view of the pros and cons of pesticide use. I even wrote a joint paper with an industrialist on the value of certain herbicides in conservation management, but to no avail! However, bad publicity had its plus side and Government had to take note of what we were saying. Soon we were to be visited by the Prime Minister Harold Wilson and his Home Secretary Tony Crosland who really seemed to want to understand what we were doing. The young Prince Charles also paid us a flying visit by helicopter.

In 1963 – after the publication of *Silent Spring* – Max Nicholson sent me to the USA to learn what I could about pesticide use there and how the Americans were dealing with their harmful effects on the environment. I talked to research workers in Washington, Patuxent, Denver in Colorado and Davis in California. My visit to Professor Rob Rudd at Davis proved particularly fruitful. Rob had pioneered research on the environmental effects of pesticides. We became lifelong friends and on a later occasion we flew together in a light aircraft over the famous Clear Lake. On the coast of Connecticut I saw the empty nests of Ospreys caused by DDT; I came away feeling that our research work was on the right lines. My main connection in Washington was John George. He and I both served on an IUCN committee on pesticides. Later in 1966 he was to visit us here (see photograph) on the occasion of the NATO Advanced Study Institute that I arranged with money from NATO.

Now may I try to put Monks Wood in the historical setting? It was a product of the 1950s – now generally thought to have been merely a dull aftermath of the 2nd World War. It was in fact a very remarkable time. People like me, who had had their scientific careers interrupted by 4 or 5 years of service in the Armed Forces (I was a gunner in the war), along with visionaries like Max Nicholson, were determined to make a better Britain after the war. The formation of the Nature Conservancy and the Government's involvement with conservation was part of that idealism. It was still a topdown society and people in authority were expected to take bold initiatives as they were in the war. Even people in quite lowly positions like myself were expected to get things done. For example when I was Regional Officer in south west England I liaised with a colleague in the Forestry Commission, who was in charge of acquiring land on which to plant forests. He and I got together and decided that whenever the Forestry Commission bought new land for afforestation he would ask me what areas I'd like to see left unplanted. Through this we saved some very useful little places. Today such situations would have to be referred to a Defra Forestry Commission Liaison Committee.

These were exciting days but they couldn't last. Those of us in conservation realised the huge value of the Nature Conservancy having its own research branch like Agriculture and Medicine. I remember a distinguished American ecologist being amazed that we could do this and begged me to keep it that way. He could see trouble ahead – how right he was! We were naïve to assume that politicians and industry would tolerate a government organisation backed by research which could and would criticise them and other government bodies.

Inevitably things changed. In 1965 the Nature Conservancy became part of the Natural Environment Research Council (NERC) and in 1973 it became divided into the Nature Conservancy Council (NCC) and the Institute of Terrestrial Ecology (ITE) and after that in 1991 the NCC was divided into separate English, Scottish and Welsh parts. The old science based Nature Conservancy which gave rise to Monks Wood had been dismembered. Sadly, some in universities felt that places like Monks Wood competed with them for funds and so were happy to see a further weakening of the scientific support of conservation.

Excellent scientific work has been done at Monks Wood from its inception until now. But once its special position in the nation's life had been lost it was probably inevitable that it would become a victim of cost cutting, of a commercial approach to applied science, and as a competitor with universities for resources. Nevertheless I think we can all feel proud of what we have been able to achieve over the years despite the obstacles.

Acknowledgments
Doreen Wade, Lizzy Carroll and Tim Sparks helped prepare this manuscript.

100 Years of Cambridge Meteorological Records

Lizzy Carroll, Tim Sparks and Tim Upson

Introduction

John Clarke has contributed Weather Notes from Swaffham Prior (TL5764) for Nature in Cambridgeshire since 1959. As stated in the last issue (no. 49), he is no longer able to continue recording and contributing these data. In future issues of this journal, meteorological data recorded at the Cambridge University Botanic Garden (hereafter referred to as the Botanic Garden) (TL4557) will be published instead.

The Botanic Garden has collected meteorological data since July 1899, recording such information as air temperature, rainfall, soil temperature and snowfall. The primary purpose of this paper is to see how closely the records from Swaffham Prior and the Botanic Garden agree, and what differences, if any, existed between them. One would expect some variation owing to the

surroundings and locations of the two sites; Swaffham Prior is situated approximately eight miles north-east of Cambridge, and while the Botanic Garden is located in the city, Swaffham Prior is rural. However, it is also likely that any differences would be fairly small due to their relative closeness and similarity in altitudes.

The second aim of this paper is to examine the climate of Cambridge (as recorded at the Botanic Garden), from 1900 to the present day. 30-year means are often used to compare meteorological data and are also used for future reference. The period most often used is that of 1961-1990. We now have the opportunity to update this and compare it with the mean for 1971-2000. Extremes of meteorological data will also be presented for future reference.

Methods

John Clarke's data were recorded at Ivy Farm in Swaffham Prior. Ray Symonds had previously abstracted many of the data from Weather Notes in *Nature in Cambridgeshire*, and further data were abstracted from *Nature in Cambridgeshire* for this article. Imperial measurements were converted to metric measurements.

Recent meteorological records from the Botanic Garden were obtained directly from the monthly data sheets held at the Garden. Pre-1984 records were abstracted from the Monthly Weather Reports (e.g. The Meteorological Office, 1984). Data from the years 1899 and 2007 were not included in calculations as they were incomplete at the time of writing. Years with one or more missing monthly values were not included in annual calculations due to the bias they may bring to the result.

In order to compare the meteorological data recorded at the Botanic Garden with that collected by John Clarke at Swaffham Prior, Pearson's correlation coefficients were calculated, and paired t-tests were used to examine the differences between the means of both sets of data. The following variables were analysed: mean air temperature, mean minimum air temperature, mean maximum air temperature, total rainfall and number of rain days (days with ≥0.2mm precipitation). Both the monthly and annual means were analysed for the years 1959–2006 (the time period when records for both sites overlap).

The records obtained from the Botanic Garden were then further examined to determine changes in the climate of Cambridge from 1900 to 2006 using regression analysis that allowed us to calculate the average changes per year. We also compared the most recent 30-year mean (1971–2000) with the earlier 1961–1990 mean often used in climate studies, and compiled a list of extremes of temperature and rainfall recorded over the last 107 years.

Results

Comparing Botanic Garden and Swaffham Prior Records

Statistically significant positive correlations ($P \leq 0.003$) were found for both the annual and monthly values for temperature (mean, mean minimum and mean maximum), rainfall and rain days.

Month	Mean temp (°C)		Mean max temp (°C)		Mean min temp (°C)		Total rainfall (mm)		No. rain days	
	Diff	P	Diff	P	Diff	P	Diff	P	Diff	P
Jan	-0.70	0.000	-1.26	0.000	-0.13	0.346	-1.54	0.091	-0.86	0.064
Feb	-0.60	0.000	-1.11	0.000	-0.10	0.372	-2.16	0.014	-0.86	0.157
Mar	-0.39	0.000	-0.72	0.000	-0.05	0.651	-2.71	0.012	-0.33	0.438
Apr	-0.28	0.002	-0.50	0.000	-0.07	0.573	-0.21	0.880	0.71	0.074
May	-0.03	0.684	-0.16	0.104	0.09	0.416	0.15	0.901	-0.14	0.787
Jun	0.21	0.009	-0.02	0.837	0.44	0.000	-2.48	0.221	-0.38	0.401
Jul	0.21	0.001	-0.19	0.014	0.60	0.000	0.73	0.743	-1.29	0.054
Aug	0.21	0.004	-0.26	0.001	0.67	0.000	1.30	0.531	-0.71	0.139
Sep	0.14	0.163	-0.35	0.008	0.62	0.000	-1.83	0.342	-0.19	0.715
Oct	-0.15	0.127	-0.60	0.001	0.30	0.009	-2.75	0.052	-0.29	0.444
Nov	-0.45	0.000	-1.21	0.000	0.29	0.118	0.71	0.527	0.14	0.803
Dec	-0.50	0.000	-1.22	0.000	0.20	0.080	-1.98	0.085	-0.57	0.271
Annual	-0.23	0.000	-0.69	0.000	0.19	0.028	-14.58	0.006	-6.17	0.045

Table 1: Differences between the mean values of data collected at the Botanic Garden and at Swaffham Prior, 1959-2006 with the significance (P) for each difference. Positive differences reflect higher values at Swaffham Prior and vice-versa.

As can be seen from Table 1, the annual means of mean temperature, mean maximum temperature, mean minimum temperature, total rainfall and number of rain days at the Botanic Garden and Swaffham Prior were all significantly different from each other. However, the differences were small. The temperatures all varied by less than 0.7°C. The annual mean temperature at the Botanic Garden was higher than John Clarke's by 0.23°C and the annual mean maximum temperature by 0.69°C. However, the annual mean minimum temperature was unexpectedly found to be lower for the Botanic Garden. Total annual rainfall and the annual number of rain days were both slightly higher in the Botanic Garden records than in John Clarke's data.

Monthly mean temperature values for October to May were higher for the Botanic Garden than for Swaffham Prior. This trend was reversed for June to September, showing that on average the temperature in the summer was warmer in Swaffham Prior than in Cambridge. None of the differences were greater than 0.7°C. All of them were significant ($P \leq 0.009$) except for May, September and October.

Mean maximum temperatures at the Botanic Garden were higher for all months than Swaffham Prior. The largest differences in means were observed for November-February. Only the May and June mean maximum temperatures were not significantly different (Table 1).

January to April revealed a lower, but not significantly lower, mean minimum temperature at Swaffham Prior. However, the reverse was true for the remaining months and was significant for June-October ($P \leq 0.009$).

The differences between total rainfall recorded at the Botanic Garden and Swaffham Prior varied over the months from 1.30mm less in the Botanic Garden in August to 2.75mm more in October. Eight months showed a higher total rainfall recorded at the Botanic Garden, although only two months showed a significant difference between locations (February and March). Ten months showed a higher number of rain days in the Botanic Garden than in Swaffham Prior. However, none of the differences was statistically significant (P ranged from 0.054 to 0.803).

Trends over Time in the Botanic Garden Meteorological Data

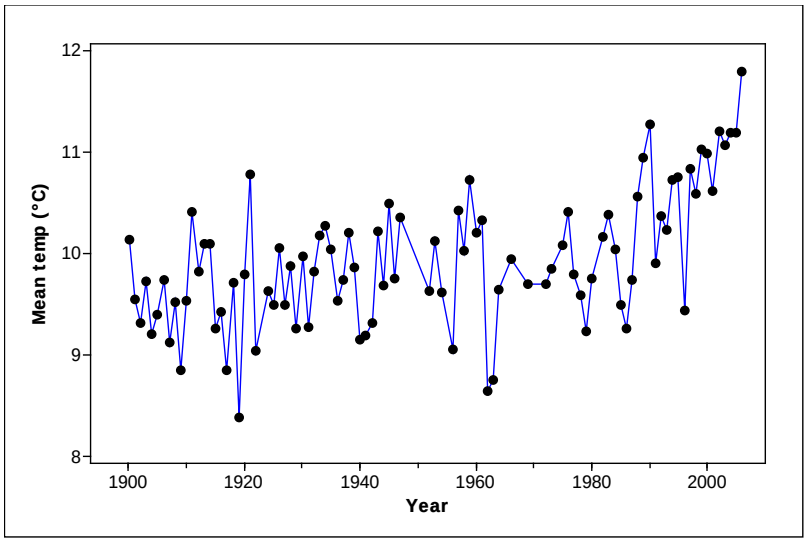

Figure 1: Annual mean temperature (°C) recorded at the Botanic Garden 1900- 2006.

Figure 1 shows how the annual mean temperature recorded at the Botanic Garden has increased over the years. This graph shows an upward curve, with mean temperature remaining fairly constant up until the end of the 1980s and then rising rapidly in recent times. A regression of annual mean temperature on year suggested a per annum increase of 0.0112°C, or 1.2°C over the entire period (R^2=30.3%, P<0.001).

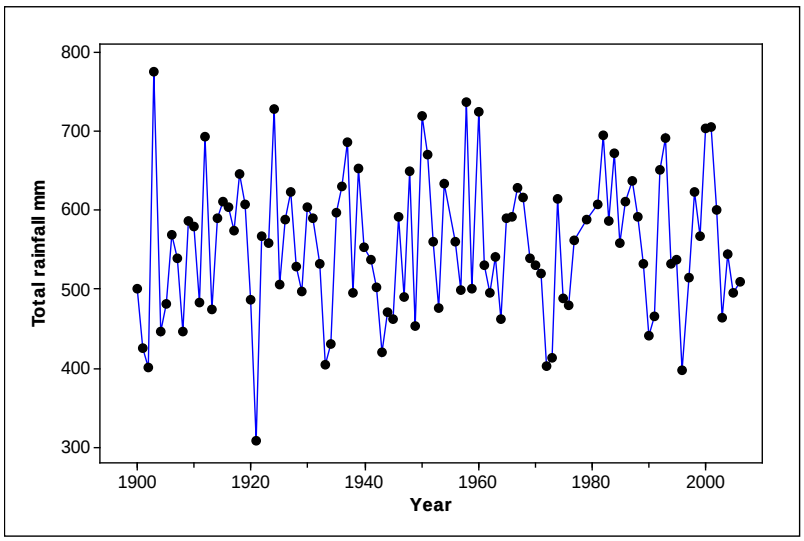

Figure 2: Total annual rainfall (mm) recorded at the Botanic Garden 1900- 2006.

Figure 2 shows the pattern of annual rainfall recorded at the Botanic Garden over time. The amount of rainfall was highly variable between years, with no significant trend (R^2=0.0%, P=0.358).

	Temperature			Rainfall	
Month	**P**	**R^2(%)**	**Average temp change (°C/year)**	**P**	**R^2(%)**
January	0.157	1.0	ns	0.845	0.0
February	0.231	0.5	ns	0.934	0.0
March	0.001	10.3	+0.02	0.962	0.0
April	0.001	9.0	+0.01	0.974	0.0
May	0.098	1.7	ns	0.539	0.0
June	0.004	6.9	+0.01	0.591	0.0
July	0.013	4.9	+0.01	0.312	0.0
August	0.000	12.4	+0.02	0.864	0.0
September	0.001	9.0	+0.01	0.158	1.0
October	0.000	10.9	+0.02	0.563	0.0
November	0.000	11.9	+0.02	0.246	0.3
December	0.138	1.2	ns	0.921	0.0

Table 2: Regression statistics for monthly mean temperature and total rainfall over time at the Botanic Garden, and the average temperature change per year for months with significant regression.

As can be seen from Table 2, none of the monthly regression analyses for total rainfall over time was significant. Eight months were significant for mean temperature; however, the R^2 values were all fairly modest, suggesting large year to year variation. Temperature increases varied between 0.01 and 0.02°C/year.

The annual number of days of ground frost (grass minimum temperature ≤0°C) and the annual number of days of snow were found to have been decreasing over time. Ground frosts have decreased by an average of 0.113 days/year from 1908 to 2006 although this is not significant. Snow days have decreased by 0.079 days/year from 1902 to 1990. This was found to be significant although the low R^2 values for both events indicate a high level of variation.

30-Year Means

	Mean Temperature (°C)		Rainfall (mm)		No. Rain Days	
Month	**1961-1990**	**1971-2000**	**1961-1990**	**1971-2000**	**1961-1990**	**1971-2000**
January	3.6	4.2	42	44	15	15
February	3.9	4.4	33	33	12	12
March	6.0	6.7	40	40	14	14
April	8.4	8.5	42	43	14	13
May	11.7	11.8	47	44	13	12
June	14.9	14.8	48	54	11	12
July	16.8	17.3	48	42	10	10
August	16.6	17.1	54	48	11	10
September	14.3	14.4	47	52	11	12
October	11.0	10.8	50	54	12	13
November	6.7	6.9	51	52	15	14
December	4.5	5.0	49	51	14	14
Annual	**9.9**	**10.2**	**552**	**557**	**151**	**150**

Table 3: 30-year means 1961-1990 and 1971-2000 for mean monthly temperature (°C), total monthly rainfall (mm) and the monthly number of rain days recorded at the Botanic Garden.

A comparison between the 1961-1990 and the 1971-2000 30-year means shows that in ten months there has recently been an increase in mean temperature. The two months not following this trend (June and October) have only dropped by 0.1 or 0.2°C. The annual mean temperature between the two 30-year means increased by 0.3°C. Annually, the total rainfall has increased by 5mm (about 1%). However, the monthly averages don't show a clear pattern in change. The two 30-year means show very little difference in number of rain days for each month or, indeed, annually. In fact, the difference in annual number of rain days between the 1961-1990 and the 1971-2000 means only shows a decrease of one day.

Climate Extremes

	Value	**When**
Hottest year (mean temperature)	11.8°C	2006
Coldest year (mean temperature)	8.4°C	1919
Hottest month (mean temperature)	21.4°C	July 2006
Coldest month (mean temperature)	-2.8°C	January 1963
Hottest day (max temperature reached)	36.9°C	10 August 2003
Coldest day (min temperature reached)	-17.2°C	24 & 25 February 1947
Wettest year (total rainfall)	776 mm	1903
Driest year (total rainfall)	308mm	1921
Wettest year (no. rain days)	185	1910, 1958
Driest year (no. rain days)	106	1949
Wettest month (total rainfall)	193mm	July 1950
Driest month (total rainfall)	0.76mm	June 1962
Wettest month (no. rain days)	26	March 1975, March 1981, June 1991
Driest month (no. rain days)	1	February 1959, August 2003, September 1959
Wettest day (total rainfall)	59.44mm	23 July 1903

Table 4: Table displaying extreme temperature and rainfall events for years, months and days, recorded at the Botanic Garden, 1900- 2006.

Discussion

Comparing Botanic Garden and Swaffham Prior Records

As expected, all of the differences in annual means between the two sets of data were small, probably due to the relatively close proximity (approximately 8 miles or 11.5km) of the two sites and the similar altitudes. The fact that the annual mean temperature was higher at the Botanic Garden than at Swaffham Prior was also expected, as due to human activity and the use of materials such as concrete and tarmac, urban environments both generate and retain more heat

than rural areas. However, the fact that the annual mean minimum temperature was lower (more extreme) than the equivalent value for Swaffham Prior was unexpected. The slightly higher rainfall seen over the Botanic Garden could be due to what is known as the Urban Heat Island Effect (Pielke *et al* 2007). As the city is generally warmer than the surrounding countryside, convection currents are set up as the warm air rises, and this causes cloud formation, or enhances existing clouds, increasing the likelihood of rain. This effect has only been demonstrated in large cities and therefore may not be applicable to Cambridge. Alternatively, rain generally approaches from the south-west, decreasing as it travels north-eastwards. Swaffham Prior is situated to the north east of Cambridge so this could account for the small decrease in rainfall observed there. However, the proximity of the two sites makes this unlikely.

The mean monthly temperatures at the Botanic Garden were found to be higher than at Swaffham Prior in the winter months. This could be due to the increased heat retaining properties of urban areas and/or an increase in heat production caused by heat escaping from centrally heated buildings etc. However, in the summer months mean temperatures were higher at Swaffham Prior. The largest differences in mean monthly maximum temperatures were seen in the winter months, again possibly due to better heat retention. The differences in the summer were not significant, indicating that the summer temperatures were more similar between the two sites. Many of the mean monthly minimum temperature differences were not significant, and those that were showed that the Botanic Garden temperatures dropped lower than those at Swaffham Prior. It is unclear why this was so.

The monthly totals of rainfall and rain days were generally not significantly different between the two locations. Of the very few that were, there appeared to be increased rainfall at the Botanic Garden. As discussed earlier this could be due to the Urban Heat Island Effect causing convection currents and therefore more rain. However, the non-significance of the majority of differences suggests that it is more likely to be due to random variation.

Trends over Time in the Botanic Garden Meteorological Data

Mean annual temperature was warming at what appeared to be an accelerating rate (Fig.1). Regression analysis indicated that over the past 107 years, the mean annual temperature increased by an average of 0.01°C/year. This may not sound like much but it means that Cambridge is now on average 1.2°C warmer than it was in 1900. As the warming appears to be accelerating, much of this increase will have taken place in the recent past, and the rate of increase is continuing to rise.

Total annual rainfall was very varied over time (Fig. 2). No consistent pattern of change was evident. As with the annual results, monthly total rainfall showed no significant trends of change over time. Eight months showed a significant trend of monthly mean temperature which were increasing by 0.01°C or 0.02°C per year. However, low R^2 values suggest that there was much variation around the trend.

30-Year Means

The increase of 0.3°C seen between the previous and the present 30-year mean temperatures is as expected. We have seen from looking at the annual mean temperature over the past 107 years that it is increasing, and would expect the magnitude of increase to be higher in the past 30 years than over the whole time period since warming is accelerating. Again, as with the trends over time, rainfall and rain days were inconsistent in the direction of change. The annual total has increased by 5mm, but with the variation in monthly values, firm conclusions cannot be drawn from this. The same applies to rain days. We hope that these 30-year mean values will be useful for future comparisons.

Extremes

The hottest temperature extremes all occurred in the last decade, again suggesting a shift towards a warmer climate. Equally, the coldest extremes were all seen in 1963 or earlier; very cold temperatures are rarely seen in Cambridge any more. The wettest and driest extremes were fairly evenly spread throughout the whole recorded period. As with the 30-year means, these extreme values can be used for future reference in Cambridge climate studies.

Conclusion

The data collected from the Botanic Garden show a good match with John Clarke's Swaffham Prior data. The average temperature in Cambridge is increasing with a more rapid increase seen since the late 1980s. High temperature extremes have been experienced more in recent times.

Acknowledgments

We owe a huge debt of gratitude to John Clarke for Swaffham Prior data, and to the diligent recorders at the Botanic Garden. Ray Symonds, and the Cambridge University, Botanic Garden and Monks Wood libraries were used as additional sources of data. We expect that the meteorological data collected at the Botanic Garden will now be freely available on the Cambridge University Botanic Garden website (http://www.botanic.cam.ac.uk/) although we can accept no liability for its accuracy.

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The aquatic plants of the River Cam and its riparian commons, Cambridge, 1660–1999

C. D. Preston

Introduction

The riparian commons of Cambridge are one of the main features of the city's landscape and combine with the University buildings to produce some of the most famous views in Europe. The management of the commons over the last 150 years is well documented. The minute books of the Borough of Cambridge's Commons Committee, which survive from 1849 onwards, show that the current state of the commons is the product of a long period of human manipulation. During the 19th and early 20th centuries materials such as rubbish, river dredgings and street sweepings were used to raise the level of the commons, after which the ground was levelled and often resown (Preston & Sheail, 2007; Sheail & Preston, 2001). The flora of the commons is also well documented. Although few rare species have been recorded, the commons lie within easy walking distance of the city centre and therefore provided an early opportunity for botanists who were learning their plants as undergraduates to encounter wetland species. Several of these collected herbarium specimens or annotated their Floras, and there are also records made by more experienced botanists resident in Cambridge or visiting the city. In particular, there are many records from Coe Fen and Sheep's Green dating from the middle of the 19th century onwards. This paper summarises the historical records of aquatic plants from the riparian commons, reports the results of a survey of the area carried out at intervals between 1985 and 1999, and attempts to relate changes in the flora to our knowledge of the management of the commons.

The area covered comprises the River Cam from Newnham Croft and Vicar's Brook to the Chesterton railway bridge, and the adjacent flood plain. It thus includes the public open spaces of Coe Fen, Sheep's Green, Lammas Land, Queens' Green, The Backs, Jesus Green, Midsummer Common, Butt Green and Stourbridge Common. Coldham's Common and Empty Common, both of which had a relatively rich flora before they were mined for coprolites in the 19th century, are outside the study area. The data presented here represent a modified version of the dataset summarised and analysed by Preston *et al.* (2003), and this paper includes a map of the study area.

Sources of records

'Aquatic plants' are difficult to define as there is no clear separation between aquatic and terrestrial species. For this paper, aquatic plants are defined as those included in Preston & Croft (1997), where problems of definition are discussed. I drew up a shortlist of aquatics recorded in TL45 or TL46 by Perring *et al.* (1964) or Crompton & Whitehouse (1983). Over a period of years from the mid 1980s, as and when opportunity allowed, I compiled records of these species from the study area from various sources, including the following.

Specimens in the herbaria of the Natural History Museum, London (**BM**), University of Cambridge (**CGE**), Royal Botanic Garden, Edinburgh (**E**), Hancock Museum, Newcastle upon Tyne (**HAMU**), University of Leicester (**LTR**), University of Oxford (**OXF**) and Royal Albert Memorial Museum, Exeter (**RAMM**). In addition, M. N. Sanford provided a list of specimens from the herbarium of E. B. Cowell at Ipswich Museum (**IPS**) and I extracted details of relevant *Potamogeton* specimens from the card index of J. E. Dandy (**BM**).

Records from the published Floras of Cambridgeshire and from the three-volume manuscript *Flora of Cambridgeshire: being the original record of localities of the plants found in the county: by Charles Cardale Babington 1845–60* (held in the Department of Plant Sciences, University of Cambridge).

Records from copies of Babington's *Flora of Cambridgeshire* (1860) annotated by C. C. Babington, A. Fryer, C. E. Moss, W. H. Mills, A. S. Shrubbs and W. West jnr (Department of Plant Sciences, University of Cambridge), by E. B. Cowell (Cambridge University Library), by H. N. Dixon (Cambridge University Botanic Garden), by A. H. Evans and J. S. L. Gilmour (Simpson collection, Department of Plant Sciences) and by A. W. Graveson (owned by D. A. Pearman). Most of these records are dated or can be assigned to the relatively brief periods that the annotators spent in Cambridge. However, the dating of A. H. Evans' records is more problematic. Evans matriculated in November 1875 and after taking his degree in 1879 he remained in Cambridge until he retired to Buckinghamshire in 1928 (Sclater, 1943). Most of his numerous annotations are undated but there are scattered dates ranging from 1900 to 1928, with the majority between 1904 and 1912 (a single record from 1880, of *Blysmus compressus*, is clearly dated later, from memory). It is tempting to suggest that most of the undated records similarly date from 1904–1912, and his aquatic records are consistent with other records made during this period, but I cannot rule out the alternative explanation, that the concentration of records in this period simply reflects a greater tendency in these years to date his records.

Records in the Cambridge Natural History Society card index (**CGE**), the card index of the B.S.B.I. vice-county recorder for Cambridgeshire (v.c. 29) and the recording cards for *Flora of Cambridgeshire* (Perring *et al.*, 1964) and *Atlas of the British Flora* (Perring & Walters, 1962), also held by the vice-county recorder. Also records from the cards compiled for the B.S.B.I. Monitoring Scheme, held at the Biological Records Centre, Monks Wood, and other records held in the B.R.C. database.

Records were also extracted from other relevant publications, including West (1898) and Bennett (1899). In recent years Mrs G. Grompton's *Flora of Cambridgeshire* website (www.cambridgeshireflora.com) has become available, and in preparing this paper in 2008 I checked my records against those in this invaluable compilation. This added records from several sources, including W. L. P. Garnon's specimens collected in 1839 (**SWN**) and W. H. Coleman's records from 1833–35, as well as valuable 20th-century records made by D. E. Coombe (1940s), P. H. Oswald (1950s), A. C. Leslie (1970s and 1980s) and C. Newell (1990s).

None of these historic sources represents a comprehensive survey of the study area, so the historic records are a compilation of miscellaneous records made at various periods for other purposes. By contrast, my survey of the current flora of the area, made on occasional visits between 1985 and 1999, was aimed at recording all the aquatic plants in the study area. All 1985–99 records are mine unless stated, and the phrase "recent years" applies to this period. In writing this paper I have generally disregarded poorly localised records (e.g. specimens labelled 'Cambridge') that may or may not have been collected in the study area. Floating fragments of plants detached from rooted colonies have also been disregarded. Records from 'Cow Fen' are given the modern spelling 'Coe Fen'. In the numerical summaries in the Discussion, the taxa counted are those with a main entry (in bold italics) in the species accounts, excluding only the generic entry for *Callitriche* (to avoid double-counting).

The main sites for aquatic plants, 1985–1999

Records made between 1985 and 1999 are listed at the end of the species accounts for some of the main sites in the study area, using the abbreviations listed below. These have been chosen as the main areas for aquatic plants in the modern landscape. The River Cam (**RC**) supports aquatics throughout its length, although these are never present in dense stands and are very sparse in the central stretch between Queens' and St John's Colleges (**RC2**). The banks of the river are artificial except at Stourbridge Common, where cattle have access to the river's edge. The aquatic flora of Vicar's Brook (**VB**) is very limited, in part because it is shaded by trees and by tall herbs on its banks. I did not survey the Paradise/Owlstone Croft area, although I have included records made by others. Coe Fen (**CF**), Sheep's Green (**SG**) and the Newnham Mill Pond (**NM**) provide a range of aquatics in various streams and ditches, some with cattle-poached edges as these areas were grazed seasonally throughout the period in which I was recording. The Backs (**B**) have a network of ditches, many connected to the river, most of them with steep banks and all set in a formal and highly managed landscape. The Bin Brook along the east side of Queen's Road provides a short length of a shallow, flowing but very shaded stream in this area. Jesus Ditch (**JD**), like many of the ditches by the Cam, is shallow and silty, and also shaded by numerous Horse Chestnuts along its bank from which it receives many fallen leaves in autumn. Jesus Green, Midsummer Common and Stourbridge Common form a sequence of progressively less manicured amenity or grazed swards but all are now too well drained to provide a habitat for aquatic plants, although the short stretch of Coldham's Brook (**CB**) which flows through Stourbridge Common at the northern edge of the study area is very shallow but choked with aquatic plants.

RC: River Cam, **1** from Vicar's Brook to Silver Street, **2** from Silver Street to Magdalene Bridge, **3** from Magdalene Bridge to Victoria Bridge, **4** from Victoria Bridge to Elizabeth Way, **5** from Elizabeth Way to railway bridge at TL473601.

VB: Vicar's Brook from Stone Bridge, Trumpington Road to the River Cam.

CF: Coe Fen, **1** central ditch S. of Fen Causeway, **2**, other ditches S. of Fen Causeway, **3**, central ditch N. of Fen Causeway, **4**, other ditches N. of Fen Causeway.
SG: Sheep's Green and Lammas Land, **1**, S. of Fen Causeway, **2**, N. of Fen Causeway.
NM: Newnham Mill, **1**, Mill lode (Snobs' stream), **2**, Mill Pit.
B: The Backs, **1** Queens' Ditch, **2** ditch W. of King's College, **3** ditch N. of Garrett Hostel Lane, **4** other ditches.
JD: Jesus Ditch.
CB: Coldham's Brook N. of railway bridge at TL472599, **1**, TL472599, **2**, TL473600.

If there are only pre-1985 records for these main sites the relevant abbreviations are given in square brackets, but I have not tried to allocate older records to the numbered subdivisions.

Native species recorded from the riparian commons, 1660–1999

Species are treated as 'extant' (recorded between 1985 and 1999) or 'extinct' (recorded only before 1985). The species accounts give a summary of the records for the species in the study area, but I have not attempted to give a comprehensive list of all records for all species. Three extinct species are illustrated as Figure 1.

Extant species

Alisma plantago-aquatica Collected at Sheep's Green by W. P. Hiern in 1863 (**RAMM**) and E. B. Cowell in 1885 (**IPS**), but not subsequently. First recorded from Coe Fen by Relhan (*fide* Babington's ms Flora) and still present there. CF2–4, [SG].

Apium nodiflorum Widespread, although no longer present on Jesus Green where it was collected (as 'Common behind Jes. Coll.') by Garnons in 1839. RC1, CF1–4, SG1–2, B2, 4, CB1–2.

Berula erecta Surprisingly, the only localised record from the study area before 1985 is E. F. Warburg's from Sheep's Green, 1938. VB, CF4, [SG].

Butomus umbellatus A conspicuous species when flowering, but easily overlooked in the vegetative state, especially when submerged; plants in the river are easier to find in dry summers when water levels are low and the short, spirally twisted emergent leaves develop. RC1, 3–5, [CF], SG2, NM1, B1.

Callitriche Older published records are unreliable and the comments on the few Cambridge specimens in **CGE** suggest that most are inadequate for certain determination. Although the genus has received little critical study in Cambridge, there are reliable records of three species from the study area. RC1–5, VB, CF1–4, SG1–2, NM1–2, B1–4, JD, CB1–2.

Callitriche obtusangula Only known from recent collections from The Backs, where it was abundant in 1989 in the ditch N. of Garrett Hostel Lane, TL444585, and in King's College ditch, TL444583 (both **CGE**, det. R. V. Lansdown). B2–3.

Callitriche platycarpa According to the 1964 *Flora* "A. O. Chater has seen it in several places in Cambridge during the last few years" (Perring *et al.*, 1964). The locality he remembers is Jesus Ditch, then very good for *Callitriche* though rather shaded (A.O.C., pers. comm., 1987). In recent years this has been the most frequent species in the study area and most of the records of *Callitriche* probably refer to it. RC1, 4, CF1–4, B4, [JD].

Figure 1. Three species which have been lost from the study area, Bogbean, *Menyanthes trifoliata* (left, last seen before 1860), Frogbit, *Hydrocharis morsus-ranae* (centre, last seen in 1905) and Water-violet, *Hottonia palustris* (right, last seen in 1938). Drawn by Lucy Hulmes.

Callitriche stagnalis The only records before the current survey are A. O. Chater's from Coe Fen, 1955 (**CGE**, conf. H. Schotsman) and The Backs behind Queens' College, TL445581, 1954. I have identified it only on the cattle-poached mud at the edge of Coldham's Brook in recent years, though it was probably also present as flowerless plants in the brook itself. [CF, B], CB2.

Carex acuta Described as abundant on Paradise, TL446572, by S. M. Walters in 1961 and later that year collected there by P. D. Sell (**CGE**, conf. J. S. Faulkner & R. W. David). Still present in this area, in Owlstone Croft Nature Reserve, where it was recorded at TL 446573 by C. J. Cadbury in 1980 and by C. Newell between 1993 and 2000.

Carex acutiformis Less frequent than *C. riparia* but still present in the study area. RC1, CF2, 4, SG2, NM1.

Carex elata Long extinct on Sheep's Green, where it was recorded in 1887 by E. B. Cowell (**IPS**) and *c.* 1932 by T. G. Tutin. However, it persists at Paradise, where it was recorded by C. Newell in 1990 (det. S. M. Walters) and 1993–2000. [SG].

Carex riparia Widely distributed in the study area in the past, as now. RC1, CF1–4, SG2, NM1, B2, CB2.

Catabrosa aquatica Still present at Coe Fen, where records date from 1901 (no collector named, **CGE**). This is probably rarer in Cambridgeshire than any other aquatic plant in the study area. By 1964 there were only three extant sites in the vice-county (Perring *et al.*, 1964), the others being Coldham's Common, where it still persists, and Swaffham Prior, where it was last recorded in 1963. *Catabrosa* was formerly known from Jesus Ditch (C. E. Moss, 1909) and Sheep's Green (N. W. Simmonds, 1941, **CGE**) as well as from other sites just outside the study area, including Grantchester Meadows, Open Common and a pit at the end of Burrell's Walk. [It was again reported from Sheep's Green by Shanklin & Hartley (2006)]. CF1–3, [SG, JD].

Ceratophyllum demersum There are historical records from a number of sites in the study area, suggesting that it was as widespread in the 19th century as it is today. It has, however, been lost from Midsummer Common, where H. N. Dixon recorded it in 1883. RC1, 3, 4, CF1–4, SG2, NM1, B1.

Glyceria declinata This grass was overlooked by Cambridgeshire botanists until it was first recorded by S. M. Walters in 1945. It was recorded from Coe Fen by A. C. Leslie in 1978 and I collected it with *G. fluitans* on damp mud by a ditch, Coe Fen, TL448576, in 1999 (**CGE**, det. C. A. Stace). CF4.

G. declinata* × *fluitans also occurs on Coe Fen, Sheep's Green and the muddy edge of Newnham Mill Pit (Crompton & Preston, 2000). CF1, SG1, NM2.

Glyceria fluitans An early record from Sheep's Green (1905) is probably correct, although there is the possibility of confusion with *G. declinata* and the hybrid (see above). It is still present on Coe Fen, where it was recorded by D. A. Hopwood in 1952 and A. C. Leslie in 1978. CF4, [SG].

***G. fluitans* × *notata* (*G.* × *pedicellata*)** is also known from Coe Fen, TL448572, Sheep's Green, TL446576, the grassy edge of the R. Cam at Stourbridge Common, TL469599, and at the N. end of Coldham's Brook (all 1999, **CGE**, det. C. A. Stace). RC5, CF1, SG1, CB1–2.

Glyceria maxima Frequent in the study area. RC1, 3, 5, CF1–4, SG2, NM1–2, B1–2, 4.

Glyceria notata Although there are 19th-century specimens from Cambridge, there is no definite record from the study area until A. C. Leslie reported it from Coe Fen in 1978. In 1999 I collected it on the E. side of Coe Fen N. of the Engineering Department, TL449577, and opposite the Garden House Hotel, TL446578, and, with *G.* × *pedicellata*, at the edge of the R. Cam on Stourbridge Common, TL469599 (all **CGE**, det. C. A. Stace). RC5, CF4.

Iris pseudacorus Well distributed in the study area. RC1, 4, VB, CF3, 4, [SG], NM1, B2–4, JD, CB2.

Lemna gibba Known from the area since 1824, when Henslow collected it on Coe Fen (**CGE**). RC1–4, CF1–4, SG2, NM1.

Lemna minor An abundant aquatic in the study area. T. G. Tutin saw it flowering on Coe Fen in 1938, but I have never seen a flowering *Lemna* in Cambridgeshire, despite much searching. RC1–5, VB, CF1–4, SG1–2, NM1–2, B1–4, JD, CB1–2.

Lemna trisulca Collected from Coe Fen by W. L. P. Garnons in 1839 and known to several later botanists until *c.* 1913 (A. W. Graveson). Still present there, and recorded for the first time (rather surprisingly) from Sheep's Green in the current survey. CF1, SG2, B2, JD.

Myosotis scorpioides Widespread in the study area, especially on Coe Fen and Sheep's Green. RC1, 5, CF1–4, SG1–2, NM1–2, B1–2, 4.

Myriophyllum spicatum I would have expected this to be frequent in the river but, remarkably, there are only two records from the study area. It was recorded by H. N. Dixon on Sheep's Green in 1882 and it was locally abundant in King's College ditch, TL444583, in 1986 but reduced to a few shoots by 1989 (by which time the ditch had become choked with *Phalaris* and it was slubbed out in the following winter). [SG], B2.

Nuphar lutea Frequent in the River Cam on either side of the city centre. It usually grows towards the centre of the channel as submerged leaves, but sometimes the floating leaves and one or two flowers are produced and survive damage from boats and punts. It is difficult to know whether older records from Coe Fen and Sheep's Green refer to plants growing in the river. RC1, 3–5, [CF, SG], NM1–2.

Persicaria amphibia Recorded historically from Sheep's Green by Babington (1860) and H. N. Dixon *c.* 1880, but not from Coe Fen, where it has been found recently. RC1, CF1–3, [SG], B4.

Phalaris arundinacea Well distributed in the study area. RC1, 5, VB, CF1–4, SG2, NM1–2, B2, CB2.

Potamogeton crispus Recorded by Babington (1860), H. N. Dixon *c*. 1880 and W. West 1892–96 from Sheep's Green, but not subsequently. On Coe Fen T. G. Tutin recorded it from Peterhouse Ditch in 1938 whereas the current record is from the central stream. It has not been recorded in recent years in the River Cam by Coe Fen, where D. E. Coombe found it in 1949, though it does still occur further downstream. RC5, CF1, [SG], B3–4, JD.

Potamogeton pectinatus Occasional in the river and in nearby ditches. RC1, 4–5, NM1–2, B1–3.

Potamogeton perfoliatus Primarily a plant of the R. Cam in Cambridge, but also recorded from the lode flowing into Newnham Mill Pit in the current survey and the pit itself in 1952 (D. M. Griffin & D. J. Griffiths, **CGE**). RC1, 3–5, NM1.

Potamogeton pusillus Records of the pusilloid pondweeds made before Dandy & Taylor's revision of their taxonomy in 1940 are unreliable, and in any case there are very few from the Cambridge area. In the current survey *P. pusillus* was collected from King's Ditch, The Backs, TL444583, in 1986 (but erroneously reported as *P. berchtoldii* in *Nature in Cambridgeshire* **29**: 76, 1987) and from the ditch on the N. side of Garrett Hostel Lane, TL445585, in 1989 (both **CGE**). B2–3.

Potamogeton trichoides Duplicate specimens of the single historic record, from the R. Cam below Jesus Lock, Cambridge, J. P. Harding, 1946 (**BM**), were distributed from **BM** to several herbaria but not **CGE**, and the record was therefore unknown to Perring *et al.* (1964) and Crompton & Whitehouse (1983). In the recent survey it was collected in 1999 from the

central stream on Coe Fen, TL448573, and the ditch on the N. side of Garrett Hostel Lane, TL444585 (both **CGE**). CF1, B3.

Ranunculus penicillatus* subsp. *pseudofluitans The taxonomic treatment of the large riparian Batrachian *Ranunculus* species has changed over the years, but Murrell & Sell (1990) regard the plant which grows in the Cam as *R. penicillatus* subsp. *pseudofluitans* (which they treat as *R. pseudofluitans*). *R. fluitans* was the name applied to it by botanists in the 19th and early 20th centuries, when there were records from the R. Cam at Cambridge and Chesterton and from Sheep's Green, the last being A. H. Evans's (undated) and A. W. Graveson's (*c.* 1913) records from Sheep's Green. A single patch of *Ranunculus* which appeared to be *R. penicillatus* subsp. *pseudofluitans* became established by the weir at Jesus Lock in 1999 and survived for a few years, but it never flowered. Detached stems from the upper river can sometimes be seen caught up on the weir and presumably this patch became established from such a stem. One vegetative *Ranunculus* plant also grew in Jesus Ditch in 1989. RC3, [SG], JD.

***Rorippa nasturtium-aquaticum* agg.** This aggregate of two species and their hybrid is widespread in the study area. RC1, 3, 5, CF1–4, SG1–2, NM1–2, B1–2, 4, CB1–2.
H. W. Howard, who with Irene Manton elucidated the taxonomy of the *Rorippa nasturtium-aquaticum* aggregate in the 1940s, recorded *R. microphylla* from Sheep's Green (1944) and *R.* × *sterilis* from Coe Fen (one plant in 1946, many in 1948 and 1949) as well as *R. nasturtium-aquaticum sens. str.* from "ditch by King's College bridge" in 1944. Subsequently D. A. Hopwood recorded *R. nasturtium-aquaticum sens. str.* on Coe Fen in 1952 and A. C. Leslie found all three taxa in the stream there, at TL448574, in 1982. I have only recorded *R. nasturtium-aquaticum sens. str.* in the current survey, at RC1, 5, CF2–3, SG1–2, CB1–2, but I did not give sufficient attention to this group and a detailed look at the Cambridge plants is needed.

Rumex hydrolapathum This striking species is still present on Coe Fen, where it was known to Martyn (1763), and on Sheep's Green, where it was first recorded by Babington (1860). It was recorded from the river wall of Clare College by J. Rishbeth in 1939. RC5, CF1–4, SG2.

Sagittaria sagittifolia Now primarily a plant of the River Cam, where the broad, strap-shaped submerged leaves are more frequent than the more recognisable emergent leaves. There is a historic record from RC2 (R. Cam by St John's College, D. H. Valentine, 1939), the only stretch of the river in which it has not been recorded recently. It is difficult to know how many of the historical records from Sheep's Green refer to plants in the river; it was last recorded here by E. B. Cowell (1901) or A. H. Evans (undated). There is a specific record from "ditch on Coe Fen" (E. A. George, 1939) and it was present in 1999 in the ditch on the E. side of the Fen north of the Engineering Department, TL449577. In addition, it was recorded from Jesus Ditch in 1921. RC1, 3–5, CF4, [SG], NM1, [JD].

Schoenoplectus lacustris Like *Butomus umbellatus* and *Sagittaria sagittifolia*, this species can persist as submerged leaves as well as the more familiar emergent stems. Although the species has been recorded from the Cam from Martyn's (1763) time, there is no definite record from the study area unless C. E. Moss's record of the submerged form "up the river to ^_____ mill Bridge" constitutes one. There is one recent record from the study area, in the River Cam between Robinson Crusoe Island and Mill Lane, TL446579, in 1999. RC1.

Sparganium emersum The most frequent rooted aquatic in the River Cam and, with the rarer *Callitriche* cf *platycarpa*, the only rooted species in the central section (RC2). The difficulties in interpreting records from Sheep's Green and Coe Fen discussed under *Sagittaria* apply to this species, but it was recorded from "pools on Sheep's Green" by W. H. Coleman between 1833 and 1835 and from a "Ditch at Newnham side of Sheep's Green" by W. West, 1892–96, which may be the mill lode where it still grows. The last record from Sheep's Green was made by P. G. M. Rhodes in 1905 and from Coe Fen by R. H. Lock in 1900 (**CGE**). RC1–5, [CF, SG], NM1–2, B1, JD.

Sparganium erectum Still in several sites in the study area. RC5, CF3–4, NM1, B2, CB2.

Spirodela polyrhiza Babington's record "In still spots by the side of the River Cam and ditches adjoining, abundantly" includes his district 1 and thus the study area, as the only part of district 1 by the Cam is in the area. His ms Flora gives the locality as "River below Cambridge" and W. West jnr confirmed the presence of the plant in this district in 1892–96 in his annotated copy of Babington's *Flora*. There are records from Coe Fen by A. S. Shrubbs (undated, as "Ditch back of St Peter's Coll."), P. G. M. Rhodes in 1904, E. F. Warburg in 1938 and F. H. Perring in 1956, and the only recent record was here, in the ditch on the S. side of the Leys School. Only a few thalli were present with abundant *Lemna minor* on 3 May 1987; the ditch dried out completely in 1990 and I have not seen the species in the study area since. There is one record from Sheep's Green, by Warburg in 1938, and one from Queens' Ditch, by P. H. Oswald in 1952. The first Cambridgeshire record, from ditches behind Christ's College (Lyons, 1763), reveals its former presence in an area that has long lost its ditches. Despite its marked decline in the Cambridge area *Spirodela* appears to have become more frequent in other sites in the vice-county, such as the Ouse Washes, in recent years. [RC], CF2, [SG, B].

Typha latifolia Recorded from both Sheep's Green and Coe Fen by W. H. Coleman in Babington (1860), records which date from 1833–35. Coleman describes it as occurring on the sides of the River Cam. Remarkably, this conspicuous species was not seen again until 1999, when clumps were recorded from three sites, the ditch on the E. side of Coe Fen N. of the Engineering Department, TL449577, the lode leading to Newnham Mill Pit immediately N. of Fen Causeway, TL44656, and by the R. Cam between the footbridge at TL466598 and the 'Pike and Eel'. RC5, CF4, [SG], NM1.

Veronica anagallis-aquatica **agg.** *V. anagallis-aquatica* and *V. catenata* were not distinguished by 19th-century botanists, so Babington's records from Stourbridge Fair Green, Sheep's Green and Coe Fen could refer to either and Cowell's 1872 specimen from Sheep's Green (**IPS**) has not been checked. The variant currently growing at Coe Fen, which has pale pink flowers with darker pink guide-lines and pink anthers, was collected by P. D. Sell in 1962 and was still present in 1999 (both **CGE**). Although this flower colour is usually taken as diagnostic of *V. catenata*, successive authorities (P.D.S., N. G. Marchant and J. H. Burnett) agree that these plants are actually the pink-flowered variant of *V. anagallis-aquatica*. CF1, 3, [SG].

Veronica beccabunga Recorded since the 19th century from the current sites of Sheep's Green and Coe Fen. J. Rishbeth noted it from the river wall by Trinity Bridge in 1939. RC1, 4, VB, CF1–4, SG1–2, NM1–2, B4, CB2.

Zannichellia palustris This easily overlooked species was historically only recorded in the study area from Coe Fen (no collector named, 1859, **HAMU**, and Babington, ms Flora). In the current survey it was found in the central stream of Coe Fen, the Bin Brook, the R. Cam N. of Riverside and the end of Coldham's Brook. RC5, CF1, B4, CB2.

Extinct species

Baldellia ranunculoides Babington's (1860) record from Sheep's Green is the only one from the study area. [SG]

Carex lasiocarpa Sheep's Green, 1878, H. N. Dixon. There is perhaps some doubt about Dixon's identification. [SG].

Carex vesicaria "In a Gravel-pit, at the bottom of the lane, leading from Cambridge to Paradise, near Granchester meadow" (Relhan, 1793), "first observed by the Rev. Mr. Newton, late Fellow of Jesus College" (Relhan, 1802).

Eleocharis palustris A specimen of subsp. *palustris*, much the rarer subspecies of *E. palustris* in Britain, was confirmed by S. M. Walters from Coe Fen (no collector named, 1911, **CGE**),

and S.M.W. himself collected it there in 1949 (**CGE**), describing it as "grazed and in small quantity". His specimens from a wet meadow by Vicar's Brook (1948, 1949, **CGE**) may have come from outside the study area. Subsp. *vulgaris* is not known from the study area although there are old records from nearby sites. [CF].

Equisetum fluviatile Known at Coe Fen from Martyn (1763) to E. B. Cowell, 1873 (**IPS**) and at Sheep's Green, *c.* 1880, H. N. Dixon. Shrubb's record from 'Newnham' (1890) may also have been in the study area. [CF, SG].

Groenlandia densa Recorded from Sheep's Green (Babington, ms Flora), Coe Fen in 1899 (A. Fryer, **K**) and Queens' Ditch in 1949 (D. E. Coombe). Still present outside the study area on Coldham's Common. [CF, SG, B].

Hippuris vulgaris Babington's annotated copy of his own *Flora* includes the only record from the study area, from Coe Fen (Mr. Gisbourne). It was recorded more frequently elsewhere in Cambridge, notably at Grantchester Meadows, Open Common and Hobson's Conduit. [CF].

Hottonia palustris Formerly widespread in the study area, with records from Paradise (Babington ms Flora), Sheep's Green from 1833 (W. H. Coleman) until 1905 (P. G. M. Rhodes), Coe Fen from Babington (ms Flora) until *c.* 1913 (A. W. Graveson), The Backs, 1930 (J. S. L. Gilmour) and Trinity College Ditch, 1938 (E. F. Warburg). There is more detail than usual of the exact habitat, as Cowell records it on "Sheep's Green, near the mill May 8, 1872. May 30 – 92. also in the ponds on Sheep's Green near the posts for beating carpets, – after passing the bridge turn to the left along the river & then strike to the right, – it grows in 3 ponds. June 3. 1901.". Non-flowering plants have been present in recent years just outside the study area in Hobson's Conduit near the Botanic Garden. [CF, SG, B].

Hydrocharis morsus-ranae Known, as *Morsus ranae*, to Ray (1660): "In the ditches cut out of the river Cam behind Peterhouse, and infinite other ditches." It continued to be recorded from Coe Fen until *c.* 1913 (A. W. Graveson). It was also known from Sheep's Green from 1892–96, when W. West recorded it in a ditch at the N. end "and in other ponds and ditches thereon" (West, 1898 and annotated Babington), until 1905 (A. M. Smith). A. H. Evans's undated record may have been later than this. [CF, SG].

Menyanthes trifoliata Listed by Relhan (1785) from Coe Fen and by Babington (1860) from both Coe Fen and Sheep's Green, but there are no later records. A note in Cowell's Babington, which, judging from his handwriting, may have been written in the 1890s, says "not found there for 40 years, since the fen was drained CCB". [CF, SG].

Oenanthe aquatica Known from "ditches near Paradise" to Relhan (1785). Babington (1860) recorded it from Sheep's Green, but his specimen (1852, **CGE**) is *O. fluviatilis*; however, Dixon *c.* 1880, West in 1892–96 and finally A. W. Graveson *c.* 1913 also recorded it here. [SG].

Oenanthe fistulosa The numerous historical records from Sheep's Green, starting with Coleman's record from "pools on Sheep's Green" in 1834, suggest that it was once frequent there. The last records are by A. W. Graveson *c.* 1913 or A. H. Evans (undated). It was also recorded at Stourbridge Fair Green by Babington (1860) and H. N. Dixon *c.* 1880, and from Coe Fen, in 1897 (A. Hosking) and 1907 (Mrs E. M. Walker, **CGE**). [CF, SG].

Oenanthe fluviatilis The most aquatic of the *Oenanthe* species. Evans (1939) regarded it as "particularly abundant in the Cam at Cambridge" and most records probably refer to material growing in the river, although the earliest is a specimen from "stream behind Queens Coll. Cambridge" collected by W. W. Newbould in 1846 (**BM**). There are several records from Sheep's Green from 1852 (Babington, **CGE**) to *c.* 1913 (A. W. Graveson), some of which are labelled as from the river and others with no further details. There are also records from "backs of the Colleges" (H. E. Fox, 1893, **OXF**) and from Coe Fen (J. S. L. Gilmour, 1930), the last from the study area. [RC, CF, SG, B].

Potamogeton berchtoldii Recorded once, from Queens' Ditch by D. E. Coombe in 1949. [B].

Potamogeton compressus G. S. Gibson collected this species from "Ditches behind the Colleges, Cambridge" in 1843 and Babington from the R. Cam near Cambridge on 16 June 1848 (Dandy index). The last precisely dated records were made later that year by Babington, who with W. W. Newbould found it on 27 July 1848 "in the ditch behind Queens' College, and a ditch on the east side of Sheep's Green" (Babington, 1897). [RC, SG, B].

Potamogeton lucens Formerly frequent in the River Cam. Babington collected it from Cambridge in 1845 and specifically from the Cam there in 1866 (**CGE**), and there are localised records from the river at Sheep's Green and The Backs in 1905 (P. G. M. Rhodes). E. A. George summarised the distribution in 1940 as "Locally abundant from Haslingfield to Hauxton to Cambridge, especially just above Byron's Pool and at Coe Fen" and D. E. Coombe recorded it from the River Cam at Cambridge in 1949. These are the last records, although detached fragments can sometimes be found floating downstream, presumably from material cut in the upper river. The only other record from the study area is Babington's from "Ditches behind Colleges" (ms Flora). [RC, B].

Potamogeton natans Recorded from Sheep's Green, by Babington (1860), H. N. Dixon *c.* 1880 and W. West 1892–96, and from Coe Fen by E. A. George, 1940. [CF, SG].

Potamogeton praelongus Like *P. lucens*, this large species is a plant of the river. Babington (ms Flora) says "often floating down the river at Cambridge when the Millers cut the weeds, its place of growth being a short distance above Sheep's Green .... (1849)". There are numerous 19th- and 20th-century records from the Cam at Cambridge, including "abundant up river at Coe Fen" (D. E. Coombe, 1949), "Backs, in the Cam" (C. E. Moss, undated) and especially from the Cam at Chesterton. The last record was P. H. Oswald's from the River Cam near Magdalene College in 1954 (and it was also recorded by S. M. Walters in 1954 at TL4760, at the edge of the study area). In addition, E. A. George recorded it from the junction of Snobs' Stream in 1940. [RC].

Ranunculus aquatilis Noted from Sheep's Green by Babington (1860) and later by H. N. Dixon *c.* 1880. There are a number of specimens in **CGE** simply labelled 'Cambridge', the last collected by F. R. Tennant in 1898. [SG].

Ranunculus circinatus This is another species where is it not always clear whether or not plants reported from the commons were actually growing in the adjacent river. There is an explicit record from the River Cam at Sheep's Green (1905), but Babington's wording 'Cow Fen, Cambridge .... Sheep's Green, Cambridge .... In the river near Chesterton" perhaps suggests that it grew in other water bodies on the commons. There are numerous later records from Coe Fen and Sheep's Green, the latest being E. B. Cowell's from Sheep's Green in 1900 (**IPS**), P. G. M. Rhodes's from the river at Sheep's Green in 1905 and R. Taylor's from Coe Fen in 1920 (**RAMM**). The last record was P. H. Oswald's from Queens' Ditch, TL445581, in 1952. [RC, CF, SG, B].

Ranunculus hederaceus The only published records are from "Cambridge Common" (Relhan, 1820) and from Jesus Green, the latter based on Relhan's manuscripts and cited by Babington (1860). There is a specimen in J. A. Power's herbarium collected on 11 April 1836 from Queens' Ditch and my very sparsely annotated copy of Relhan (1820) has "Cow Fen. belonging to Caius Coll." added in an unknown hand. (An earlier owner's name has been cut out of the book.) The species had gone from its Cambridge city sites by 1860. [CF, B].

Ranunculus trichophyllus Recorded from both Coe Fen and Sheep's Green by Babington (1860) and until A. W. Graveson *c.* 1913 or A. H. Evans (undated). [CF, SG].

Rorippa amphibia Only known from an 18th-century record from Dove-house Close (Martyn, 1763), a site near Jesus Green (see *Acorus calamus* below).

Introduced species recorded from the riparian commons, 1660–1999

Acorus calamus The scented leaves of this emergent were once strewn on floors, and it was planted in the wild from the 17th century to ensure a ready supply; it also had medicinal uses. There are only ancient records from the study area. Lyons (1763) noted it "in Dove-house Close near Jesus Green, first planted there by Mr. Dent". "The Master of St. Iohns Coll: Dove hous and fish ponds" are shown by the S.W. side of Jesus Green on Loggan's plan of Cambridge, published in 1688 (see Willis & Clark, 1886, p. 116). Peter Dent was a Cambridge apothecary, who helped John Ray with both his botanical and zoological studies; after Ray left Cambridge he prepared the second (1685) edition of the Appendix to Ray's *Catalogus*. He certainly knew *Acorus* in the county, as Ray (1690) noted that "Mr. Dent also sent me fair Juli of it, gathered somewhere near Cambridg". However, T. Martyn (1763), who also reported *Acorus* from Dove-house Close, says "it was planted there by Dr Heberden, and flourishes very much". Heberden, of St John's College, lectured on *Materia Medica* in Cambridge in 1747 but he left Cambridge, "much lamenting the want of a Public Garden, furnished with sufficient variety of plants" (Walters, 1981); the suggestion that he planted the *Acorus* at Dove-house Close seems very plausible. Relhan (1802) also recorded *A. calamus* "In the Ditch opposite to the great Gates of Trinity College Walks". Relhan's (1785) site "In the Ditch by Great Founders Closes, near the House in the Fields" lies just outside the study area, as House in the Fields is shown on Baker's 1830 map of Cambridge west of Croft Lodge, Newnham (Cambridgeshire Records Society, 1998). It had apparently gone from all these sites by 1860, although Babington (1860) reports Henslow's record from the bank of the River Cam in Chesterton parish, opposite Barnwell Gas Works, and he knew it himself in a marsh by the river at Chesterton. [RC, B].

Azolla filiculoides Found, new to Cambridgeshire, in Jesus Ditch by G. Goode in October 1913 (**CGE**, **OXF**, **NMW**); Evans (1939) said that it "covered the water for several yards" and it was still present in October 1919 (A. J. Crosfield, **CGE**). However, there was no further record from the study area until 1989. In recent years it has varied in abundance from year to year, as it so frequently does; in good years there have been dense masses of plants on some of the ditches on Coe Fen. Plants in the study area often have well-developed sporocarps. RC1, 3, CF1, 2, 4, SG2, NM1, B1–3, [JD].

Egeria densa I found one rooted plant and several floating fragments at the west end of Jesus Ditch, TL450590, in 1989 (**CGE**). They looked as if they had been recently discarded from an aquarium or garden pond; one was weighted down by a lead band around the base of the stem. Although I checked on several later visits, I never saw the species in the ditch again. JD.

Elodea canadensis This species colonised the River Cam from cultivated stock soon after it was planted in Hobson's Conduit, alongside the Botanic Garden, in 1848. By 1860 it was established "from Sheep's Green down to the boundary of the county below Littleport". Unfortunately its subsequent history in the Cambridge area is poorly documented, as there are remarkably few later records. It was still present in Coe Fen in the 1960s but by 1986 the only *Elodea* species in the study area was *E. nuttallii*. For further details, see Preston (2002). [VB, RC, CF, SG].

Elodea nuttallii First recorded in 1986 as the most abundant aquatic in King's College Ditch (**CGE**). By the time I first systematically recorded the aquatics in the study area in 1989 it was widespread in the river and in nearby ditches. R1, 3–5, CF1, SG2, NM1, B1–4, JD.

Lemna minuta This alien duckweed was discovered in a ditch on Coe Fen by Professor E. Landolt in 1977, the first British record (Leslie & Walters, 1983). It was seen here again in 1980, but Prof. Landolt could not refind it when he returned to Cambridge in 1983, although it was again seen on Coe Fen in 1988. In the hot summer of 1990 it was abundant in the study area (Preston, 1991) and it has been an established member of the flora since then. RC1–5, CF1–4, SG1, 2, NM1, 2, B1–4, JD, CB1–2.

***Nymphaea* cultivars** Cultivated water-lilies have been planted in recent years in Queens' Ditch, in front of the Cripps building, where I first noted them in 1989 and where there were four patches in 1990. By 1999 there were two large patches, with white and pale yellow flowers. I also recorded a pink-flowered clump of *Nymphaea*, doubtless also planted, by the W. edge of the River Cam immediately S. of the footbridge at TL466598 in 1999. RC5, B1.

Stratiotes aloides West (1898), in a paper based on observations made between 1892 and 1896, reported that *Stratiotes* "was introduced from the Botanical Gardens into a pond on Sheep's Green, Cambridge, where it has driven out the other aquatic plants". This pond was "nearly opposite the Leys' School bathing-place" (West's annotated Babington). A specimen collected from a pond in Cambridge in 1900 (C. C. Mountford, **UPP**, *fide* CNHS card index) probably came from here, the last dated record. A. M. Smith recorded it from Coe Fen before 1905, but could this have been an error for Sheep's Green? [CF?, SG].

Discussion

Summary of the historical trends

Although the historical record of aquatic species in Cambridge dates back to Ray's *Catalogus* of 1660, most of Ray's records are couched in fairly general terms. Although entries such as those for *Nuphar lutea* "In the river Cam almost every where", *Potamogeton perfoliatus* "In the river Cam plentifully every where" and *Sparganium erectum* "Ubique ferè in aquosis" are consistent with the presence of these species in the study area, they are too generalised to be used in this study. There are more localised records of the rarest species from the 18th century, but it is not until the mid 19th century that numerous detailed records of the commoner aquatics become available. Thereafter many species are fairly well documented, although the historical records for the extremely common species (e.g. *Lemna minor*, *Phalaris arundinacea*, *Sparganium erectum*) are notably sparse. This study, therefore, mainly concerns changes that have taken place in the last 170 years.

Of the 66 native species listed above, 43 survived in the study area until 1985–99 and 23 (35%) are apparently extinct. This is a large percentage loss, much greater than the 13% of species and the 21% of hydrophytes that are extinct in the vice-county as a whole (Preston, 2000). The aquatic flora of the River Cam and its commons was exceptionally rich in the 19th century *by modern standards*. However, it seems likely that what we perceive as a rich flora might have been regarded as quite ordinary in the mid 19th century, except perhaps for the presence of *Potamogeton compressus* which Babington clearly regarded as noteworthy. Local studies such as this illustrate the gradual loss of biodiversity from the countryside and the reduction of a formerly diverse assemblage of species to a much less varied flora. However, the loss of species could have been worse, and it is perhaps surprising that as many as 43 aquatic species survive in an area so close to central Cambridge. It is interesting to speculate how the current flora, which seems fairly ordinary to us, will be perceived in future centuries.

The statistics for the main sites within the area are listed in Table 1. Most historical records are from the River Cam and the two commons nearest to central Cambridge, Coe Fen and Sheep's Green. Relatively few species have been lost from the river, despite its notoriously polluted state in the 19th century.

	Whole area	RC	VB	CF	SG	NM	B	JD	CB
Extant	43	28	5	30	14	19	23	6	10
Extinct	23	6	0	17	31	0	10	3	0
Total	66	34	5	47	45	19	33	9	10

Table 1. Totals of extant and extinct native species in the study area and some of its component sites. Abbreviations: RC, R. Cam; VB, Vicar's Brook; CF, Coe Fen; SG, Sheep's Green; NM, Newnham Mill; B, The Backs; JD, Jesus Ditch; CB, Coldham's Brook.

The watercourse has not been subjected to major modification in this period, and there is always the possibility that species have been lost from the river in Cambridge for a period but have recolonised from populations further upstream. The major loss in the Victorian period was *Potamogeton compressus*, which was never recorded upstream of Cambridge. A more puzzling feature of the history of the river is the loss in the 1950s of the large-leaved pondweeds *P. lucens* and *P. praelongus*. *P. lucens* survives in the upper river but *P. praelongus* has been lost from the entire length of the Cam, suggesting that it has been affected by more general factors than those affecting the river in the city. Perhaps these species have been affected by an increase in nutrient levels resulting from the great increase in the use of agricultural fertilisers, although if so this is not reflected in assessments of the water quality in the river, which is thought to be as good in the 1990s as at any time since 1870 (Preston *et al.*, 2003). The broad-leaved species *P. perfoliatus* survives in the river.

Coe Fen has lost a third of its species, a similar proportion to that of the study area as a whole. It is the richest remaining site for aquatic plant species in the city, their diversity enhanced by the presence of the central stream with its grazed margins as well as a number of surviving ditches. Sheep's Green has lost nearly two-thirds of its recorded species. The loss of the pools in this area probably led to the loss of species such as *Hottonia palustris* (which survived until 1901), *Oenanthe aquatica*, *O. fistulosa*, *Ranunculus aquatilis* and *R. trichophyllus*. One of the assumptions of this paper is that botanists of the past knew the difference between Coe Fen and Sheep's Green. There is no way of checking this but the greater loss of species from Sheep's Green would be predicted from its history and suggests that in general the historical record is reliable.

Eight species have been introduced to the area, of which four survive, three (38%) are extinct and one (*Egeria densa*) was recorded recently but only as the most fleeting casual. In recent years *Lemna minuta* and (in some seasons) *Azolla filiculoides* have been conspicuous features of the aquatic vegetation, but their life-form is so similar to that of the native *Lemna minor* and *L. gibba* that their presence may not have a very marked ecological effect.

The nature of the extant and extinct native species

The characteristics of the extant and extinct native species are compared in Table 2. There appears to have been a general tendency for species with more southerly distributions to survive. Over half the relatively northerly Boreal,

(a) Wider distribution

	Boreal-montane	Wide-boreal	Boreo-temperate	Wide-temperate	Temperate	Southern-temperate	Total
Extant	0	0	8	3	17	15	43
Extinct	1	2	8	1	9	2	23
Total	1	2	16	4	26	17	66

(b) Frequency in Britain (number of recorded 10-km squares)

	1–500	501–1000	1001–1500	1501–2000	2001–2500	>2500	Total	Mean no.
Extant	2	11	15	6	7	2	43	1359
Extinct	7	7	4	2	2	1	23	986
Total	9	18	19	8	9	3	66	1229

(c) Life-form (S indicates submerged, F floating and E emergent or terrestrial leaves.)

	S	S and F or E	F	F and E	E	Total
Extant	10	7	4	2	20	43
Extinct	9	4	2	0	8	23
Total	19	11	6	1	28	66

(d) Specialised adaptations to clonal spread

	Rhizomes or stolons	Rooting at nodes	Lemnoid budding	Turions	None	Total
Extant	16	9	4	3	11	43
Extinct	7	2	0	2	12	23
Total	23	11	4	5	23	66

(e) pH preferences (Ellenberg R values; the lower the value, the greater the preference for more acidic habitats)

	4	5	6	7	8	Total
Extant	0	0	9	32	2	43
Extinct	1	2	9	9	2	23
Total	1	2	18	41	4	66

(f) Nutrient preferences (Ellenberg N values; the lower the value, the greater the preference for nutrient-poor habitats)

	2	3	4	5	6	7	8	Total
Extant	0	0	0	5	18	18	2	43
Extinct	1	2	7	6	4	2	1	23
Total	1	2	7	11	22	20	3	66

Table 2. A comparison of the characteristics of the extant and extinct species in the study area. Except for life-form, characteristics are taken from Hill *et al.* (2004).

Boreo-temperate and Wide-boreal species have been lost whereas 15 of the 17 Southern-temperate species have survived. The extant species are rather more frequent in Britain as a whole than the extinct species, as measured by the number of 10-km squares in which they are recorded, and the median values for the two groups are significantly different (Mann-Whitney test, $p = 0.01$). However, this is not a well-marked trend, and some very common species have been lost from the area, notably *Eleocharis palustris*, *Equisetum fluviatile* and *Potamogeton natans*.

The loss of species that have submerged leaves has been greater than that of emergents. Species with specialised means of clonal spread, such as rhizomes, show a higher survival rate than those with no such specialised adaptations. However, the most marked trends appear to be those relating to the pH and nutrient requirements of the aquatic species. Few species generally characteristic of more acidic habitats were present in the study area and all have been lost (*Carex vesicaria*, *Menyanthes trifoliata*, *Ranunculus hederaceus*). The difference between the median R values of the extant and extinct species is statistically significant ($p < 0.05$). There is an even more striking trend in the nutrient requirements of the species, with all ten species with the lowest Ellenberg N values (2–4) having been lost whereas 20 of the 23 species with the highest values (7–8) survive. Again, the difference between the median N values of the extant and extinct species is significant ($p < 0.001$). It is notable that *Menyanthes* survives in calcareous but nutrient-poor conditions at Chippenham Fen, suggesting that habitat destruction or nutrient enrichment are probably more important than the elimination of acidic habitats in the loss of this species.

It is not surprising that the loss of species of nutrient-poor habitats is the most marked trend. These plants have not only had to cope with the general increase in environmental nutrient levels in the last two centuries but also with the deliberate policy of levelling the commons by the deposition of the town's rubbish over many decades in the 19th and 20th centuries.

Seven native and two alien species were recorded between 1985 and 1999 in over half of the 19 sites from which records are listed at the end of the species accounts. *Callitriche* (almost certainly *C. platycarpa*) is also recorded from over half the sites. The characteristics of these ten taxa are listed in Table 3. These successful species include a range of life-forms, including submerged, floating and emergent species, but all are clonally reproducing species of nutrient-rich habitats. There are, admittedly, two species which lack specialised adaptations to clonal spread but these must spread by fragmentation, as *Ceratophyllum demersum* often fails to fruit in Britain and *Elodea nuttallii* never fruits (only female plants being naturalised). All eight native taxa are listed for Cambridgeshire by Ray (1660), either without any indication of their frequency (implying that they were frequent) or with an explicit indication that they were common.

The loss of species of northern distribution, calcifuge species and species of nutrient-poor habitats are all trends that emerged from a study of the plant species that have become extinct in Cambridgeshire as a whole (Preston, 2000).

	Wider distribution	No. of British 10-km squares	Life-form	Specialised adaptations to clonal spread	Ellenberg R	Ellenberg N
Callitriche agg.	Temperate	1006	S, F	Rooting at nodes	7	7
Ceratophyllum demersum	Southern-temperate	927	S	—	7	7
Elodea nuttallii	Introduced (N. America)	808	S	—	7	7
Glyceria maxima	Temperate	1291	E	Long rhizomes	7	8
Lemna minor	Southern-temperate	2168	F	Lemnoid budding	7	6
Lemna minuta	Introduced (N. & S. America)	540	F	Lemnoid budding	7	7
Myosotis scorpioides	Temperate	2291	E	Short stolons	6	6
Phalaris arundinacea	Boreo-temperate	2449	E	Long rhizomes	7	7
Rorippa nasturtium-aquaticum agg.	Southern-temperate	2317	E	Rooting at nodes	7	7
Veronica beccabunga	Temperate	2333	E	Rooting at nodes	6	6

Table 3. The ecological characteristics of the most frequent species in the study area. Values for *Callitriche* agg. refer to *C. platycarpa*, the commonest species in the study area. Under Life-form, S indicates submerged, F floating and E emergent or terrestrial leaves.

The aquatic species of Cambridge analysed in this paper are an almost completely different group of species from those analysed earlier, as almost all have survived somewhere in the vice-county. *Potamogeton compressus*, *Ranunculus hederaceus* and *Stratiotes aloides* are the only species also included in the study of extinctions and, incidentally, *P. compressus* has subsequently reappeared (Leslie, 2006). It is striking that the trends revealed when studying the extinction of species in the vice-county as a whole are also demonstrated when considering the history of the surviving species in a much smaller area.

This paper is concerned solely with aquatic plants. The city commons also supported many other species of marshland and other wetland habitats, including such local plants such as *Eriophorum angustifolium*, *Pedicularis palustris*, *Rumex maritimus*, *R. palustris*, *Samolus valerandi* and *Valeriana dioica* (Babington, 1860). It would be interesting to compare the survival of such wetland species to that of the true aquatics.

Processes of landscape modification

The processes that have affected the aquatic flora of the Cam and its adjacent flood plain in Cambridge in the last 170 years can be summarised as:

- pollution and consequent dredging of the river;
- removal of the smaller water bodies on the flood plain, especially ponds and drainage ditches, by infilling and drainage;
- raising the levels of commons by using them as rubbish tips, with consequent eutrophication;
- conversion of some commons from grazing pasture to amenity grassland, with the embankment of the river and the consequent loss of cattle-poached edges;
- planting of trees alongside some streams and ditches, leading to shading of the water bodies;
- planting or discarding of alien aquatic species and cultivars into the river and other water bodies.

In recent years the transition of the Cam and its commons into park-like open spaces seems in places to have proceeded very gradually but quite remorselessly. This has been most clear to me in the area of Queens' Green and Queens' Ditch in the last 30 years, where the paths across the green have been widened and surfaced, the edge of the ditch has gradually become more sharply defined, and *Nymphaea* cultivars have been planted in the ditch itself, symbolically incorporating it into the gardens of the College. Aquatic plants in ditches fluctuate greatly in abundance depending in part on successional processes. Their presence may depend on the vagaries of extinction and recolonisation – the presence of large floating fragments of species such as *Potamogeton lucens* not only in the river but also in the major ditches connected to it shows how effective the processes of dispersal can be within a network of connected water bodies. It is difficult in a period of 15 years to detect long-term trends amongst this annual or cyclical variation in the truly aquatic flora, but marginal wetland species do seem to have been lost from Queens' Ditch as it has been tidied up. I did not see *Senecio aquaticus* by the ditch between 1985 and 1999 (though it was present in the preceding decade) and *Ranunculus sceleratus* also seems to be absent from this site at the moment. One might predict further losses of true aquatics from the study area in the future, with short species dependent on cattle-poached edges being perhaps the most vulnerable.

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Contributions towards a new algal flora of Cambridgeshire (Vice-county 29), III. Phylum Chlorophyta, class Chlorococcales (first part)

Hilary Belcher, Eric George and Erica Swale

This order of green algae traditionally contains species with non-motile cells or colonies, never filamentous nor forming a thallus, and they reproduce by producing 2,4, 8 or many motile or non-motile daughter cells within the mother cell wall, generally using up the contents of the mother. The nomenclature used below follows that of the British Algal Flora of John *et al*. (2002). In Cambridgeshire the many species belonging to this order seem to prefer neutral or slightly alkaline eutrophic water.

The richest local site we have found for planktonic Chlorococcales at all times of the year is the ornamental pool at Vision Park Business Centre in Histon. The visibly green water of this 900 square metre artificial pool is fertilized by the many fine ornamental carp, as well as Mallard and Moorhens. There is neither inflow nor outflow, but the water is aerated by an ornamental fountain, and recirculated over a weir (Belcher & Swale, 1999). Other sites rich in species and individuals during the later part of the year are slow flowing stretches of the rivers Great Ouse and Cam, though in spring the plankton is usually dominated by small centric diatoms of the genera *Stephanodiscus*, *Cyclotella* and *Cyclostephanos* (Belcher & Swale, 2003). Marinas and backwaters such as the ditch on Queens' Green are particularly good in summer and autumn. Small ornamental ponds are often good hunting grounds, such as that in front of Churchill College, where the nutrients no doubt given to the water lilies (which only cover part of the surface) probably encourage the rich growth of smaller algae of many species and several classes. Ponds whose surface is completely covered by higher plants such as water lilies or duckweed (*Lemna* spp) are always very poor in photosynthetic algae.

As in previous parts of this series the initials E.G.P. represent E.G. Pringsheim, E.A.G. Eric George and B. & S. Hilary Belcher and Erica Swale and W, G.S. West.

Phylum Chlorophyta, Class Chlorococcales, first part:-

Actinastrum hantzschii Lagerheim 1882. E.A.G., Madingley Hall, pond on lawn, 1962; B. & S., River Cam and Ouse, several times, Churchill College lily pond, March 2001, New Hall, Sept. 1999, Milton Country Park, Aug. 1996. Figure 1A.

Amphikrikos minutissimus Korshikov 1953. B. & S., River Great Ouse, 1999, Madingley Hall, Nov. 1995. Figure 1B.

Ankistrodesmus falcatus (Corda) Ralfs 1848, G.S. West, River Cam, Wicken Fen and other records, 1899; M.E. Godward, Madingley Brick Pits, Feb. 1962; E.A.G., Twenty Pence Pits, 1968; B. & S., Rivers Cam and Ouse, many times, Vision Park pool, many times, small pond at Histon, April 2004, Cambridge 2001 and many other records. Figure 1C.

Ankistrodesmus fusiformis Corda ex Korshikov 1953. B. & S., Rivers Cam and Ouse, various times, several small ponds in Cambridge, mostly in autumn, Vision Park pool, various times, Prince Albert Lake, Madingley Hall, Nov. 1999. Figure 1D.

Ankistrodesmus spiralis (W.B. Turner) Lemmermann 1908. B. & S., Churchill College water lily pond, Feb. 1995. Figure 1E.

Ankyra judayi (G.M. Smith) Fott 1959. B. & S., Rivers Cam and Ouse, various occasions, pond at Fowlmere Aug. 1996. Figure 1F.

Botryococcus braunii Kützing 1849. W., Sheep's Green, the Ouse washes, Sutton West Fen, Twenty Foot River. E.A.G., Madingley Brick Pits, Nov. 1962, Cambridge, garden pond April 1968, Twenty Pence Pits, May 1968; B. & S., Cambridge, pond in garden of Lutheran Church, where it remained dominant for over a year, Nov. 1999 to late 2000, WCMC Pellew's Pond, July 2004, Churchill College lily pond, Dec. 2001, and other records. Figure 1G.

Characiochloris characioides (Korshikov) Pascher 1927. B. & S., Caxton Ford, May 1995. Figure 1H.

Characiochloris sessilis (Korshikov) Pascher 1927. B. & S., Oakington Crossroads Pond April 1995. Figure 1I.

Characium acuminatum A. Braun 1849. B. & S., Cambridge - pond under Geodesy Department steps Mar. 1995. Figure 1J.

Characium angustum A. Braun 1855. B. & S., Cambridge – Crescent Pond in Storey's Way, Nov. 1994, Geodesy Department pond Sept. 1990. Figure 1K.

Characium ornithocephalum A. Braun 1855. W., Wicken Fen 1899; B. & S., Cambridge – Geodesy Department pond Sept 1990, Storey's Way crescent pond Nov. 1994. Figure L.

Chlorella vulgaris Beijerinck 1890. E.G.P., Cambridge – garden pond 1940 (as var. *tumidus* West); T. Christensen, Madingley Brick Pits 1949; E.A.G., animal drinking trough, Girton 1959 (as *C. pyrenoidosa* Chick); F.E. Fritsch, Melbourn 1940 (as *C. pyrenoidosa*); B. & S., often seen in plankton of rivers Ouse and Cam, pond in Cambridge Jan. 2005, and other records. Older coenobia of *Coelastrum microporum* (and perhaps other species) often break up and the isolated cells resemble *Chlorella vulgaris.* Figure 1M.

Chlorochytrium lemnae Cohn 1872. W., near Sutton on *Lemna trisulca.* S,R. Price, Sheep's Green 1910.

Closteriopsis acicularis (G.A. Smith) J.H. Belcher et Swale 1962. B. & S., River Ouse, various records, Madingley Hall Lake, June 1995, Churchill College lily pond, Sept. 1999, Linton Zoo lily pond, Sept. 1995. Figure 2A.

Coelastrum astroideum De Notaris 1867. B. & S., Vision Park pool various times (B. & S. 1999), Gretton Court pond, Girton, Aug. 1999. Figure 2B.

Coelastrum microporum Nägeli 1855. E.G.P., Cambridge 1940; E.A.G., Wicken Lode 1962, Madingley Hall Lake 1963; B. & S., River Cam, Aug. 2002 and others, R. Ouse, Sept. 1999 and others, Vision Park Lake (B. & S. 1999), Cambridge Regional College, Sept. 1999. May break up into *Chlorella* – like cells. Figure 2C.

Coelastrum pulchrum Korshikov 1953. B. & S., Vision Park, several occasions (B. & S. 1999), pool at Cambridge Science Park July 1999, Unicorn Pond Trumpington July 1999, plankton of R. Ouse Sept. 1999. Figures 2 D, E.

Coelastrum reticulatum (P.A. Dangeard) Senn 1899. B. & S., Vision Park, various occasions (B. & S. 1999), Milton Country Park Jan. 1994, Trumpington Unicorn Pond July 1999, New Hall Sept. 1999. Figure 2F.

Crucigenia fenestrata (Schmidle) Schmidle 1900. B. & S., Willer's Mill Black Swan pond July 1999. Figure 2G.

Crucigenia tetrapedia (Kirchner) West et G.S. West 1902. B. & S., Willer's Mill Black Swan Pond July 1999, Churchill College lily pond June 2002, Vision Park Pool (B. & S. 1999), Cambridge Regional College Pond Sept. 1999. Figure 2H.

Crucigeniella apiculata (Lemmerman) Komárek 1974. B. & S., River Ouse various times (B. & S. 2003). Figure 2I.

Crucigeniella rectangularis (Nägeli) Komárek 1974. W., Wicken Fen, Ely Roswell Pits 1999; B. & S., Storey's Way Crescent Pond July 1995. Figure 2J.

Diacanthos belenophorus Korshikov 1953. B. & S., River Cam backwater 1977, Vision Park (B. & S. 1999) Figure 2K.

Dicellula plantonica Svirenko 1926. B. & S., River Ouse at Twenty Pence Bridge July 1993, Madingley Hall Prince Albert Lake Nov. 1995. Figure 2L.

Dichotomococcus curvatus Korshikov 1939. B. & S., Madingley Hall Lake June 1995. Figure 2M.

Dictyosphaerium chlorelloides (Naumann) Komárek et Perlman 1978. B. & S., Milton Country Park July 1995, Cambridge Athletics Complex Pond Aug. 1995, Trumpington Unicorn Pond Sept. 1999, Churchill College Lily Pond Sept. 1999. Figure 2N.

Dictyosphaerium ehrenbergianum Nägeli 1849. E.G.P., Cambridge garden pond 1942; E.A.G., Shelford garden pond 1947; B. & S., Vision Park Pool various times (B. & S. 1999), River Cam and Ouse, various times (B. & S. 2003), Churchill College Lily Pond March 2001, Trumpington Unicorn Pond Sept. 1999. Figure 2O.

Dictyosphaerium pulchellum H.C. Wood 1872. B. & S., Vision Park Pool several times (B. & S. 1999), Rivers Cam and Ouse several times (B. & S. 2003), Churchill College Lily Pond June 2002, Gretton Court Girton pond Aug. 1999, Trumpington Unicorn Pond Sept. 1999. Figure 2P.

Dictyosphaerium subsolitarium Van Goor 1924. (not in John et al. 2002). B. & S., Bolton's Pit Newnham Oct. 1979. Cambridge Science Park July 1999. Figure 2Q.

Didymogenes palatina Schmidle 1905. B. & S., Rivers Cam and Ouse, various times (B. & S. 2003). Figure 3A.

Golenkinia radiata Chodat 1894 em. Korshikov 1953. Vision Park Pool, various times, often abundant (B. & S. 1999), Churchill College Lily Pond June 2002, Comberton Pond Sept. 2001 (dominant), Cambridge garden pond Mar. 2000. Figure 3B.

Golenkiniopsis parvula Korshikov 1953. Rivers Cam and Ouse (B. & S. 2003). Vision Park Pool April 1995. Figure 3C.

Hydrodictyon reticulatum (Linnaeus) Lagerheim 1883. B. & S. River Ouse, Stretham, Summer 1994. Figure 3D.

Juranyiella javorkae (Hortobagyi) Hortobagyi 1992. Madingley Hall Prince Albert Lake Nov. 1992 (B. &S. 1996). Figure 3E.

Kirchneriella lunaris (Kirchner) K. Möbius 1894. New Hall Sept. 1999, Vision Park (B. & S. 1999), Cambridge Regional College April 2001, Adams Road Pond Oct. 2001. Figure 3F.

Kirchneriella obesa (West) Schmidle 1893. B. & S. Rivers Cam and Ouse (B. & S. 2003), Vision Park Pool (B. & S. 1999) and various ponds. Figure 3G.

Lagerheimia ciliata (Lagerheim) Chodat 1895. Rivers Cam and Ouse (B. & S. 2002), Girton Evergreens Pond May 2001, Madingley Hall Prince Albert Lake Nov. 1999. Figure 3H.

Lagerheimia citriformis (J. Snow) Collins 1909. Vision Park Lake Sept. 2002. Figure 3I.

Lagerheimia genevensis (Chodat) Chodat 1895. Rivers Ouse and Cam (B. & S. 2003), Vision Park Lake (B. & S. 1999). Figure 3J

Lagerheimia subsalsa Lemmermann 1898. B. & S., Madingley Hall Prince Albert Lake Nov. 1995, Churchill College Lily Pond Sept. 1999, River Ouse at Twenty Pence bridge Sept. 1996. Figure 3K.

Lagerheimia wratislaviensis Schröder 1897. B. & S., Rivers Cam and Ouse, various times (B. & S. 2003), Vision Park Lake various times (B. & S. 1999), Madingley Hall Lake April 1997. Figure 3L.

Micractinium pusillum Fresenius 1858. Rivers Cam and Ouse, many times (B. & S., 2003), Vision Park Lake (B. & S. 1999) and other pools, Adam's Road Pond Oct. 2001. Figure 3M.

More details of these organisms can be found in the new standard Freshwater Algal Flora of the British Isles (John *et al*., 2002), which this account follows in matters of classification. They would be a fascinating but little studied group for the amateur microscopist.

Acknowledgment.

Some of the figures have appeared before in papers by the authors in *Nature in Cambridgeshire* and in their *Beginners' Guide to Freshwater Algae* (1976) and *An illustrated Guide to River Phytoplankton* (1978), both published by the Natural Environment Research Council.

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Note on the figures. The scale bars mainly indicate the size of the alga as collected. Algae belonging to the Chlorococcales can vary greatly in size, as a reproducing cell can give rise to variable numbers of daughter cells of the same shape, but much smaller. Figure 3E shows a moderate example of this size variation.

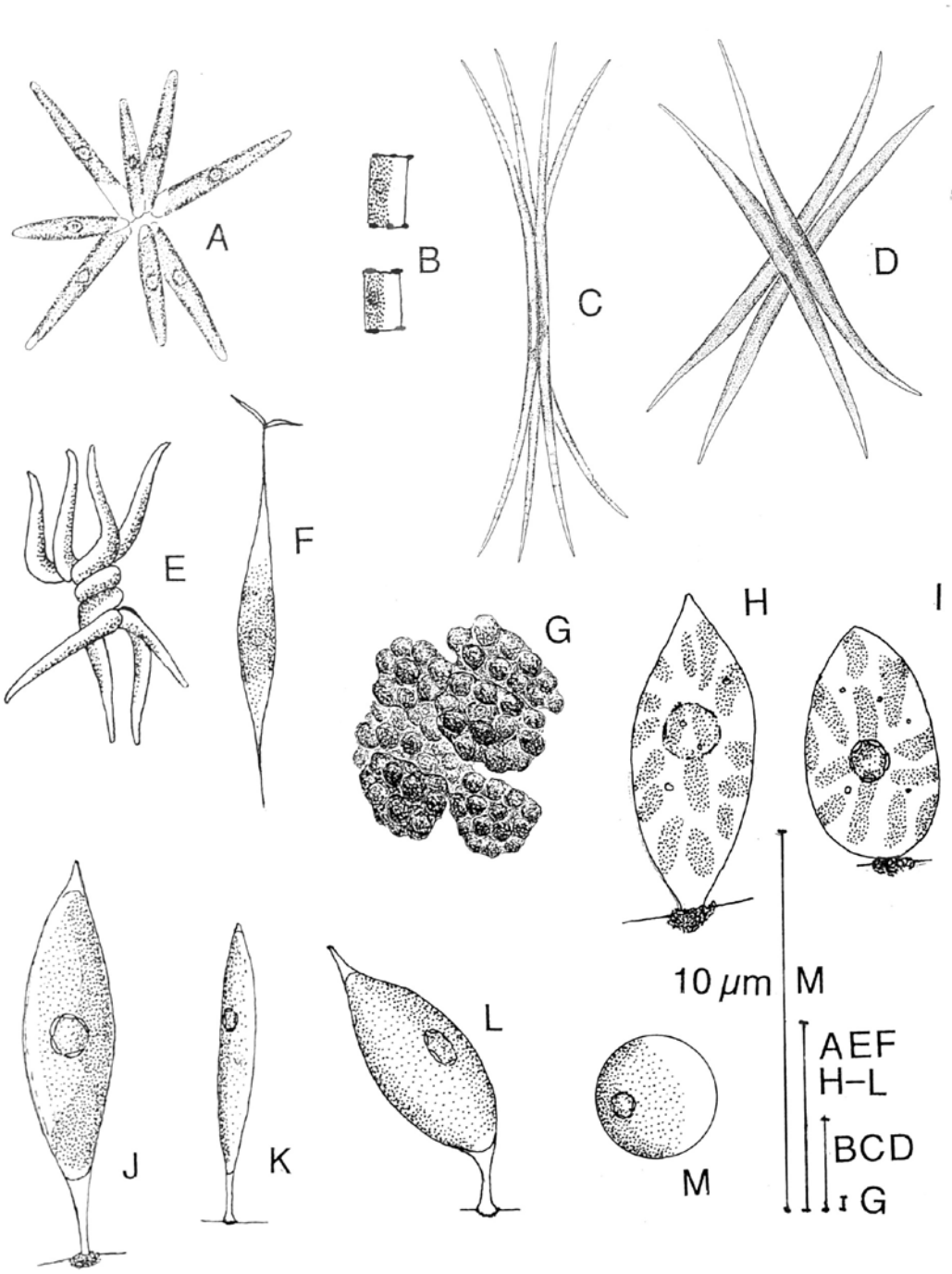

Figure 1. 1A, *Actinastrum hantzschii*, River Cam, x 2000. 1B *Amphikrikos minutissimus*, Hatfield Forest, Herts, x 1000. 1C, *Ankistrodesmus falcatus*, River Cam, x 1000. 1D, *Ankistrodesmus fusiformis*, River Cam, x 1000. 1E, *Ankistrodesmus spiralis*, pond, Churchill College, x 2000. 1F, *Ankyra judayi*, River Cam, x 2000. 1G, *Botryococcus braunii*, River Cam, x C. 100. 1H, *Characiochloris characioides*, Caxton Ford, x 2000. 1I, *Characiochloris sessilis*, pond at Oakington, x 2000. 1J, *Characium acuminatum*, pond Cambridge, x 2000. 1K, *Characium angustum*, pond, Cambridge, x 2000. 1L, *Characium ornithocephalum*, pond, Cambridge, x 2000. 1M, *Chlorella vulgaris*, from culture, x 4000.

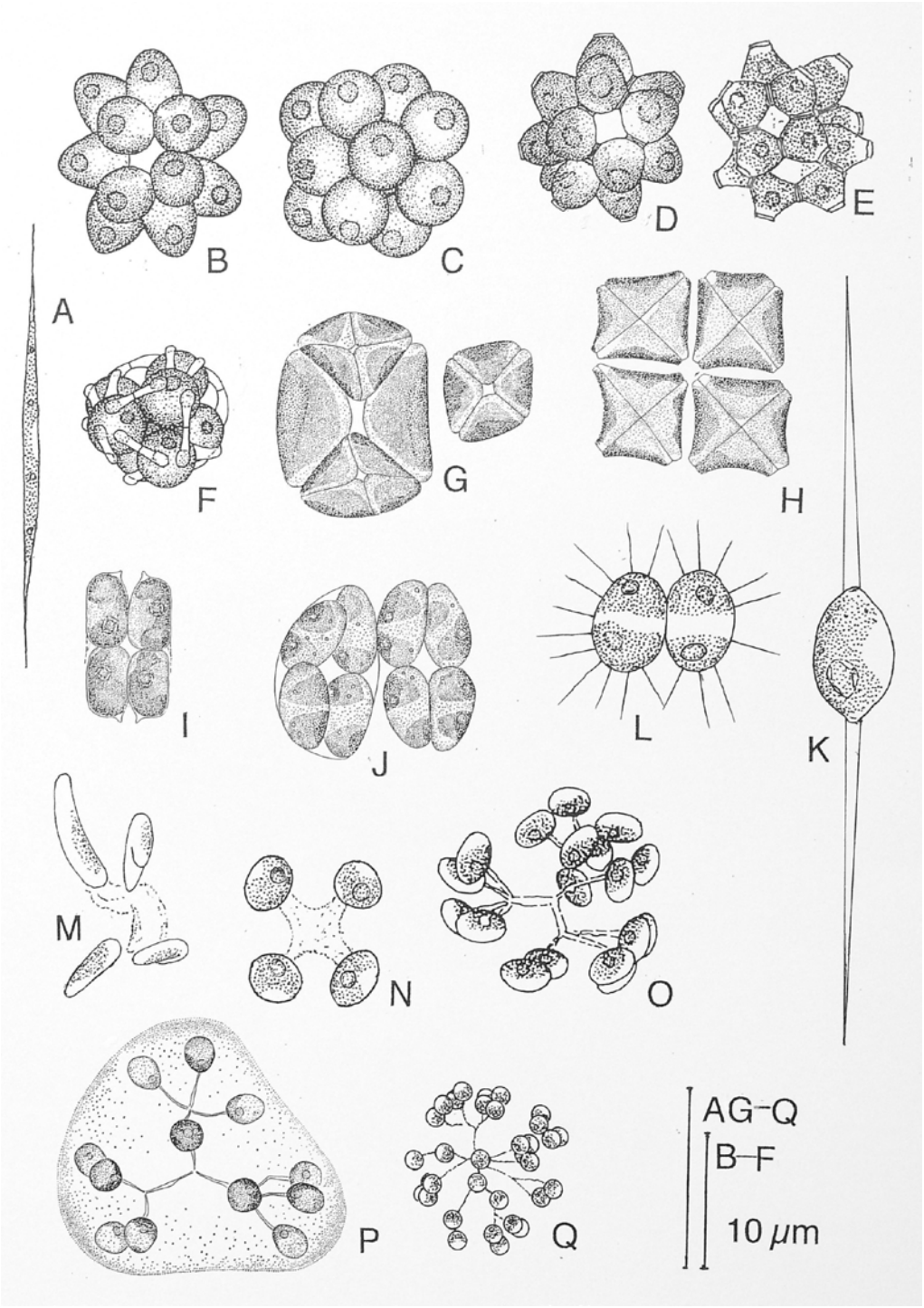

Figure2. 2A, *Closteriopsis acicularis*, pond, Cambridge, x 2000. 2B, *Coelastrum astroideum*, pond, Histon, x 15000. 2C, *Coelastrum microporum*, Histon, x 1500. 2D, E, *Coelastrum pulchrum*, pond, Histon, x 1500. 2F, *Coelastrum reticulatum*, pond Histon, x 1500. 2G, *Crucigenia fenestrata*, pond, Shepreth, x 2000. 2H, *Crucigenia tetrapedia*, pond, Cambridge, x 2000. 2I, *Crucigeniella apiculata*, River Ouse, x 2000. 2J, *Crucigeniella rectangularis*, River Cam, x 2000. 2K, *Diacanthos belenophorus*, River Cam, x 2000. 2L, *Dicellula planktonica*, River Ouse, x 2000. 2M, *Dichotomococcus curvatus*, Madingley Hall, x 2000. 2N, *Dictyosphaerium chlorelloides*, River Ouse, x 2000. 2O, *Dictyosphaerium ehrenbergianum*, Histon, x 1500. 2P, *Dictyosphaerium pulchellum*, River Cam, x 2000. 2Q, *Dictyosphaerium subsolitarium*, Windsor, Berks, x 2000.

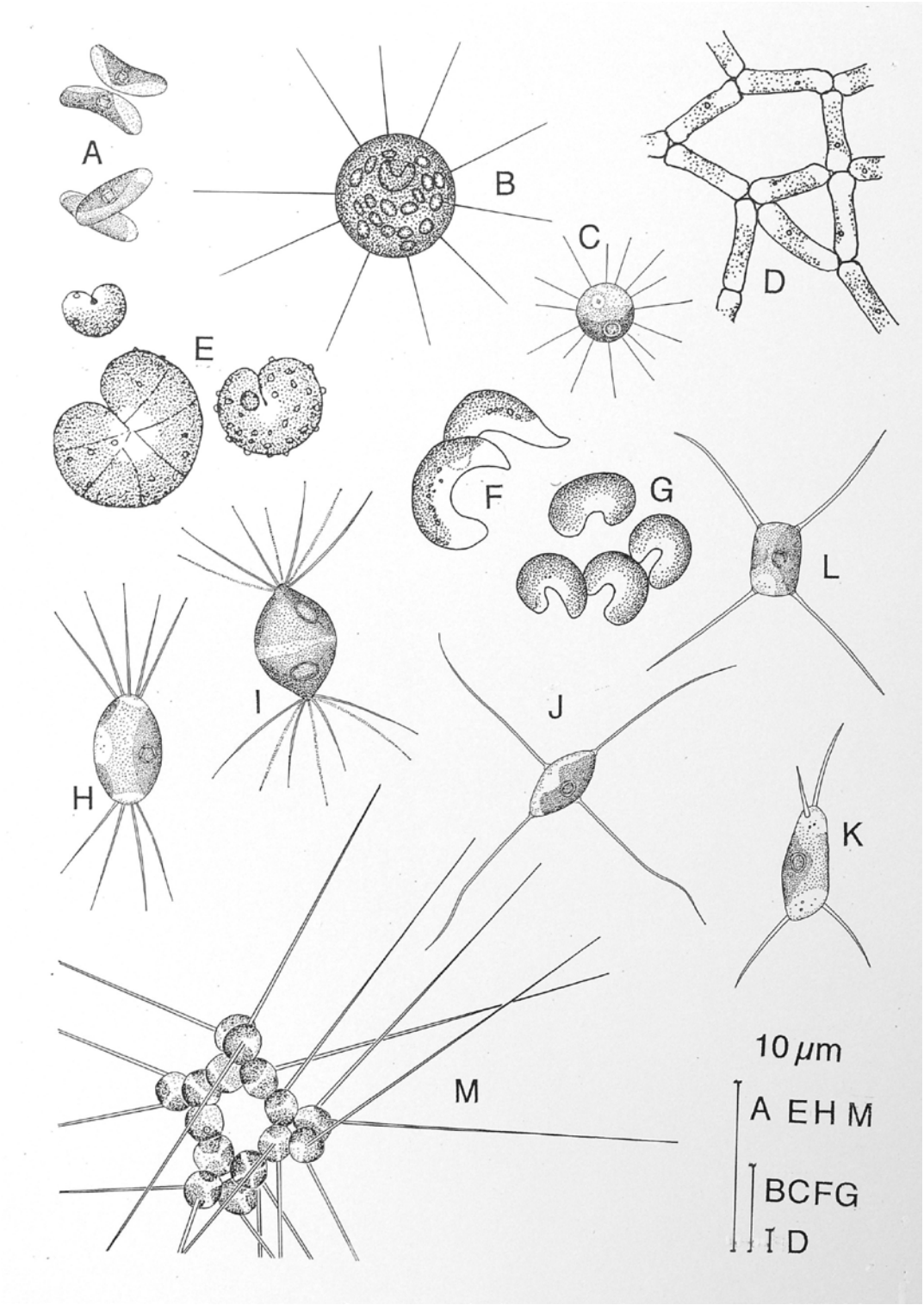

Figure3. 3A, *Didymogenes palatina,* River Ouse, x 2000. 3B, *Golenkinia radiata,* Histon, x 1500. 3C, *Golenkiniopsis parvula,* River Ouse, x 1500. 3D, *Hydrodictyon reticulatum,* New River, Herts, x 500. The cells can grow to 10mm long. 3E, *Juranyiella javorkae,* Madingley Hall, x 2000. 3F, *Kirchneriella lunaris,* Histon, x 1500. 3G, *Kirchneriella obesa,* Histon, x 1500. 3H, *Lagerheimia ciliata,* River Cam, x 2000. 3I, *Lagerheimia citriformis,* River Cam, x 2000. 3J, *Lagerheimia genevensis,* River Cam, x 2000. 3K, *Lagerheimia subsalsa,* Cambridge, x 2000. 3L, *Lagerheimia wratislaviensis,* River Cam, x 2000. 3M, *Micractinium pusillum,* River Cam, x 2000.

Exploring Eversden Wood

Louise Bacon and Vince Lea

Most of us are familiar with the ancient boulder clay woodlands of the heaviest of the heavy soils in the area of South Cambridgeshire, North Essex, NW Suffolk and adjacent parts of Bedfordshire. They have a long and interesting history, much studied by Cambridge academics, most notably Oliver Rackham, who has developed the discipline of historical ecology through studies of these woods. The main reason for their survival in what is now predominantly an arable landscape is that the soils were too heavy and wet to be ploughed; they then became vital as sources of timber and wood for construction, crafts and as fuel. Old maps show us that most had the same boundaries as they do today. They were recognised for their unique assemblages of plants in the earliest days of botany and were among the first sites to receive protection under the new era of nature conservation in the 1960s; Hayley Wood, for instance, was an early site purchased by the county Wildlife Trust (CAMBIENT as it was then). Other woods in the area are not always as well studied, and throughout these woods, the fauna is less well documented than the flora; this is especially true of the invertebrate fauna. Over the past two or three years we have made several visits to Eversden Wood, initially to study the birds and then to begin to get an insight into the insect fauna of the site. This paper outlines our findings and speculates on why this woodland is interesting.

We first visited Eversden Wood (TL3453) during preliminary fieldwork for a British Trust for Ornithology Woodcock survey in 2003. Winter visits to the site showed lots of evidence of the past coppice practices, such as old multi-stemmed trees.

The three main features of this woodland are very heavy, wet soils with lots of standing water – much wetter than the other woods in the area; a very diverse and natural mixture of tree species – no one species dominating overall but patches of different tree communities; and a network of wide, grassy rides and a couple of reasonable-sized glades. The boulder clay woodlands of southern Cambridgeshire are normally dominated by Ash and Field Maple, with Hazel, Hawthorn, Small-leaved Elm, willows and Blackthorn also being present in varying densities. The other main species present in them is Pedunculate Oak, which has often been planted a very long time ago as timber, but not at high density as would be found with modern forestry. However, the difference with Eversden Wood is the addition of significant quantities of Silver Birch and Aspen, fewer oaks than some nearby woods, and a noticeable mosaic of species through the wood.

This mosaic of tree types may be in part due to its history – it is in three parishes, and there could have been differences in the management of woodland in historic times in the different parishes resulting in differences today.

Our surveys have shown that there is a broad mixture of birds present during the breeding season in this wood, including Marsh Tit, Coal Tit, Nuthatch (all scarce breeders in Cambridgeshire), Treecreeper, Blackcap, Chiffchaff, Willow

Warbler, all three Woodpeckers (although we have no evidence for breeding of Lesser Spotted Woodpecker) alongside the more ubiquitous Blue and Great Tits, Chaffinch, Blackbird, Robin, Dunnock, Wren, Song Thrush, etc. Buzzards are also seen with increasing frequency around the area, especially in winter.

Our bird survey visits gave several sightings of interesting, initially unknown insects. On one May visit with friends, a strange "wasplike" insect landed on a fore-arm, and its large size (that of a wasp) and black and yellow colouration made it striking and interesting – something we had never seen before. John Dawson, vc29 moth recorder identified this as the Birch Sawfly (*Cimbex femoratus*). This is not a common insect, but once seen, always remembered. The observation which really clinched our interest in the site was actually of day-flying lepidoptera in late March. About a year after the initial observation of what we had decided were day-flying moths, a chance discussion with John Dawson, hinted at the identity of these moths as either Orange Underwing (*Archiearis parthenias*) or Light Orange Underwing (*Archiearis notha*), both day-flying spring species of geometer moths. Neither had been recorded in Cambridgeshire (vc29) for many decades; the last record of Light Orange Underwing was from Eversden in 1934 (Victoria County History). Orange Underwing is a birch feeder in its larval stage, and Light Orange Underwing an Aspen feeder, so both could potentially have been observed by us in Eversden.

Several days of determined observation in 2004 by both the authors and by John Dawson led to sightings in several locations within the wood, around stands of both aspens and birches. JD managed to net a couple of individuals and confirmed Light Orange Underwing, Nationally Scarce Nb (recorded in 30-100 10km squares). Presumably the species had continued to exist there un-recorded since the 1930s.

In 2005 and 2006 we again looked for these species, and again saw moths flying very early in the year around Birch trees, these probably being Orange Underwing, but unfortunately all were at a great height and none was caught for verification.

The number of interesting insect sightings led us to seek permission to take John Dawson and several moth traps into the wood. The landowner has been very co-operative in granting us access with a vehicle to this wood, parts of which are served by two public rights of way, but it is a substantial walk from the nearest parking-spot. The wood has a series of grassy rides, two of which are these public rights of way, the others are not.

We ran five Mercury Vapour (MV) light traps and one or two actinic light traps on a number of occasions from June 2005 to May 2006. Other field trips during summer were made by either the authors or others to look for beetles and day-flying moths. One of the moth team also made a visit in November 2006 to record leaf-miner moths, which can be identified by their distinctive patterns left in leaves. We used the same locations for each light-trapping session, covering a broad range of tree species, but only around a quarter of the woodland. We have recorded 314 species in total, of which 6 are beetles, 3 hymenoptera, one groundhopper and one fly. All others are lepidoptera (303 moths). The number of interesting species recorded was unprecedented at the time, and to get species

unrecorded for several decades and also species new to the vice county in a short survey period was a real highlight.

A summary of the most interesting insect finds is given in the table below alongside numbers of species recorded:

Date	Total species recorded	Non lepidoptera	Interesting species
11/06/2005	41	2	Orange Footman
18/06/2005	5	4	Dead-wood beetles – *Sinodendron cylindricum*, longhorn beetles (Cerambycidae)
23/06/2005	113	3	Orange Moth, Poplar Lutestring, Cream-bordered Green Pea
09/07/2005	2	0	Orange-tailed Clearwing
25/07/2005	98	2	Maple Pug, Lunar-spotted Pinion, *Euzophera pinguis*,
18/08/2005	96	0	Square-spotted Clay, Barred Rivulet, Maiden's Blush, two new micros for vc29.
10/10/2005	31	0	Green-brindled Crescent, Red-green Carpet
31/03/2006	17	0	Typical woodland spring species
03/05/2006	36	1	Lunar Marbled Brown
12/11/2006	19	0	Leaf miners

Notes: Orange Moth first record since 1974; Poplar Lutestring first since 1991, *Euzophera pinguis* – ash specialist, rare; Orange Footman, becoming more frequent, woodland specialist; Maple Pug – rare, woodland specialist, Square-spotted Clay – Nationally scarce (Nb), ex UKBAP species; this area is a national hot-spot for this latter species.

No attempt was made to count individuals on these occasions, but the ideal conditions prevailing on our second visit led to the most amazing abundance of moths that the two authors have ever seen, along with swarms of other insects such as midges, craneflies, beetles, ichneumons, sawflies, and a couple of Hornets. We also had a bat detector running during the evening and heard Barbastelle bats flying overhead. The abundant moths in the wood are a vitally important food source for this species.

The other insects include the longhorn beetles *Leiopus nebulosus, Phymatodes testaceus, Stenocorus meridianus*, sawflies tentatively identified as *Tenthredo mesomelas* and *T. maculata*, and the cranefly *Tipula maxima*. The use of light-traps to investigate the diversity of these species groups is poorly documented, but we have had other successes with luring longhorn beetles to MV light. This is notable, as at the time, we had spent warm mid-day hours looking for longhorns on flowers and vegetation, but had seen none, so to then observe species coming to light was a bonus. Research on the effectiveness of MV and actinic light traps for monitoring non-moth insect populations is lacking, but a potential worthwhile course of investigation. Carabid (Ground), Staphylinid (Rove) and Elaterid (Click) beetles have also been noted by the authors at light with regularity, but our lack of knowledge of these groups precludes further discussion of them here.

None of the ‘Interesting species’ listed in the table is nationally rare – most are classified as Nationally Notable or ‘Local’ species with a widespread but thin distribution across Britain. They are, however, scarce within vc29. Orange Moth, in particular, has no other known current sites in the county, the previous record being in 1974 from a completely different part of the county, but the following year (2006) was found in one other wood. Most of these species we found are woodland specialists and their local scarcity is a result of the lack of woodland in the area. The ancient woodland sites like Eversden Wood offer the best chance of finding these specialists, since the continuous cover of trees has allowed the populations to persist. Hayley Wood was another well-studied site in 2005/6 and was found to have several of these species as well. Many of these species are rather sedentary and unlikely to colonise new plantations unless very close to existing woods. Also, they have specialised requirements in terms of foodplants (the Light Orange Underwing being a good example, feeding only on the catkins of Aspen). Some species require a number of different components in the same habitat; flowering plants for nectar and specific growth stages of trees for larval feeding, leaf litter for pupation etc.; those species which, like the fritillary butterflies, depended upon lots of vigorous early stage growth following coppice operations, have probably mostly been lost, as there have only been a few intermittent attempts at coppicing in the last 50 years or so. Recent revival in the interest of coppice produce has not been sufficient to reverse this situation in Eversden Wood. Some coppicing has been done, but there are so many Fallow Deer in the area that the new shoots of the coppiced tree stumps are eaten to the ground as soon as they appear, leading to the death of the trees rather than the desirable regrowth. This deer population also influences the flora – it is not a woodland with carpets of spring flowers – Fallow grazing sees to that.

It is clear from the invertebrates we have found so far that several factors are important in influencing the invertebrates of the wood. We consider these to be the following:

- Aspen allowed to grow to a fair size, in larger populations than in other woods in the area, and scattered throughout several parts of the wood
- Birch scattered throughout the wood, rather than in small pockets of sandy soils
- Cessation of coppicing
- Dead wood of all tree species, both standing and fallen, found throughout the wood; especially important for the beetles we have found so far.

Much remains to be discovered in this woodland, and we hope to revisit other parts in the coming years to continue our work.

Acknowledgments

We would like to thank the landowner for his co-operation in allowing access to this valuable ancient woodland away from the public rights of way, and John Dawson and Ian Barton, amongst others, for all their knowledge, identifications of difficult species and invaluable hours spent in this woodland.

The carnivorous slug *Testacella* in Cambridgeshire

Fred Naggs, Dinarzarde Raheem and Prem Budha

A single specimen of *Testacella haliotidea* was found during a brief stop at Wandlebury on 21st August 2007. The slug was found on flagstone paving in front of Wandlebury House (52º 9' 30''N; 0º 10' 57''E; Grid reference: TL493533). Examination of the records of the Conchological Society of Great Britain and Ireland held at the Natural History Museum, London, demonstrate that this represents only the third record of *Testacella* in Cambridgeshire. *Testacella haliotidea* was first recorded in Cambridgeshire by Hugh Watson, who found a specimen in a survey of Cambridge University Botanic Gardens in or sometime before 1920 (Watson, 1929). A second specimen was found nearby in 1960 by Charles B. Goodhart in Chaucer Road and recorded by Martin J. Bishop. The new record presents an opportunity to provide some information on this fascinating group of elusive slugs.

Testacella is a very distinctive genus of carnivorous slugs that possess a small external shell attached posteriorly and, when extended, a body that tapers anteriorly with eye tentacles that lack the terminal swelling characteristic of most stylommatophoran land snails (see Plate 1, inside front cover). Distinct dorso-lateral grooves run anteriorly from the shell. Pilsbry (1885) listed 20 species in his review of *Testacella* systematics; some were misidentifications, the status of several others is uncertain and only six are widely recognised as valid. *Testacella gestroi* Issel 1873, *T. riedeli* Giusti, Manganelli & Schembri 1995 and *T. bisulcata* Risso 1826 are localised around the Mediterranean and poorly known. *Testacella haliotidea* Draparnaud, 1801, *T. maugei* Férussac, 1819 and *T. scutulum* Sowerby, 1821 are widely distributed and all three are recorded from England where they are considered to be synanthropic introductions (Kerney, 1999). Although Kerney (1999) expressed doubt about *T. haliotidea* and *T. scutulum* being distinct species, there are external differences and Taylor (1888, 1907) clearly demonstrated robust differences in the internal morphology that recent studies have confirmed (Ben Rowson pers. comm.).

The natural range of *Testacella* is uncertain but it is likely to have been restricted to the Mediterranean area and possibly Atlantic islands during the last glacial period and subsequently spread to areas of western Europe with a mild climate but apparently not east of Croatia. The wider distribution of *Testacella i*s poorly documented; it includes introductions in South Africa, USA, Canada, Cuba, New Zealand, Tasmania and coastal areas of New South Wales and Victoria. In the nineteenth and early twentieth centuries *Testacella* was recorded as far north as southern Scotland but in the past forty years the most northerly record for *T. scutulum* has been from Scarborough. Records for *T. haliotidea* have been south of Scunthorpe and the range for all three species appears to have contracted in England and Ireland. Post 1965 records for *T. haliotidea* show occurrences in only 26 of the 1,303 ten-kilometre squares in England and in 3 of the 844 ten-kilometre squares in Southern Ireland (Kerney, 1999). This

apparent reduction in range for a group at the northern limits of its distribution runs counter to an expansion in range that might be predicted from the general pattern of northern range extensions attributed to global warming. Their distribution is largely confined to habitats such as parks and gardens and loss of habitat seems unlikely to account for a reduction in range.

The reduction in range is likely to be a reflection of reality because there is an active mapping scheme conducted by the Conchological Society of Great Britain and Ireland. Nevertheless, there can be little doubt that these slugs are significantly under recorded. They are active only in mild wet weather, are mostly nocturnal and are otherwise hidden in subterranean burrows or under rocks and stone slabs, where several may be found together. During hibernation they occupy underground mucus-lined chambers when the otherwise small mantle extends over the rear of a greatly contracted body (Ellis, 1926).

In most molluscs, other than bivalves, the feeding structures consist of a pair of jaws and a sheet of teeth, the radula, supported on a rigid cartilaginous rod, the odontophore, within the mouth or buccal cavity. The majority of gastropods are herbivores or detritivores and the odontophore acts like a scraping tongue with the radula teeth functioning as a rasp for grating food before ingestion. In *Testacella* jaws are absent, the buccal mass (the expanded section of foregut containing the radula and odontophore) is large and, when attacking prey, the odontophore is rapidly everted far out beyond the mouth, revealing its coating of rows of pointed radula teeth. The posteriorly directed hooked teeth on the leading edge of the odontophore pierce the prey and restrain it. Once prey is captured the odontophore rapidly retracts and the prey is irrevocably trapped as the radula is introverted and the teeth surround the prey in the buccal cavity (Taylor, 1902; Crampton, 1975). Earthworms are the main diet; if the worms retract into their burrow on being seized the slug will allow itself to be drawn down into the burrow when they will leisurely undertake the process of swallowing the earthworm whole. Slugs, including smaller individuals of *Testacella*, shelled gastropods and other invertebrates such as centipedes are also eaten (Taylor, 1902).

The adaptations associated with carnivory in land snails have resulted in very similar morphological solutions and carnivorous gastropods provide a textbook case of convergence that appear to have misled comparative morphologists into suggesting that they were all closely related (Pilsbry, 1885). Molecular biology provides powerful tools for constructing ‘family’ or phylogenetic trees that are based on ancestor descendent relationships derived completely independently from morphological criteria. The molecular approach has provided fascinating information about previously unrecognised relationships and it has unequivocally demonstrated that several completely independent land snail lineages have developed a carnivorous diet (Wade *et al.,* 2001).

The relationships established from molecular data place *Testacella* as a basal group in pulmonate land snails (Wade *et al.,* 2006) and current investigations (Hudelot *et al.,* in prep.) confirm critical morphological studies (Watson, 1915; Tillier, 1989) that place *Testacella* as a sister group with the eastern circum-Mediterranean *Poiretia,* which possesses a complete shell. *Testacella* and

Poiretia share a very long independent lineage on the molecular tree. *Poiretia* and the tropical American Oleacinidae appear to be separated by an enormous temporal distance and have followed separate phylogenetic paths but they appear to have followed a combination of parallel and convergent morphological paths and share a conservative morphological form. The earliest fossil records of the *Poiretia*/Oleacinidae shell form are from the European Palaeocene but it seems likely that the *Testacella/Poiretia* lineage diverged from its distant South American cousins when the Atlantic opened up some 130 million years ago. This is consistent with other basal groups in the molecular tree of land snail relationships in showing phylogenetic links across Mesozoic tectonic plates. Most of these relationships are between groups considered to be southern relicts from the break up of the Gondwana landmass but there is fossil evidence that some of these supposed southern relicts occurred in Laurasia and have their origins in the Early Mesozoic combined landmass of Pangaea (Naggs & Raheem, 2005). Most of the European representatives of this ancient Pangaean fauna appear to have died out at the end of the Eocene and *Testacella* is the sole representative of this Mesozoic lineage in Britain. New records will be welcome and you are encouraged to look for this carnivorous Mesozoic relict in your garden.

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The Biodiversity Benefits of Cambourne

Rob Mungovan

Introduction

This article will introduce the broad range of biodiversity benefits that the development of Cambourne has brought about. It will not try to be too specific about species numbers; instead it will focus on the success that Cambourne has had in the integration of biodiversity within a new "village", and how it has set standards for future large-scale developments across Cambridgeshire.

The background to Cambourne

In the early 1990s the planning of Cambourne began to be discussed in detail. From the early concept of the site, it was decided that wildlife and landscape form would be a factor in deciding the overall layout of the site. This was a bold step for South Cambridgeshire District Council (SCDC) (as it would have been for any planning authority of the time) as it should be remembered that this was before the Government's Planning Policy Guidance note on nature conservation (PPG9, 1994), and before the concept of biodiversity conservation had come into general use.

A legal agreement attached to the outline planning permission for 3,300 dwellings obligated the developers to (as copied from the legal agreement):
1) Appoint a suitably qualified ecologist prior to the commencement of the development (this was the company Ecological Services Limited (ESL)) who are still working on the site twelve years later).
2) Undertake site surveys to identify areas with species of nature conservation interest, with emphasis on the local otter population associated with the Bourn Brook, and to identify environmental enhancement opportunities.
3) Liaise with the Council in order to harmonise the land-use and development with areas of ecological importance.
4) Consult and liaise with English Nature (now Natural England) and other relevant local nature conservation bodies.
5) Provide the Council with an on-going monitoring programme during the phased development of Cambourne.

6) Undertake the marking out and fencing off of no-go areas for the construction.
7) Brief site engineers on ecology matters.
8) Supervise development adjacent to sensitive areas.
9) Prepare and provide to the Council an ecological management plan for landscaped areas of the site.

Whilst many of the points required above are now accepted standard practice, during the time of its writing the legal agreement for Cambourne was particularly forward-thinking as it now encapsulates the philosophy of survey, avoidance, mitigation, compensation and monitoring, and has continued to provide a means to ensure environmental enhancement and long-term monitoring of the site.

The legal agreement has been a model that has been evolved and improved for potential use in the latest major developments such as Northstowe, also in Cambridgeshire.

The masterplanning process

The understanding of the biodiversity resource of Cambourne in the mid-1990s enabled ecological information to be fed into the masterplanning process that would ultimately determine the shape of Cambourne and the integration of its biodiversity. For example, the distribution of greenways, retained woodland and scrub habitats is a direct result of the understanding of the distribution of badger social groups, and a desire to protect and enhance the valuable landscape features of an otherwise largely arable landscape.

ESL prepared the ecological aspect of the Environmental Statement to support the original outline planning application for Cambourne. The introductory section contained the following:

"The ecological baseline description showed that the site of the proposed development is predominantly agricultural with small, isolated areas of secondary woodland, deciduous plantations, shelterbelts and improved grassland together with a fragmented network of hedgerows and field drains. None of the habitats present within the site are of national or high county conservation value. In the context of the site, the main features of local conservation interest include Poplar Plantation, the woodland east of Poplar Plantation, the woodland east of Jeavons, the reported species-rich grassland of Crow Dean track and the small pond south of Monk Field Farm. Despite the fragmented and small size of semi-natural habitats, the proposed development site also supports a number of statutorily protected species including badger, bats and great crested newt."

It continues:

"As a result of the interactive nature of the design process and the initial objective of minimising any adverse ecological impacts, many measures intended to avoid, minimise or compensate potential impacts, have been incorporated into the project design, landscaping proposals and development schedule. Throughout the development period the principal land-take will be arable land of minimal conservation value. The main existing blocks of woodland will be retained, whilst smaller features, such as hedgerows and mature trees, will be incorporated where possible into the detailed design plans. Overall, the proposals will lead to a significant increase in the extent and diversity of the habitats and species present. Although there will be some degree of wildlife disturbance during the construction phases and following the occupation of the site, the proposed mitigation measures and continuous

monitoring programmes should avoid any significant adverse changes in the wildlife communities present. Furthermore, by increasing the availability of suitable habitats the landscaping proposals will help to strengthen existing populations and provide opportunities for the (possible) introduction of new species such as dormouse (in the long term)."

The masterplan (which was really more of a design statement than a single plan) has also proved to be an effective tool for biodiversity conservation in so far that it contained the following statements:

1) Ecological considerations will be incorporated throughout the design process and all development stages.
2) Existing habitats and species of nature conservation value will be protected.
3) Biodiversity will be conserved and enhanced by habitat management and creation.
4) Habitats characteristic of the local area and region will be created.

Thus the case can be made to the developers that every building plot should make some form of provision for biodiversity and to ensure the delivery of such biodiversity benefits planning conditions are most commonly used.

The broad range of biodiversity benefits

Legal commitment to wildlife conservation. As already mentioned, the establishment of a legal obligation (section 106 in planning terms) for the protection of wildlife within the site was a significant move for SCDC. The commitment is for the period of the development. Furthermore it secured the Cambridgeshire Wildlife Trust (WT) as the body that would take on the management of the open spaces (both formal and the more wild). This has been an exciting move for Cambourne as the WT obviously understand habitat management and seek to optimise the range of habitats. One wonders if the WT will be in a position to repeat this bold step with other large-scale developments around Cambridge, or whether other bodies or trusts will come forward to manage new open spaces. Whoever takes over this responsibility needs to ensure that the management of habitats can be financially viable over a long-term period; perhaps practical nature conservation can become a business opportunity.

The need for advance survey. This identified the general species diversity before development. As mentioned earlier, by understanding the distribution of species and habitats from the outset it had been possible to "design in" their needs to an extent within the Cambourne masterplan. The close working relationship of ESL and SCDC meant that the planning officers of the Cambourne team received an excellent grounding in habitats and species. Advance surveys are now increasingly requested in order to support planning applications across the whole of the district, and this has been accepted as Government policy in Planning Policy Statement 9: biodiversity and geological conservation (PPS9, 2005). Whilst it is easy to assume that Cambourne has been good for biodiversity one needs to consider the information that was presented in the Environmental Statement (ES) for the original outline planning application. Part of the introductory text from the ES has already been presented above; here the main groups of fauna are considered (Table 1).

Birds Background data searches for the ES did not reveal any past records of scarce or protected species, and no specific surveys were carried out for wintering or breeding birds as the farmland landscape was considered to be poor for biodiversity. As the site was investigated, lists of bird species were compiled with particular effort made to note breeding species. A total of 27 species was recorded.
Bats Examination was undertaken of both trees and buildings for their suitability for use by bats, but none was found.
Badgers Initial surveys revealed widespread evidence of Badger activity within the proposed development site. To understand the activity further extensive surveys were undertaken. This also included land outside the site, which was known to be used by Badger social groups. Surveys entailed detailed searches of the whole site, mapping signs of Badgers, including their runs and footprints, feeding signs, latrine sites and setts. This survey work identified and mapped the feeding territories and main trackways of four Badger social groups.
Otters It was known that Otters used the Bourn Brook downstream of Toft (c17 km downstream). Walk over surveys were undertaken to determine the nearest point downstream of the development site where the river became suitable for use by Otters. The survey also recorded signs of Water Voles on the Brook.
Herptiles All ponds on the site were surveyed for Great Crested Newts. Low numbers of Common Frog and Smooth Newt were found in suitable water-bodies, as one would expect. Great Crested Newts were found in very low numbers within one man-made pond (suggesting that all these amphibian species had possibly been introduced). No toads were recorded. Common Lizards were also searched for but none was found.
Saproxylic invertebrates Within the woodland areas the habitat survey recorded abundant dead wood, indicating potential habitat for saproxylic invertebrates. A more detailed invertebrate survey was therefore carried out in February 1995 resulting in nearly 800 species being recorded including over 50 that were either scarce or nationally rare. The wood is now recognised as a nationally important site for its invertebrate fauna.

Table 1

Mitigation measures. As the appointed site ecologists ESL were, and still are, in close contact with the Cambourne Consortium (the developers). An important part of their rôle is to ensure compliance with wildlife legislation and planning conditions (although these are legal requirements under the Wildlife and Countryside Act, 1981, even into the late 1990s the construction industry was only just starting to appreciate and understand the protection afforded to Badgers, for example). In this rôle it is important to understand the movements and habits of protected species, such as Badgers or breeding birds, in order to propose detailed mitigation schemes. For example, some of the development plots might necessitate the closure of Badger setts if they are no longer occupied (with full regard given to the Protection of Badgers Act, 1992), or might need the advance stripping of vegetation to limit nesting habitat. Continual monitoring of the site has enabled this information to be gained. The Cambourne development was the first one in South Cambridgeshire regularly to use planning conditions to limit development impact on species. An example of this has been to limit the harm caused to nesting birds by using the following condition: No development, site clearance or vegetation removal shall take place during the period 15th February to 15th July without the prior inspection of the site by a suitably qualified ecologist and the written approval of the local planning authority.

To limit the harm caused to Badgers: No development shall commence until a scheme for the protection of Badgers has been submitted to and approved in writing by the Local Planning Authority. Measures shall include:
1) Details of protective and/or guide fencing (type, location and duration)
2) Details to mitigate against Badgers becoming trapped in open holes/trenches
3) Habitat remediation works
The approved scheme shall be fully implemented unless otherwise agreed in writing.

Protection of Great Crested Newts. To ensure that the small population of Great Crested Newts was protected from harm and conserved within the site, a "newt reserve" was established where suitable terrestrial habitat was created alongside a pond that later proved successful for breeding. This requirement was an obligation under the licence issued to ESL for the protection of the Great Crested Newts, but in addition to licence compliance it met with the masterplan aim "...species and habitats will be protected..."

Whilst the use of conditions to control biodiversity impact has now become more widely practised, Cambourne provided an excellent opportunity in which to "practise" the approach as ESL were able to provide support and steer the developers through the matter.

Habitat creation measures. It needs to be remembered that 60% of the Cambourne development can be considered as a form of habitat creation, with the additional enhancement of retained landscape features. It was largely accepted that the arable landscape was species-poor. The mix of open water, grasslands, woods and gardens has changed the landscape, some species have remained (such as the Brown Hare) and others have moved in. Table 2 broadly summarises the landuse types before and after the development.

Habitat type	Existing area (ha)	Potential loss (ha)	Created area (ha)*
Arable	375	375	0
Woodland/scrub	8-9	<1	80
Grassland	5-6	5	120
Wetland	<1	<1	10

Table 2 * Area estimates provided by Randall Thorpe Landscape Architects

Habitat type	Priority species
Built-up areas (i.e. the housing and streets)	House Sparrow (increasing), Black Redstart (visitor), House Martins (abundant)
Grasslands (both amenity and landscaped areas)	Skylark (stable), Yellow Wagtail (visitor), Barn Owl (occasional visitor?), Stonechat (visitor), Whinchat (visitor)
Open water (for drainage needs and for aesthetics)	Water Vole (increasing), Great Crested Newt (increasing), Kingfisher (visitor), Little Egret (visitor), Little Ringed Plover (visitor)
Woodland (new and existing)	Badger (stable), Pipistrelle Bats (increasing)
Scrub (new and existing)	Roosting Starlings (increasing), Bullfinches (increasing?)
Hedgerows (new and existing)	Corn Bunting (stable), Turtle Dove (stable), Yellowhammer (stable)

Table 3

Table 3 broadly summarises the priority species that are using the main habitats (and also lists some of the more interesting rare occurrences).

The open space philosophy at Cambourne was to create spaces that:

1) were in keeping with the existing landscape form (so woodland copses and waterbodies were created that were linked by hedgerows and grasslands)
2) would provide a dual use (open space for informal use but would also provide for the Brown Hares and Barn Owls)
3) would sustain existing species.

This approach of ecological enhancement through planning conditions has been highly successful for all. The new residents have attractive and diverse open spaces, biodiversity still has space and the developers have a selling point that makes Cambourne special.

Much of the smaller habitat gain at Cambourne is now achieved through planning conditions that require a scheme of ecological enhancement to be implemented. For example, specialist high-quality bird and bat boxes (often of the woodcrete type to give a life span of up to 30 years) have been erected, new hedgerows on the boundaries and front gardens of development plots have been planted, and gaps have been left at the bases of fencing, a simple measure to allow small animals such as hedgehogs access to gardens.

This approach is now being used more commonly across the wider district in order to meet the biodiversity gain objective of PPS9. Furthermore, the SCDC Biodiversity Strategy (Aug 2006) encapsulates these ideas within one document as planning guidance for developers and planning staff (www.scambs.gov.uk/ biodiversitystrategy). The Biodiversity Strategy has been adopted as council policy. One simple but effective requirement of the policy is to ensure that on all major developments 50% of the dwellings have an association with a biodiversity feature such as a bird, bat or insect box. Thus on a development of 50 dwellings 25 bird boxes could be provided, in addition to native plants in boundary features and nectar or berry-rich species in more formal areas.

Monitoring. The benefits of the Cambourne monitoring programme are that it enables ecologists to demonstrate the successes of species conservation to a wider audience and to adjust approaches where they might not have delivered the expected result. In the first instance effort had been put into the erection of bat boxes that was causing a degree of concern with some development companies. Following box monitoring it was found that the actual usage of boxes was extremely low; as such greater effort was placed on the erection of a wider range of bird boxes thus directing the effort into a more successful outcome.

As an example of good practice Cambourne is now having further-reaching biodiversity benefits as other local authorities try to replicate the mix of housing and semi-natural open spaces. The Good Practice Guide that accompanies PPS9 makes specific reference to the Cambourne development. One of the keys to the success of Cambourne for biodiversity has been the relatively low housing density (c30 dwellings per hectare), which has allowed wildlife space within gardens and public open spaces. At future development sites, such as Northstowe, the density is set to increase above 45 dwellings per hectare. This will present interesting challenges and will not enable a simple repetition of the Cambourne philosophy. There will need to be a greater focus on the innovative

integration of biodiversity. Such measures will then need to be supported through masterplans and design guides so that it is clear what measures developers will be expected to include within their plans for higher density developments. With less space the integration of biodiversity will have look at examples of existing best practice. For instance, Lamb Drove in Cambourne has been a demonstration site for the way in which sustainable drainage systems (SUDS) can be integrated within normal housing developments. Lamb Drove has shown that a vegetated or "green roof" can be provided on outbuildings such as bin stores, and that grass swales and infiltration ponds can add character to a development and provide for interesting habitats to evolve in time. The water run-off rate from Lamb Drove is less than the normal "green field run-off rate" that the Environment Agency expects developments to achieve. Recently, the partnership working on the scheme between the Cambridge Housing Association, the County Council, SCDC, the Environment Agency, Anglian Water, and the Engineering Consultants Royal Haskoning has been recognised with a commendation from the Royal Town Planning Institute in its annual awards.

The legal agreement stipulated that a management plan had to be produced for the open space management. Included within this document was also a Biodiversity Action Plan (BAP) for Cambourne that is an innovative approach for a new settlement. It will be interesting to review this BAP in the future to see which targets have been met by the habitat creation and management.

Perhaps one of the less obvious biodiversity benefits of Cambourne that has ensured further protection and enhancement across the district has been the creation of the post of Ecology Officer. Many local authorities buy in the advice of ecologists or simply don't have the mechanism to consider it. However, in 2001 SCDC had the foresight to recognise this growing area of work and the other opportunities that would arise. I was then fortunate enough to be offered the position and since then the work hasn't stopped coming.

The current status of Protected Species and current interesting recordings

From the update report provided by ESL and records passed on, one is able to report that as a whole the development of Cambourne has been beneficial for a range of species. The 2005 update (provided Jan 2006) details are in Table 4.

One hundred and eighteen species of bird have now been recorded from the site (compared with 27 in the first survey), including Jack Snipe (increasing) and Stonechat in the winter. However, Reed Warbler and Sedge Warbler are yet to be reported as breeding. This is very likely to occur once the reedbed areas develop more dense cover.

Conclusion

The creation of extensive wetland features has enabled the relatively rapid expansion of water-related fauna at Cambourne. This area of Cambridgeshire simply did not provide the mix of habitats in its previous arable-focused landscape. Yet the habitats would not have been created if it were not for the desire to create an attractive and functioning setting for a major housing development which had water management and landscape design fundamental to its concept.

Date	Location	Comment
2006	Caxton by-pass	Otter spraint found on mammal ledge provided on Bourn Brook crossing
2005	Lake Ewart	A Water Vole latrine was observed on the north eastern bank
2003	Redgrave Water	Water Vole signs present, 2006 Water Vole burrows on northern, western and eastern banks
?	Knapwell Central ditch	Water Vole seen, latrine present
2004	Field pond near Jeavons	Smooth Newt larvae and Common Toad tadpoles present
2004	Small pond at Jeavons	2 Great Crested Newt larvae (5 adult Common Toads also observed, plus Smooth Newts)
1999	Monkfield Paddock Pond	Great Crested Newts (pond later became dry)
2005	Nature Pond on southern boundary	Great Crested Newt, and a Smooth Newt
2005	Southern boundary pond B	7 Great Crested Newts and eggs, plus Smooth Newts
2005	Southern boundary pond 27	14 Great Crested Newts and eggs, plus Smooth Newts (pond created in Dec 2003)
2005	Lake Ewart	Smooth Newts and 2 Common Toads (lake created in 1999; no amphibians recorded in 2001)
2005	Redgrave Water	500+ Smooth Newts on land adjacent to lake (lake created in 1999)
2005	Ditch near allotments	Smooth Newts and Water Shrew
2004	Lake Ewart	Daubenton's Bat detected. A slight increase noted in 2005
2005	Eco Park, Greater Cambourne and Lake	Pipistrelle Bats detected by evening bat surveys. This was the first time bats were detected in these parts of the site. However 80 boxes were checked in Monkfield Wood and the Eco Park woods all with negative results. Thus the bats were coming to the site to feed or were living in houses
2005	SCDC bat wall	A single bat dropping was found possibly indicating that a bat had investigated the structure
2004	Lake 4 (Lake Sirius)	Little Ringed Plover. Believed to have bred in 2004 as well
2005	Lake 4	Single Kingfisher observed (not believed to be breeding in the artificial cliff face yet)
2005	Ex-arable fields and seeded grasslands	Skylark still continue to be relatively common
2005	Western and southern boundaries of the country park	Linnet, Reed Bunting and Yellowhammers are believed to be breeding
2005	Western boundary and business park area	Corn Bunting believed to be breeding
2005	Eco Park woodlands and other scrub habitats	Bullfinch regularly noted and believed to be breeding
2005	Crow Dene hedge and Lower Cambourne	Small flocks of House Sparrows regularly noted. Believed to be breeding in hedges
2005	(location not reported)	Willow tit observed in the winter
2005	Various undeveloped plots	Meadow Pipits continue to be widespread
2006	Business Park lakes	Little Egret
2006	Wildlife Trust garden	Black Redstart

Table 4 (No date was given for the Water Vole record at Knapwell Central Ditch)

Water-bodies that are not subject to intense water-based recreation or other forms of regular disturbance will always provide a sanctuary for biodiversity as by their very presence they may often be excluding people from certain areas. Furthermore, water is often a natural 'draw' for people whether it is as an enjoyable feature to experience during a quiet walk or a place to spend time whilst enjoying recreation. All large-scale developments should aim to have areas of open water with natural planting and secluded areas.

The use of native planting in public open spaces and in new gardens greatly enhances the attractiveness of these areas for various bird species and adds a feeling of maturity and a sense of place once the plants establish. If over-looked or poorly planted, a huge opportunity is missed and streets lack vegetation and structure. This can lead to built-up areas being left devoid of vegetation or planting being replaced with gravel areas that are easier for the new residents to maintain. The planting of new developments should always aim to complement the landscape character and to provide for biodiversity whilst considering the likely effects of climate change and the practicalities of future maintenance.

All animal species need some form of shelter. Thus, if crevices and holes do not occur in new buildings then suitable bird, bat or insect boxes should be provided. Where sensitive species occur, such as Badgers, buffer zones should be created around them. Undisturbed areas can also be left on the edges of formally managed spaces. This might necessitate the creation of log piles or long-grass areas adjacent to hedges. Invertebrates should also be considered if one wants to adapt the ecosystem approach to habitat management.

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This article is written by Rob Mungovan (SCDC Ecology Officer) in a non-professional context. The author is grateful to ESL and the Cambourne Consortium for permission to reproduce information submitted in fulfilment of the Cambourne legal agreement.

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Greater Water-parsnip (*Sium latifolium*) at the Ouse Washes, Cambridgeshire and West Norfolk: a large population and its ecology

C. James Cadbury

Abstract

Greater Water-parsnip (*Sium latifolium*) has declined substantially in Great Britain and is considered to have an endangered status. It is a Biodiversity Action Plan Priority species. Since 1987 *Sium* has been recorded in

Cambridgeshire from seven 10-km squares out of the 16 from which it was known historically. Most of the extant sites are at the Ouse Washes (Cambridgeshire and West Norfolk). The population at the Ouse Washes has been subject to periodic surveys in 1978–2006. It has been recorded in 31 1-km squares at the Ouse Washes (25 in v.c. 29, Cambridgeshire, and six in v.c. 28, West Norfolk) and another two upstream on the River Ouse between Over and Earith (v.c. 29). Highest counts of plants have been 1648 in 2001 and 1053 in 2006. It is doubtful whether any surveys have been fully comprehensive. There is evidence of an increase, particularly after late spring/summer flooding. Though *Sium* is largely a plant of ditch-banks, it is tolerant of the shade of willow-beds. Many of the sites at the Ouse Washes are at the margins of willow-beds or reedbeds where a ditch provides protection from grazing by cattle. Some trampling and grazing or mowing may be beneficial for seedling establishment. In 2006 *Sium* was predominantly associated with NVC community **S5** *Glyceria maxima* swamp, though willows were in close proximity at nearly half the sites. At the Ouse Washes it is largely associated with a peat substrate. It is probable that this population of *Sium* is one of the largest in Britain and, against the national trend, it appears to be increasing.

Introduction

Greater Water-parsnip has been declining in Great Britain since before 1962 and the trend has continued. Before 1970 it was recorded from 166 10-km squares but between 1987 and 1999 in only 62 squares. The change index calculated by Preston *et al.* (2002) is –1.83, indicating a substantial decline. Currently its distribution is largely the Norfolk Broads, the Cambridgeshire Fens, the Yorkshire Ings, the Somerset Levels and Romney Marsh and the Arun Valley in Kent and Sussex. It is a Biodiversity Action Plan Priority species, is Nationally Scarce (Stewart *et al.*, 1994) and is considered to have an Endangered Status (Cheffings & Farrell, 2005).

In Cambridgeshire *Sium* has been recorded from 16 10-km squares, but between 1997 and 2006 from only seven – TL29 (Bassenhally), TL37 (Earith and Over), TL47 (Haddenham), TL48, TL58 and TL59 (all at or close to the Ouse Washes) and TF30 (Guyhirn) (Crompton, 2007). Most of the extant sites are at the Ouse Washes. There appear to be no records from the Nene Washes (TL29 and TL39, TF30), though the Bassenhally and Guyhirn sites are close by.

A substantial proportion of the Ouse Washes is owned and managed as an RSPB nature reserve. As part of the RSPB's Biodiversity Recording Programme at its nature reserves *Sium* at this wetland has been the subject of ten surveys between 1978 and 2006. Several of these were more general surveys of ditch plants (Cadbury, 1999, 2003, 2005; Cadbury *et al.*, 1993, 2003; Cadbury & Shardlow, 1997, 1998, 2002; Grose & Allen, 1978; Gurney & Cadbury, 2002). This paper aims to review these surveys and describe the ecology of the species at the Ouse Washes.

General characteristics of the Ouse Washes

The Ouse Washes cover an area of 1914 ha, extending 32 km in length but no more than about 1 km wide. The Old Bedford/Delph River extends along the north-west boundary of the washes between Earith and Welmore Sluice. There is something like 140 km of ditches. The prime function of the washes is flood relief, mostly in winter, but since the mid 1970s increasingly in late spring. In summer and autumn the traditional land use is pasture for cattle. The ditches act as wet fences to retain livestock. Beds of willow have been established along the Old Bedford and Delph Rivers. Coppicing of these is only occasional.

Methods

Surveys of *Sium* have involved counting plants at discrete sites that were mapped and in recent years located by GPS. Surveys have been undertaken by RSPB staff and volunteers as well as by the author. In 1978 and 1992 it was surveyed incompletely as part of a survey of the ditch flora (Grose & Allen, 1978; Cadbury *et al.*, 1993). Because of the size of the area and difficulties of access, none of the surveys was comprehensive; the most complete were in 2001 and 2006. Young plants were distinguished from mature ones in these years, as were flowering and non-flowering ones. Details of associated plants within three metres of *Sium* plants were taken in 2006. What was considered a site may not have been constant from year to year. In 2006 a site was defined as being one or more *Sium* plants separated from others by 25 m.

Results

The results of the surveys over the period 1976–2006, with the 1-km squares and the number of discrete sites and plants within them are given in Tables 1 and 2. Further details of the survey in 2006 are presented in Tables 3–5 and of the distribution of *Sium* in the Ouse Washes in earlier surveys in Table 6.

Over the period 1976–2006 *Sium* has been recorded in 31 out of the 44 1-km squares that cover the Ouse Washes (25 in v.c. 29, Cambridgeshire, and six in v.c. 28, West Norfolk) and another two upstream along the River Ouse between Over and Earith in Cambridgeshire (Table 1). These extend over four 10-km squares. The maximum number of plants recorded in any one year was 1648 (61 sites) in 2001, with 1053 (at least 87 sites) in 2006 and 792 (29 sites) in 2000 (Table 2). In 2006 only 18 (21%) of the 84 fully recorded sites had 20 or more plants. The two sites with the largest numbers (both 70 plants) were in wildfowlers' washes between Pymore Viaduct and the Norfolk border. Fifty-two sites (62%) had less than 10 (Table 3).

Sium has been recorded since 1987 on ditches in arable land or adjacent to gravel-pits at several sites near but outside the Ouse Washes – Fortreys Hall (TL4482 and TL4483) and near Haddenham (TL4375 and TL4376) (Crompton, 2007). In 2006 it could not be found at the Haddenham sites, where the ditches with high banks seemed unsuitable for the plant. At Bassenhally Pit there were 50–100 plants in the eastern marginal ditch (TL286985) in August 2006 (J. O. Mountford, pers. comm.). This continues to be one of the largest populations of *Sium* in v.c. 29 outside the Ouse Washes.

	1-km square	Site	Years
	Cambridgeshire		
v.c. 29	TL3874	Earith	1980*, 2006
	3974	Earith	2006
	3975	Earith – Sutton Gault	2001
	4076	Earith – Sutton Gault	2002
	4582	Mepal – Welches Dam	2000, 01, 02, 03
	4583	Mepal – Welches Dam	1996, 2000, 01, 03, 06
	4684	Mepal – Welches Dam	2001
	4685	Mepal – Welches Dam	2002
	4784	Mepal – Welches Dam	2002
	4785	Welches Dam	2000, 01, 02, 06
	4786	Welches Dam – Purls Bridge	2006
	4787	Welches Dam – Purls Bridge	2006
	4885	Purls Bridge – Pymore Viaduct	2001, 06
	4886	Purls Bridge – Pymore Viaduct	2001, 02
	4887	Purls Bridge – Pymore Viaduct	2002, 2006
	4987	Purls Bridge – Pymore Viaduct	2003
	4988	Pymore Viaduct	1976*, 78, 79*, 80*, 90*, 92, 96, 97, 98, 2000, 01, 02, 06
	4989	Pymore Viaduct	1976*, 78, 80*, 90*, 91*, 92, 96, 97, 2001, 06
	5088	Pymore Viaduct	1978, 92, 96, 2000, 01, 06
	5089	Pymore Viaduct – Norfolk border	1992, 96, 97, 98, 2000, 01, 02, 06
	5090	Pymore Viaduct – Norfolk border	1996, 2001, 06
	5190	Pymore Viaduct – Norfolk border	2001, 02
	5191	Pymore Viaduct – Norfolk border	1992, 97, 98, 99*, 2000, 01, 02, 03, 06
	5291	Pymore Viaduct – Norfolk border	1998, 2001
	W. Norfolk		
	5192	Norfolk border – Welney road	2006
	5292	Norfolk border – NW of Welney road	2000, 01, 06
	5293	Norfolk border – NW of Welney road	1996, 2000, 03
v.c. 28	5393	N of Welney road (WWT)	2003, 06
	5394	N of Welney road (WWT)	2003
	5495	N of Welney road (WWT) NW of Observatory	2006†
	5496	N of Welney road (WWT) N of Observatory	2006†
	5595	N of Welney road (WWT) NW of Observatory	2003
	5596	N of Welney road (WWT) NW of Observatory	2006†

*G. Crompton, 2007; †P. Wisniewski, 2006

Table 1 Recorded distribution of *Sium latifolium* at the Ouse Washes 1976–2006

Ecology of *Sium latifolium* at the Ouse Washes

Sium is largely a plant of ditch-banks and the margins of pools, but after years of prolonged spring or summer floods it may spread into the wet washes, which then tend not to be grazed. Young plants occur in more open areas lacking tall vegetation and shade, but mature ones are tolerant of shade and may persist in the deep shade of willow-beds. In 2006, eight sites were recorded as being in deep shade and a further 14 in more than 60% shade.

Year	No. of 1-km squares	No. of sites	No. of plants
1978	2	5	Not counted
1992	4	25	Several hundred
1996	6	?	Not counted
1997	5	*c.* 12	236
1998	3	?	480
2000	11	29	792
2001	16	61	1648
2002 (incomplete)	11	17	64
2003	8	14	155
2006	20	87+	1053

Total 1-km squares at which *Sium* was recorded, 1978–2006

Earith (Cambs, v.c. 29) – only in 1980 and 2006	2
Earith – Welney (Cambs, v.c. 29)	25
Welney – Welmore (W. Norfolk, v.c. 28)	6
	33

These extended over four 10-km squares, TL 37, 48, 58 and 59.

Details for the number of sites and plants in each 1-km square for each of the 10 years have been deposited with the Cambridgeshire Flora Records.

Table 2 *Sium latifolium* at the Ouse Washes: numbers of 1-km squares in which it was recorded, numbers of discrete sites and numbers of plants

Plants per site	No. of sites (n = 84)
< 10	52 (62%)
10–19	14 (17%)
20–39	14 (17%)
40–59	2 (2%)
70	2 (2%)

Table 3 Distribution of number of plants per site at the Ouse Washes, 2006

Sium is apparently readily grazed by stock (J. O. Mountford in Stewart *et al.*, 1994). Though there were only a few instances of direct evidence of this at the Ouse Washes, there was a strong relationship between the plant's distribution and situations protected from grazing such as willow-beds and reedbeds separated from washes or banks by a flooded ditch. This was evident along the

edge of the willow-bed that extends for 15 km along the base of the Middle Level Barrier Bank beside the River Delph between Welches Dam and the Welney road, the willow-bed beside the River Ouse opposite Earith, and the reedbed on the north-west side of Pymore Viaduct. All but two of 84 *Sium* sites fully recorded in 2006 were ungrazed that year and many of them for longer. This feature had been noted in previous years.

A certain amount of trampling and grazing or mowing of surrounding vegetation may be beneficial for germination and seedling establishment. The distribution of young plants on mud exposed by summer draw-down in water level was apparent along the margins of pools on the south-west side of Pymore Viaduct. Furthermore, in 2006 there were many young plants along lightly mown tracks in the wildfowlers' washes between the viaduct and the Norfolk border.

Young plants in their first year or two appear not to flower. Flowering of mature ones is associated with open, unshaded sites, but may vary in frequency from year to year. In 2001 virtually all the 1474 mature plants were recorded as flowering. In 2006 only 23% of about 870 mature plants were in flower. Leaves with linear lobes – like those in Carrot (*Daucus*) – are supposed to be restricted to submerged plants in spring. However, some terrestrial plants, particularly those in shade, showed this feature in July and August.

In the 2006 survey the associated plant species were recorded at 84 sites (Table 4). The total number of associated species was 36 plus three hybrid

Species	**Sites (n = 84)**
Glyceria maxima	54 (64%)
Phalaris arundinacea	31 (37%)
Mentha aquatica	24 (29%)
Lythrum salicaria	22 (26%)
Salix fragilis	17 (20%)
Agrostis stolonifera	16 (19%)
Carex acuta	13 (15%)
Calystegia sepium	10 (12%)
Salix viminalis	10 (12%)
Iris pseudacorus	9 (11%)
Alisma plantago-aquatica	8 (10%)
Typha latifolia	6
Carex riparia	4
Myosotis scorpioides	4
Persicaria amphibia	4
Solanum dulcamara	4
Sparganium erectum	4
Stachys palustris	4
Thalictrum flavum	4

In addition 17 other species and 3 hybrid willows were recorded at 1–3 sites.

Total: 36 spp. + 3 hybrid willows. Willows present at 39 (46%) sites.

Table 4 Vascular plant species associated with *Sium latifolium* at the Ouse Washes, 2006

willows. The most frequent four species were Reed Sweet-grass (*Glyceria maxima*) (64% of the 84 sites), Reed Canary-grass (*Phalaris arundinacea*) (37%), Water Mint (*Mentha aquatica*) (29%) and Purple-loosestrife (*Lythrum salicaria*) (26%). Willows (*Salix* spp.) of five species plus hybrids were present at 46% of sites.

In terms of the National Vegetation Classification (NVC) the predominant community in which *Sium* was growing at the Ouse Washes in 2006 was **S5** *Glyceria maxima* swamp (44 of the 84 sites – 52%). This was followed by **S28** *Phalaris arundinacea* tall-herb fen (13 sites – 15%). A community of large sedges in which *Sium* occurred at 10 sites was probably best classified as **S6** *Carex riparia* swamp (Rodwell, 1995), though at seven of these sites the dominant sedge was *C. acuta*. In the shade of willow-beds *Salix* spp. featured almost to the exclusion of other plants. This community was represented at nine sites (Table 5).

NVC community		**Sites (n = 84)**
S5	*Glyceria maxima* swamp	44 (52%)
S28	*Phalaris arundinacea* tall-herb fen	13 (15%)
S6	*Carex riparia* swamp	10 (12%)
	Salix beds	9 (11%)
S4	*Phragmites australis–Urtica dioica* tall-herb fen	2
S12	*Typha latifolia* swamp	2
S10	*Equisetum fluviatile* swamp	1
	Undetermined	3

Table 5 NVC communities associated with *Sium latifolium* at the Ouse Washes, 2006

Substrate associated with *Sium*

The soils over most of the Ouse Washes between Earith and Welches Dam and the upper parts of the washes downstream to the Welney road are gleys derived from clayey riverine alluvium. The lower parts of the washes (nearest the River Delph) from Welches Dam to the Welney road are organic soils derived from humified peat. The distribution of *Sium* is largely associated with the peat, though there are some exceptions such as one willow-bed near the Old Bedford River near Fortreys Hill and much of the Pymore Viaduct population.

Population trends in *Sium* at the Ouse Washes

Though survey cover has not been consistent between years, there are indications that *Sium* has spread and increased since the early 1990s. It has spread downstream from the long-known population on either side of the Pymore Viaduct. An increase was particularly marked after wet springs that resulted in extensive and prolonged summer flooding such as occurred in 1983, 1986, 1992 and 2004. Flowering Rush (*Butomus umbellatus*) is another plant that has benefited from spring/summer flooding; this enabled both species to spread temporarily away from the ditches into wet washes.

There is also evidence of *Sium* disappearing from sites. In 2006 it was no longer present in washland ditches between Earith and Sutton Gault where it had been recorded in 2001 and 2002; the washes in question have been intensively

grazed in recent years. *Sium* also appears to have been lost from some sites upstream of the Welney road after excavation and clearing out of ditches.

The Ouse Washes population is probably one of the largest in Britain.

Acknowledgments

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The Hoverflies (Syrphidae) of Fowlmere Nature Reserve

Peter Herkenrath

Hoverflies (Syrphidae) are among the better-studied insects. An excellent guide (Stubbs & Falk, 2002) and a provisional distribution atlas (Ball & Morris, 2000) cover all British species, with the final version of the atlas being prepared by the Dipterists Forum. There is also a very useful website, which, among other aspects, shows updated distribution maps for all British species (www.hoverfly.org.uk). Hoverflies had not been studied systematically at Fowlmere Nature Reserve and thus the author undertook a survey over the four years 2004–2007. This paper describes the hoverfly fauna of this attractive reserve in the south of the county, as found during this survey, with the addition of a few other records that have come to my attention.

Fowlmere Nature Reserve lies in the south of Cambridgeshire, between the villages of Fowlmere and Melbourn (TL4045). It is an area of fen, isolated within the surrounding arable farmland, of 100 acres (40 ha), and comprises a mosaic of reeds, pools fed by spring water, a stream, hawthorn and other scrub, deciduous woodland and areas of open chalk grassland. The reserve has been managed by the Royal Society for the Protection of Birds (RSPB) since 1978, and was notified under Section 28 of the Wildlife and Countryside Act 1981 as Fowlmere Watercress Beds Site of Special Scientific Interest in 1982.

The reserve was visited 54 times in four years (15 times in 2004, 17 in 2005, 13 in 2006 and nine in 2007). The monthly distribution of visits was as follows: one visit in March, nine visits in April, seven in May, nine in June, 11 in July, nine in August, six in September and two in October. A total of 165 hours was spent in the field, which makes an average of 3.1 hours per visit. John O'Sullivan helped record hoverflies on several dates. In addition, a search for hoverfly larvae in rot-holes was made on 1st February 2006 with S. Damant, D. Radford and M. Telfer.

At each visit, hoverflies were searched for in various habitats on the reserve, probably with a bias towards areas with flowering plants, which tend to attract more hoverflies. Other areas may have been under-recorded. Flies were identified either *in situ*, or were trapped with a net or jar and subsequently identified with the aid of an 8x hand lens and released. When identification in the field was not possible, the flies were collected and identified later with the aid of a stereo microscope. The resulting collection is with the author.

Further records of hoverflies at Fowlmere have been supplied by Andrew Halstead, who visited the reserve several times in 1988, and Alan Stubbs (a visit on 16th August 2007). In addition, the results of a survey of *Callicera spinolae* in 2001 (Plant, 2001) are included here.

The hoverfly list

The following alphabetical list provides details of all hoverfly species recorded, with remarks on distribution, habitat, identification and taxonomy taken from Stubbs & Falk (2002) and Ball & Morris (2000). Sixty-six species of

hoverfly have been recorded at Fowlmere Nature Reserve (with the species pairs *Melangyna compositarum/labiatarum* and *Pipiza fenestrata/noctiluca* as well as *Platycheirus scutatus sensu lato* counted as one species each, see below). Apart from several 1988 records and the 2001 records of *Callicera spinolae*, all records come from the four years 2004 to 2007. All observations by PH, or PH and John O'Sullivan, unless otherwise stated.

Anasimyia interpuncta: A male on Field Maple (*Acer campestre)* on 2.5.2004 is the only record. This rare species has its core British range in East Anglia where it favours open areas with Reed Sweet-grass (*Glyceria maxima*).

Baccha elongata: One on Hogweed (*Heracleum sphondylium*) on 24.7.2004 is surprisingly the only record of this rather common woodland species from this survey, but Alan Stubbs also recorded it on 16.8.2007. Otherwise probably overlooked.

Callicera spinolae: This is a very rare species, only known from a few localities in eastern England, including Cambridgeshire (*e.g.* Damant, 2005); it is the subject of a Biodiversity Action Plan (BAP). It develops in the rot-holes of deciduous trees and the adults are found feeding on Ivy (*Hedera helix*) flowers in autumn. A probable was found on 3.10.2001 and a definite male on 9.10.2001 by C. Plant (Plant, 2001). Extensive searches for the species were undertaken in the autumns of 2004-2006, to no avail. A search for larvae in rot-holes on 1.2.2006 did not reveal any signs of the species.

Cheilosia bergenstammi: Three records: A female on 29.5.2005 on Buttercup (*Ranunculus* sp.), and on 25.8.2007 a male on Wild Carrot (*Daucus carota*) and a female on Angelica (*Angelica sylvestris*).

Cheilosia illustrata: Two records: A male on 12.7.2005 and a female on 23.7.2005, both on umbellifers.

Cheilosia impressa: Recorded in good numbers between late May and late August in every year, mostly on umbellifer flowers but also on Hemp Agrimony (*Eupatorium cannabinum*).

Cheilosia pagana: A male on 24.7.2004 on umbellifers is the only record.

Cheilosia proxima: Recorded between late May and mid August in every year, on Hogweed, Cow Parsley (*Anthriscus sylvestris*) and Wild Carrot.

Cheilosia soror: Recorded by Alan Stubbs on 16.8.2007; also a male on 25.8.2007 on Wild Carrot. This is a scarce species of chalk and limestone areas in southern and eastern England, which has become more frequent in the county in recent years.

Cheilosia variabilis: A male on Cow Parsley and a female on Common Nettle (*Urtica dioica*) on 29.5.2005 are the only records of this woodland species.

Cheilosia vernalis: A male and female on Cow Parsley on 2.5.2004.

Chrysogaster solstitialis: Recorded in small numbers between late June and late August in every year, mostly on umbellifers.

Chrysotoxum verralli: A female on 5.8.2006 on an umbellifer and a male on 23.6.2007 on Bramble (*Rubus* sp) are the only records of this species, which has a localised distribution mainly in southern England.

Dasysyrphus albostriatus: Recorded by A. Halstead on 26.8.1988. In 2004, an individual on 24th July on Burdock (*Arctium* sp.) and a male on 7th August on an umbellifer.

Epistrophe eligans: Several records of this spring species in May 2004 and May 2006, *inter alia* on Cow Parsley and Field Maple.

Episyrphus balteatus: Probably the most common species, recorded in all years, between early May and late September, with a peak in June/July/August. Between mid July and mid

August 2004, it was particularly abundant, occurring in its thousands. Recorded on a variety of plants, most numerous on Bramble. Often seen hovering.

Eristalis arbustorum: A total of five records between late April and late August, recorded in all years except for 2006, on Hawthorn (*Crataegus* sp.), Hemp Agrimony, Ragwort (*Senecio* sp.) and Dogwood (*Cornus sanguinea*).

Eristalis interruptus: Five records: Found by A. Halstead on 27.8.1988; a male on 2.5.2004 on Hawthorn, a male on 25.6.2006, a male on 9.6.2007 on Dogwood and a female on 4.8.2007 on Bramble.

Eristalis intricarius: Found in small numbers between mid April and mid July in all years, on Bramble, Hawthorn, Thistle and Dogwood.

Eristalis pertinax: A very common species, recorded every year, between late March and mid October, peaking from June to August. Found on a variety of plants, in particular on flowers of Bramble, Hemp Agrimony and Ivy. Often seen in territorial hovering.

Eristalis tenax: Another common species in every year, particularly common in 2005. Recorded between early April and mid October. Similarly to the previous species, peaking between June and August, and favouring flowering Bramble, Hemp Agrimony and Ivy. Often seen in territorial hovering.

Eupeodes corollae: Several records between late May and early August in all years except for 2007; found on Bramble, Burdock, Buttercup, Thistle and Hemp Agrimony.

Eupeodes luniger: Similarly to the previous species, missing in 2007, but several records in all other years; between late April and late September. Found on Bramble, Hemp Agrimony, umbellifers, Ivy and Field Maple.

Helophilus hybridus: This wetland species was recorded by A. Halstead on 27.8.1988.

Helophilus pendulus: Several records between early May and late September; recorded in every year, on a variety of plants.

Leucozona lucorum: Four records: Recorded on 2.5.1988 by A. Halstead, then on 2.5.2004 on Cow Parsley, 5.6.2004 in grass and on 30.4.2005 on Ground Ivy (*Glechoma hederacea*).

Melangyna compositarum/labiatarum: A male on 29.8.2005 on Hogweed. *M. compositarum* and *M. labiatarum* are very difficult to tell apart (Ball & Morris, 2000; Stubbs & Falk, 2002).

Melangyna lasiophthalma: Single females on 24.7.2004 and 7.8.2004 (on an umbellifer) are the only records, remarkably late for this rather early spring species of woods.

Melanogaster hirtella: One record of this wetland species: On 29.5.2005 a female on Common Nettle.

Melanostoma mellinum: Recorded between mid May and late August in each year except for 2006, with several flies on Bramble, and singles on Buttercup, Hemp Agrimony and Wild Carrot. Also seen hovering.

Melanostoma scalare: A common species, recorded between late April and mid October in each year, with most of the records in May, July and August. Found on a range of plants, with a preference for Bramble and also Common Nettle.

Meligramma guttatum: A female on 25.8.2007 on Angelica. A scarce species of wet woodland, this appears to be the first more recent record for Cambridgeshire, with the last record apparently dating back to 1959 (I. Perry *in litt.*; www.hoverfly.org.uk).

Meligramma trianguliferum: A female on 11.9.2004 on Privet (*Ligustrum vulgare*) is the only record of this scarce species of woods and scrub, which has a southern distribution in Britain.

Meliscaeva auricollis: Just five records of four males and a female between 10 June and 5 August, in 2004, 2005 and 2006. Found on Bramble and Hemp Agrimony; also seen hovering.

Myathropa florea: Found several times between mid June and late September in each year, on Hogweed, Hemp Agrimony, Dogwood, Bramble, Ivy and Angelica. In addition, a search for hoverfly larvae in rot-holes on 1.2.2006 produced four larvae in rot-holes of ash trees.

Neoascia geniculata: A. Halstead reported this species on 1.5.1988.

Neoascia meticulosa: A male on 2.5.2004 on Dandelion (*Taraxacum* sp.) is the only record of this wetland species.

Neoascia podagrica: Four records: On 30.4.2005 on Ground Ivy, on 21.7.2007 on Bramble, and on 25.8.2007 on Thistle, all records relating to females. In addition, a record by Alan Stubbs on 16.8.2007. This is a common and widespread species and has probably been overlooked.

Neoascia tenur: Recorded between early May and mid August in every year, particularly common on 29.5.2005. Most individuals were females. This wetland species was found on a variety of plants, in particular Common Nettle and Bramble.

Parhelophilus frutetorum: A female on Bramble on 24.7.2004 is the only record. This is a species of fen and wet woodland, with a southeastern distribution in Britain.

Parhelophilus versicolor: On 18.6.2006, a female was found visiting Common Nettle and Common Cleavers (*Galium aparine*). A species of wetlands in southern Britain.

Pipiza austriaca: A female on 26.6.2005 is the only record of this species of woodland margins.

Pipiza fenestrata/noctiluca: A male on 29.5.2005 on nettle. *P.fenestrata* and *P. noctiluca* form a species complex with *P. bimaculata* and *P. lugubris* and are hard to tell from each other.

Platycheirus albimanus: Recorded between mid April and late September in all years in good numbers (although only one record in 2006), the majority of records fairly evenly spread between May and August. Found on several different plants. This is a very common and widespread species.

Platycheirus angustatus: This rather common species of fen and grassland was found six times in 2004 to 2006, between 2 May and 25 August, with three records in May and two in August.

Platycheirus clypeatus: A male on 5.8.2006 in a meadow is the only record of this species of predominantly wet grassland.

Platycheirus fulviventris: A. Halstead found this species on 1.6.1988. In addition, on 29.5.2005, a female of this uncommon species of wetlands was recorded.

Platycheirus manicatus: A male of this grassland species was found on Ground Ivy on 12.5.2006.

Platycheirus occultus: A male on 25.8.2007 was found on Wild Carrot. In eastern England, this species occurs mainly in calcareous fens.

Platycheirus peltatus: Recorded annually in small numbers, between late April and late August. Most records are from July and August, a few from April and May. Found on Bramble, Hawthorn, Ragwort and Hemp Agrimony. The species is common and widespread in a variety of habitats.

Platycheirus scutatus sensu lato: Several records between late May and mid October, in 2004, 2005 and 2007, on a variety of plants. According to current understanding, *P. scutatus sensu stricto* is much more common than its sister taxon *P. splendidus*.

Riponnensia splendens: This species of wet habitats was recorded in small numbers between mid June and late August in every year. It was found on Bramble, Cow Parsley and Privet. Also recorded by A. Halstead on 27.8.1988.

Scaeva pyrastri: Single individuals were recorded on 24.7.2004, 23 July and 6.8.2005, and ten flies were found on 5.8.2006 of which nine were on Hemp Agrimony. No record in 2007. This species is believed to migrate to Britain from the continent in summer and breeds here.

Sphaerophoria scripta: Commonly recorded between late April and mid September in every year, in particular in July and August. It was found on a number of plants, most often on Bramble and Hemp Agrimony. This species is common and widespread, but currently only males can be safely identified.

Syritta pipiens: Recorded between mid May and mid September in all years, with the vast majority of records from July and August, and at that time one of the most common species. Found on a number of plants, with a preference for Bramble, Hemp Agrimony and Ox-eye Daisy (*Leucanthemum vulgare*). A very common species of British lowlands.

Syrphus ribesii: Another common species, recorded between late April and late September in every year, with most of the records from May to August. Many individuals were hovering, others were found on Bramble, Common Nettle and several other plants. One of the commonest hoverflies of Britain.

Syrphus torvus: Only recorded on 17.4.2006 on catkins and on 5.8.2006 on Hemp Agrimony; both individuals were females. As this species is easily confused with the more common *S. ribesii* and *S. vitripennis*, it is likely to have been overlooked. It has a slight preference for woodland.

Syrphus vitripennis: Recorded in good numbers between late April and mid September in every year, although rather scarce in 2007. Most of the records come from July and August, with Bramble being preferred, among a variety of other plants. Several males were found hovering. Current knowledge does not allow the distinction of male *vitripennis* from male *S. rectus*, which has been identified in Britain, although the status of European *S. rectus* is still uncertain. As no female *rectus* has so far been found at Fowlmere, the records of males are subsumed here under *vitripennis*.

Tropidia scita: This species of fens and other wetlands is fairly common at the reserve, recorded between mid May and late July in every year, and also in June 1988 by A. Halstead. Recorded on a variety of plants, but mostly Bramble.

Volucella bombylans: A male and female on 26.6.2005, a male on 25.6.2006 and a male on 23.6.2007 are the only records of this bumblebee-mimic.

Volucella inanis: In 2004, single females were recorded on 28 July and 7 August; in 2005 a female on 12 July and two males on 23 July; in 2006 seven (of which three males and three females were identified) on 5 August, and two females on 27 August, with no record in 2007. The majority was found on Hemp Agrimony and Bramble. This species has been spreading in recent years from its core British range in the southeast of England. (See Plate 2, inside front cover)

Volucella pellucens: This is the most common species of this attractive genus at the reserve, with several individuals found between mid June and early August in every year. More records in 2005 than in any other year. Preferred plants were Bramble, Hogweed and Hemp Agrimony.

Volucella zonaria: Like *V. inanis*, this large and attractive species is currently extending its British range from the English southeast. Single females were found on Bramble on 2 and 23.7.2005 and 16.7.2006, with another rather late female on 17.9.2006 on Ivy.

Xanthogramma citrofasciatum: A male was found on 30.4.2005, a female on 15.5.2005, and a male on 6.5.2006, all in meadows. This is a scarce species of grassland.

Xanthogramma pedissequum: Four records: Single females were found on 7.8.2004 on Bramble, on 5.8.2006 on an umbellifer and on 27.8.2006 on Hogweed, and a male on

21.7.2007 in grass. This is generally a more common species than *X. citrofasciatum*, occurring in grassland and open woodland.

Xylota segnis: A female was recorded on Bramble on 24.7.2004, two males on Bramble on 21.7.2007, a male on an umbellifer on 4.8.2007 and another male on Ivy on 30.9.2007. The lack of records in 2005 and 2006 is easily explained by the difficulties in catching these flies, which tend to move fast among vegetation, hence the exact identity of several individuals, at least the majority of which are likely to have been this species, is not certain.

Discussion

How does the hoverfly fauna of Fowlmere, with 66 species recorded, compare to that of another wetland reserve in Cambridgeshire, Wicken Fen? The Checklist of the Wicken Fen Flora and Fauna (Friday & Harley, 2000) lists 114 species of hoverflies. The list does not include the following species that were found at Fowlmere: *Callicera spinolae*, *Cheilosia soror*, *Meligramma guttatum*, *M. trianguliferum*, *Volucella inanis* and *V. zonaria*. The last two species have expanded their range in recent years and thus were unlikely to have been recorded at Wicken before 2000. The Wicken list is based on many more years of hoverfly studies than the Fowlmere list, so it comes as no surprise that the latter list is much smaller. It is likely that at Fowlmere several species have been overlooked and would be found with more extensive surveys over a longer period. In addition, Wicken Fen is much bigger than Fowlmere and has a much more diverse flora. Nevertheless, there might be other reasons to explain why fewer species have been found at Fowlmere. Maybe the isolation of the fen at Fowlmere, being surrounded by arable farmland and villages with no comparable habitats near-by, is also a factor. Colonisation by species not occurring at Fowlmere might be more difficult, as might re-colonisation by species that have become locally extinct. Another important factor is that Fowlmere has been constantly exploited by man for many centuries. The site seems to have been first documented in the Domesday Survey of 1085-86 under the name of Fuglemaere, indicating that it was notable for wildfowl. Thereafter, the moor (as it was known) was very important to the local villagers, who by common right could pasture cattle, cut sedge and reeds, and gather dung and clay. These common rights were removed under the Enclosures Act of 1845, and attempts were made to drain the moor a few years later with only limited success. Watercress was grown in several parts of the site from about 1890 until about 1960, but the total area was relatively small. Larger areas were burnt until the mid 1970s to keep the fen vegetation in check (Price, 1994). The effect of these activities over many centuries is likely to have reduced the diversity of most groups of animals, including hoverflies.

The hoverfly list nevertheless reflects the rich variety of habitats at Fowlmere Nature Reserve, with flies typical of wetlands, woodlands and grasslands all represented. As to feeding plants, the flowers of Bramble and Hemp Agrimony in summer attract particularly large numbers of species and individuals. In addition, the flowers of various species of umbellifer, such as Hogweed, Cow Parsley and Wild Carrot, and of Ivy in September and October, provide significant food sources for hoverflies. A reserve management keeping the diversity of habitats and favouring the above-mentioned plants, as well as

specific features for hoverflies such as rot-holes in trees, is to be encouraged in order to further support the fauna of hoverflies and many other invertebrates.

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A sturgeon in the undergrowth

Paul T. Harding and Neil Kenny

On 25th September 2006, one of us (NK) found a dead vertebrate hanging among shrubs that he was clearing in a garden at Headlands, Fenstanton (TL3268). Rapidly dismissing other possibilities, it was obvious that it was some type of sturgeon. As one does not normally find sturgeons in bushes in Cambridgeshire gardens, NK sought the advice of PTH, a neighbour.

Our initial identification of the almost complete, but totally desiccated specimen was as the Stellate or Starry Sturgeon (*Acipenser stellatus* Pallas) [Plate 3, inside back cover]. It was only about 30 cm long and therefore

presumably immature; according to Maitland (2000) the species can grow to 1.5 m in length. The same identification was also suggested by Henry Arnold (pers. comm.). Eventually, our tentative identification was confirmed by the ichthyologist Eric Hilton through the good offices of Oliver Crimmen, Fish Curator at the Natural History Museum, London (pers. comm.).

The Stellate Sturgeon is a globally endangered species that is native to Eastern Europe and Western Russia, breeding in the river systems that flow into the Black Sea and Caspian Sea. In these seas and less commonly in the Aegean Sea, adults can live up to 35 years, and from the age of about 10 years they migrate into rivers to spawn. The Stellate Sturgeon is one of the smallest sturgeons that were fished commercially in the rivers of the Black and Caspian Seas and which are now farmed for caviar production and for their flesh. The Common Sturgeon (*Acipenser sturio* L.), which can grow up to 3 m long and weigh over 200 kg, is the only sturgeon ever to have been caught in British waters. It is very rare and only 179 incidental captures were recorded between 1980 and 1994 (Davies *et al.* 2004).

A smaller, related species, the Sterlet (*Acipenser ruthenus* L.), is quite commonly encountered in aquarist collections, and is sold commercially in the UK. Young Stellate Sturgeon are now also sold commercially to aquarists. In common with all other sturgeons, Stellate Sturgeon is included as a *Species covered by the Prohibition of Keeping or Release of Live Fish (Specified Species) (Amendment) (England) and (Wales) Orders 2003*, which means that they cannot be sold or transferred without a licence from Defra (for more information see www.defra.gov.uk/fish/freshwater/nonnative.htm).

We can only guess that this sturgeon was taken from a garden pond or aquarist's tank by a bird, such a heron or gull, and dropped accidentally.

Although it has been customary, since the time of Edward II, to offer any sturgeon from British waters to the reigning monarch, we considered that this desiccated specimen would have been of little use to Her Majesty. However, it has been donated to the Natural History Museum in London, at their request.

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Cambridgeshire and Peterborough Otter Survey 2007

Ruth Hawksley

The Wildlife Trust and the Cambridgeshire Mammal Group completed a county-wide Otter survey between the beginning of December 2006 and the end of March 2007. This was a repeat of surveys undertaken in 1992, 1997 and

2002. A total of 289 sites was visited and surveyed using the same methodology as in previous years, using bridge checks and walking adjacent riverbanks. The survey showed an increase in Otter signs from 16% of sites surveyed in 2002 to 26% of sites surveyed in 2007.

The greatest increase in Otter signs was in the north of the fens, on the old course of the River Nene, the North Level Main Drain and the Twenty Foot River. From a single site in 2002, there were thirteen sites in this area in 2007 showing signs of use by Otters. Overall, there were increases in each catchment, with new sites on the Alconbury and Ellington brooks, Carr Dyke, Soham Lode and the River Stour near Kirtling, south of Newmarket. There were decreases in signs of activity on the Maxey Cut and River Kym, which may have been due to high water at the time of survey. These are priority areas for further survey, to discover whether the population is still present.

Introduction

The first county-wide survey of Otters took place in Cambridgeshire in 1992. This confirmed that the known local decline of Otters had not reversed. The only evidence of Otter activity was along a short stretch of the River Cam near Cambridge. Ongoing monitoring work carried out by the Cambridge Green Belt Project and Wildlife Trust volunteers in 1993 and 1994 continued to find evidence of activity upstream of Cambridge and extended the known range of Otters in the area. During 1995, four captive-bred Otters were released at a site on the Ouse Washes by the Otter Trust. Similar releases took place on the River Great Ouse in Bedfordshire in 1995 and in Northamptonshire on the River Nene in 1994 and 1995.

The county-wide survey was repeated in 1997 and an increase in Otter signs observed. New positive signs on the Ouse Washes and the River Great Ouse and its tributaries near the Bedfordshire border can be attributed to the 1995 releases. Other positive signs in the east of the county may have been due to earlier releases in Norfolk and Suffolk. Positive signs were also found on the Nene and Welland to the west of Peterborough. A repeat survey in 2002 showed yet another increase in signs of Otter activity. This increase was predominantly on the River Great Ouse from its confluence with the Cam to the county boundary with Norfolk, including the rivers Little Ouse, Lark and Soham Lode. A small increase was also noted on the River Cam downstream of Cambridge and in the north of the county on the rivers Nene and Welland.

There have been no major changes to riparian habitat or land use since the last survey, but much of the county lies in a government Growth Area. A significant amount of new housing has been built over the last five years and more is planned, especially in South Cambridgeshire and Peterborough. This is likely to increase pressure on riverine habitats, especially near towns. The new Environmental Stewardship Scheme encourages farmers to manage land to benefit wildlife, and may lead to positive changes in future. There have been no major changes to water quality since the last survey, although Environment Agency data indicate that quality was particularly good in 2002 with a slight decline since then (data are available to 2006). This decline was measured as an

increase in the length of river classified “marginal” or “significant failure”. The biological quality did not vary much but chemical quality seems to have declined slightly between 2002 and 2005. Nitrate and phosphate grades improved slightly in those stretches that already had low concentrations but remained unchanged elsewhere. It has not been possible to relate the survey data directly to the Otter population, but it is assumed that an increase in the number and range of spraints found corresponds to an increase in the number and range of Otters present.

Methodology

The survey method of the previous surveys (1992, 1997 and 2002) was repeated. All 285 bridge sites surveyed in 2002 were resurveyed in 2007, with the exception of site 285. Site 285 had positive signs of Otter in 2002 but was removed from the survey as it is not near a public right of way, and we did not have the landowner’s permission to survey. Five sites were added to the survey in 2007. At each site, the bridge was checked as thoroughly as possible. Where possible, up to 600m of bank was also walked, usually 300m on either side of the bridge, concentrating on likely sprainting sites or wet mud where prints might be found. Any other bridges or possible spraint sites within 300m were checked. In addition to Otter signs, evidence of Water Vole, Mink and Brown Rat was also recorded, although no extra effort was made to look for it. Because the survey stopped if spraint was found, the data for the other species cannot be considered a complete survey.

The survey was carried out between the beginning of December 2006 and the end of March 2007. Due to high rainfall and high water levels, most surveys were postponed until late February or March.

Results

A total of 289 sites was visited and survey forms filled in. Site 290 was visited at the same time as 216. Incomplete results were recorded for 290 on the 216 survey form. A summary of results is shown in the table below:

	2007		**2002**		**1997**		**1992**	
	sites	**%**	sites	**%**	sites	**%**	sites	**%**
Otter	76	26.3	47	16.5	35	12.4	3	1.1
Mink	18	6.2	47	16.5	37	13.2	57	20.4
Water vole	13	4.5	14	4.9	0	0	9	3.2
Brown rat	72	24.9	-	-	-	-	-	-
Total sites	289		285		281		279	

Other species coinciding with Otter:
Mink: 18 positive sites of which 5 (i.e. 28%) were also positive for Otter
Water vole: 13 positive sites of which 3 (i.e. 23%) were also positive for Otter
Brown rat: 72 positive sites of which 14 (i.e. 19%) were also positive for Otter

Discussion

Otter signs

The proportion of sites with positive signs for Otter in 2007 was 26%, considerably higher than the 16% in 2002, which in turn was higher than the 12% in 1997 and 1.4% in 1992. This increase was despite the high water and seems to indicate a significantly increased Otter population in the county, or at least Otter territories covering a larger area.

Mink signs

The number of sites with Mink signs has decreased dramatically, from 20% in 1992 to 6% in 2007. This may be due to a decrease in mink numbers, but there are other factors that need to be taken into consideration. Firstly, as spraint was found under more bridges, these bridges may not have been searched so thoroughly and signs of Mink may have been missed. Secondly, the 2007 survey used a greater number of surveyors, some of whom may not have been confident at identifying Mink scat. It is not easy to say what effect these factors have had on the results. If a clearer picture of how Mink populations are changing is desired, a specific survey should be carried out for Mink and repeated after a number of years.

Effect of survey conditions

Some bridges that normally have spraint were reported negative in the survey, and it is possible that the results would have been even higher had conditions been better. However, the fact that 25% of bridges surveyed following heavy rain showed signs of Otter use, as did 37% of those where high water was reported (compared to 26% overall) indicates that the effect may not have been significant. Generally, surveyors who visited sites when conditions were not ideal did not survey those sites where obvious spraint sites were recently inundated. An exception may be the downstream part of the Ouse Washes, which was underwater for much of the survey period. A discussion by river and catchment follows:

River Cam and tributaries

Upstream of Cambridge, the rivers Cam, Rhee and Granta showed regular signs of Otter. There were sixteen positive signs, compared with fifteen in 1997 and fourteen in 2002, showing that the Otter population in these areas is relatively stable, although the positive signs were not always in the same place as in previous years. New sites were found this year in Little Abington, Barton, Melbourn, Meldreth, Haslingfield and Guilden Morden. It is thought that these rivers provide the best Otter habitat in the county, as the adjacent land has little public access, the river channel is not greatly modified and the farming is more mixed, leaving good riparian cover. Signs downstream of Cambridge have been less frequent in all four of the surveys. In 1997 and 2002 there were signs of Otter presence between Cambridge and Waterbeach and then nothing downstream of Waterbeach until the A1123 bridge near Wicken. In 2007 the

positive signs were downstream of Waterbeach and at Upware, with spraint found at the A1123 bridge in both 2002 and 2007. This section of the Cam has greater public access and has less suitable habitat for Otters. Although there is very good Otter habitat at Wicken Fen, there was no sign of Otter here or on the nearby New River. Otters are known to have used Wicken Fen in the past five years, although the person who was checking for spraint has now left and there are no very recent records. A new record of Otter spraint was found at the nearby Adventurer's Fen.

River Great Ouse (Cam confluence to Norfolk border)

This is the main area where the 2002 survey found a significant increase in Otter activity. Spraint was found at most of these sites in 2007, plus new sites on the River Lark and Soham Lode. There were considerably more sites showing positive Otter signs than negative in this area. The 2002 increase may be attributed to Otter releases in Norfolk and Suffolk in the 1980s and 1990s as well as Ouse Washes releases around the same time. It seems clear though that the population is now established and self-sustaining.

Ouse Washes

A good number of signs were found in 1997 along the Ouse Washes, but very few in 2002. The 2002 survey found signs on the side drains. This year there were a good number of positive sites between Earith and Mepal, but there were no signs downstream between Mepal and the Norfolk border. This could be due to the fact that the Ouse Washes was underwater for an unusually long time this year due to high rainfall in January and February. These sites will be checked again at a later date.

River Great Ouse (Bedfordshire border to Cam confluence)

In the St Neots area, there was only one positive site on the River Kym and one on the River Great Ouse near the town. This compares to a single site in 1997 (at Hail Bridge) and a string of three sites along the River Kym in 2002. However, the 2007 results are disappointing as Otters are regularly seen at Paxton Pits and have also been seen in St Neots. A recent survey found plenty of Otter signs along the river through St Neots, and bridges that seem always to have spraint under them did not at the time of survey. The River Kym is an area where it would be worth doing a re-survey in good conditions to check whether the poor result was due to weather. There was no sign of Otter at Offord Cluny (though spraint was found in 1997 and 2002) but a sighting of an Otter was reported from the nearby Buckden Marina, and Anglian Water have found Otter signs at their nearby works. From Brampton to Needingworth there were eight new positive records, with four more on the Alconbury and Ellington Brooks, a huge increase on previous years.

Rivers Nene and Welland

The sites on the Maxey Cut that had had positive records in both the past two surveys were all negative this year. They were surveyed in early February so

sprainting points may have been inundated. It would be worth checking these sites again. However, a well-used sprainting site was found on Carr Dyke for the first time. There was also a good number of positive records from the River Nene upstream of Peterborough, again an area with good riparian habitat cover.

Fenland

Fenland district has seen the largest increase in the number of Otter records in the 2007 survey compared to 2002. There were five positive records from the North Level Main Drain, New Wryde Drain and the North Level Drain (up from one in 2002), and further new records on Whittlesey Dyke, Morton's Leam, the Sixteen Foot Drain and the old course of the River Nene. From a single record west of Wisbech in 2002, there are now eleven records from Fenland district (excluding the Ouse Washes). They are all in the north of the district, but show that Otters are extending their range into Fenland. This is an area that could benefit from habitat improvements. Providing more suitable habitat may be all that is necessary to allow Otters to move further into the fens.

Overall conclusions

Otter activity in Cambridgeshire has continued to increase since 2002, with the latest increase greater than that seen between 1997 and 2002. The apparent success of Otters in the county does not relate to any further releases and instead seems to be due to natural colonisation. Lack of habitat is still an issue in parts of the county, especially over much of the fens. However, the Otter signs along the Ouse and Nene indicate that if the habitat is improved, there is a good chance of Otters moving deeper into fenland areas.

A new British Plume Moth (*Emmelina argoteles*) discovered at Wicken Fen in Cambridgeshire: How you can help to determine its British distribution

Zoë Ringwood, Alan Roscoe and Jeff Higgott

Abstract

The plume moth *Emmelina argoteles* was first recorded in Britain at Wicken Fen in 2005 and confirmed to be breeding at the site in 2006. The requirements of the species are very poorly understood and a research project is in progress that is providing details of the moth's life history and habitat requirements. Due to *argoteles* being almost identical in external characteristics to the closely related and common species *Emmelina monodactyla*, it is possible that it has been overlooked and is in fact more widespread. This paper provides detailed information on how to find *Emmelina* in the field and rear caterpillars through in captivity ready for dissection to confirm the presence of *argoteles*. It encourages readers to become involved in searching for *argoteles* across the wider

landscape to help to further understand the distribution and requirements of this new British species.

Discovery at Wicken Fen

The first British record of the plume moth *Emmelina argoteles* (Meyrick 1922) (Lep.: Pterophoridae) (Plate 4, inside back cover) was taken on 24th June 2005, when Jeff Higgott and Stuart Read took a male specimen at a mercury vapour light at Wicken Fen in Cambridgeshire (Higgott, 2006). Following this, a second male specimen was obtained in the same area of the Fen (Sedge Fen) by Jeff Higgott approximately a year later on 5th July 2006. Catching two specimens from the same area suggested that the species might be breeding at the site. To determine whether this was the case, caterpillars of the genus *Emmelina* were collected in August 2006, reared through and the presence of *argoteles* was confirmed through dissection. It is necessary to dissect specimens as the species' external characters overlap greatly with the closely related and far more widespread species *Emmelina monodactyla*, although *argoteles* tends to be slightly smaller.

What is currently known about *Emmelina argoteles*?

The global distribution of *argoteles* is widespread but very localised, being recorded in Europe from France, Austria, Germany and Hungary, as well as in the Far East from Japan and China (Gielis, 1996). In addition, the species has been recorded twice in Spain (Murria Beltrán, 2006) and once in Majorca (M. R. Honey, pers. comm.). The life history and habitat requirements of the species are very poorly understood. The current knowledge consists of approximate flight periods (April, June, August and September) and larval food plant, Hedge Bindweed (*Calystegia sepium*) though none of this information was recorded from Britain. It is suggested by Gielis (1996) that *argoteles* prefers damp fen or marsh habitats. This is in contrast to *monodactyla*, which occurs in any habitat where its larval food plants are found.

Research into the ecology and conservation of the species

Prior to the start of research, the only information that was available on *Emmelina argoteles* in Britain was that it had been confirmed to be breeding at Wicken Fen. Consequently, there was no detailed understanding of the moth's abundance, habitat requirements, life history or geographical distribution and therefore it was not possible to determine the conservation priority of the species or develop measures that could be taken to benefit the species.

A one-year research project began in April 2007, funded by SITA Trust though the Landfill Communities Fund together with a contribution from the British Entomological and Natural History Society (BENHS). The project is collecting information that will provide an understanding of the moth's requirements in Britain and enable conservation measures to be put in place as necessary. The project encompasses three main areas of research on *argoteles*: habitat requirements, site management and life history. The research is far reaching in its approach, in an aim to acquire as much general information about

this newly discovered British species and its habitat as possible. Dissemination of findings is being conducted through reports, site management recommendations and publications as appropriate. We are also encouraging volunteers to search for *argoteles* across the wider landscape, to help determine whether the distribution of this species is primarily confined to Wicken Fen or if it is found within other areas of suitable habitat.

This paper provides information on how to find caterpillars, eggs and adults of the *Emmelina* genus in the field and details of rearing through to adult for dissection to confirm whether they are *argoteles* or *monodactyla*. It is a practical paper aimed at field naturalists who may like to become involved in searching for *argoteles* across the wider landscape, but also includes details of the life history of the species.

Searching for *Emmelina argoteles*

The most effective way to find *argoteles* is through searching for caterpillars of the *Emmelina* genus, rearing them in captivity and dissecting the resulting adults. The caterpillars are distinctive due to the tapered 'cigar-like' shape of the body, which is generally lime green in colour but may be slightly grey or pinkish. (Plate 5, back cover) The length of the caterpillars ranges from 2 mm to 12 mm (Figure 1).

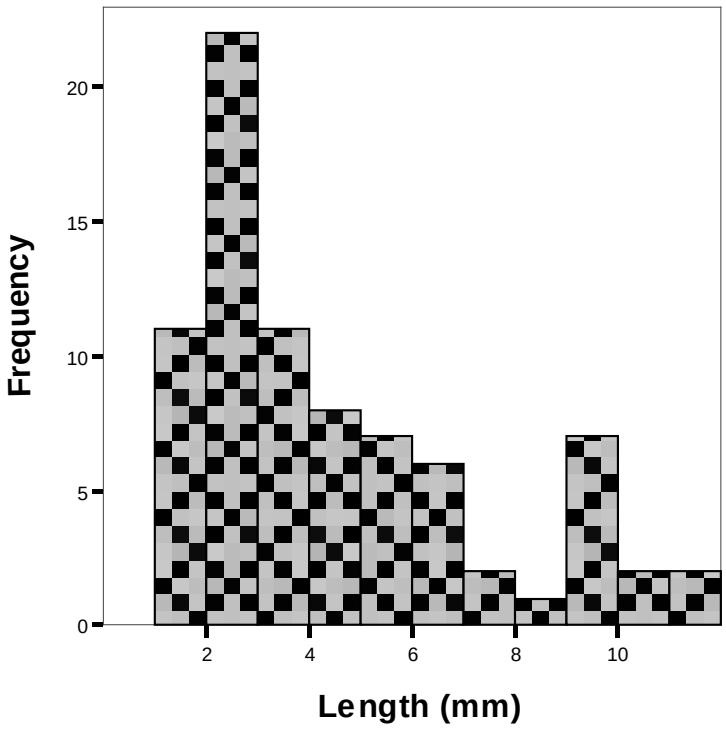

Figure 1. Histogram showing the frequency of *Emmelina* caterpillars recorded at each categorised body length at Wicken Fen in 2007 (n = 79)

The caterpillars tend to be found primarily on the leaves of their food plant, *C. sepium*, although they can also be seen on the stems and flowers.

Observations have shown that smaller caterpillars (< 5 mm in length) tend to be found on the fresh, unopened terminal leaves, whereas larger caterpillars are often located on opened, more mature leaves. The caterpillars can sometimes be located by searching for feeding signs on the leaves of *C. sepium*. The favoured height to find caterpillars is between 600 and 800 mm from the ground, but as illustrated in Figure 2 they can be found at any height between 300 and 1400 mm.

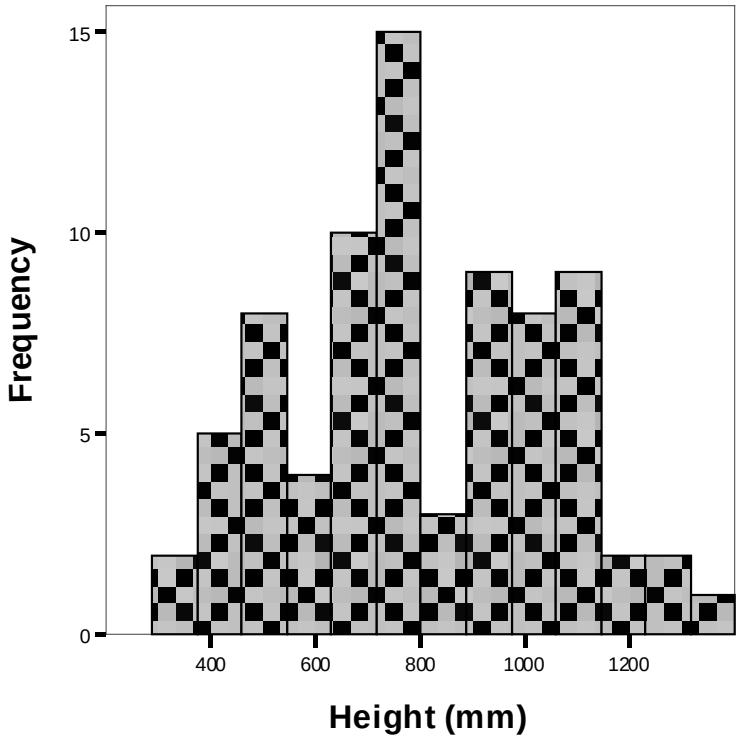

Figure 2. Histogram showing the frequency of *Emmelina* caterpillars recorded at each categorised height from the ground at Wicken Fen in 2007 (n = 79)

Caterpillars were recorded at Wicken Fen in every month surveyed: May, June, July, August and September. There was, however, a great variation in the number collected between months (Figure 3). A trend for a good month for caterpillars, followed by a poor month, can be identified, with May, July and September all being good months. The peak number of caterpillars (35) was recorded and collected in July and the lowest number in August (3). June was also a very poor month with only five *E. argoteles* caterpillars recorded. Consequently, it appears that July is the best month for searching for caterpillars.

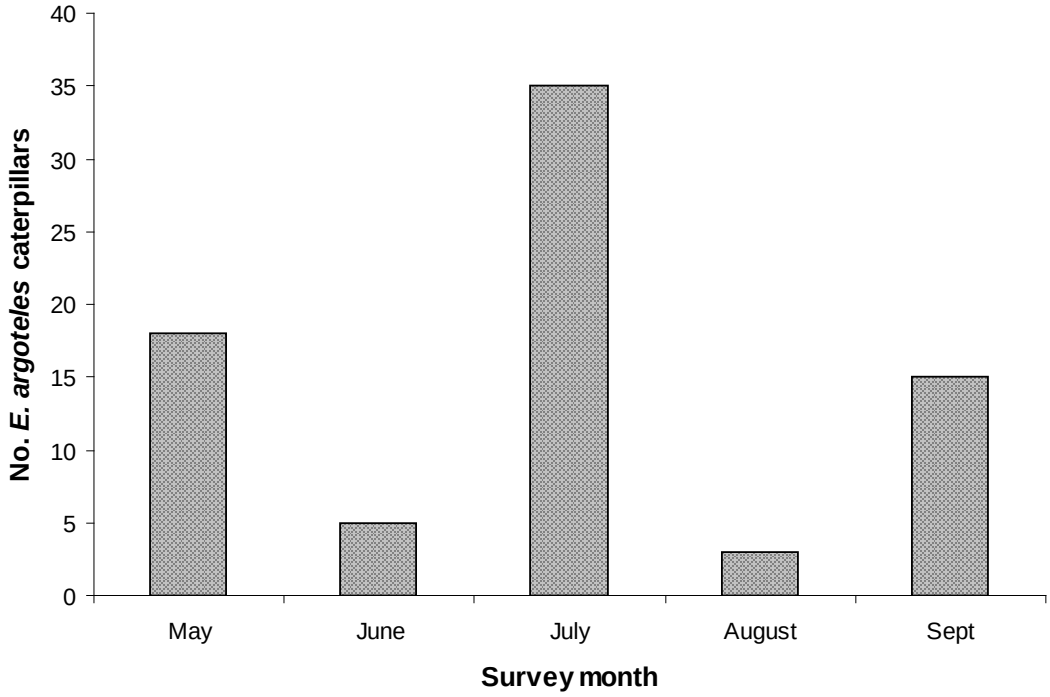

Figure 3. The total number of *Emmelina argoteles* caterpillars collected each month at Wicken Fen in 2007

The eggs of *Emmelina* can also be readily found in the wild. They are laid on the underside of *C. sepium* leaves, either singularly or in clusters of between three and six, and tend to be located close to the veins of the leaf. They appear white/transparent in colour, are oblong in shape and have a diameter approximately 0.5 mm. The leaves supporting eggs tend to be open and relatively large (around 50 to 60 mm in length by 30 to 40 mm in width). Eggs can be found throughout the summer months.

As the adult moth will come to MV light, light-trapping is a method that could be used to record the species. From experience, however, it is suggested that searching for caterpillars is a much more productive method to use. Catching adults at light does have its benefits, as it removes the necessity of rearing through before dissection to confirm species. If light-trapping, it would theoretically be possible to catch *argoteles* anytime between April and October.

To date, *argoteles* has only been recorded within fenland habitat in Britain, primarily where *C. sepium* grows alongside Common Reed (*Phragmites australis*). Although Wicken Fen currently seems to be the main site, *argoteles* has also been recorded at the nearby site of Chippenham Fen: caterpillars were collected, bred through and adults dissected in July 2007 by the authors of this paper and collected again in September by Vince Lea. Because of the almost identical external appearance of *argoteles* and *monodactyla*, it is possible that *argoteles* is more widely distributed and has been overlooked for many years. It is therefore necessary that concerted efforts be made to determine the presence of *argoteles* across the wider landscape, particularly within fen or marsh habitat where *C. sepium* grows. This may involve searching for *Emmelina* spp. using

any of the methods described above and, unless catching adults, will require rearing through to adult prior to dissection.

Rearing *Emmelina* caterpillars through to adult

Emmelina caterpillars are easily reared through to adult in captivity. It is simply necessary to rear them in a container, lined with absorbent paper, along with a supply of fresh *C. sepium* leaves and stems. Fortunately, as *C. sepium* is such a common and widespread plant, a supply is generally readily available across the UK. Ideally, the container should be cleaned of excrement and fresh vegetation provided every two days. To ensure that the *C. sepium* vegetation provided is not contaminated with other *Emmelina* caterpillars, the foliage should be washed in water and the leaves wiped before introducing it to the containers being used for rearing - as mentioned above *monodactyla* is widespread and it is therefore easy to introduce accidentally the species on the *C. sepium* vegetation collected. The caterpillars tend to pupate either on the tissue paper or close to the lid of the container.

The duration of each life cycle stage, as recorded from breeding caterpillars throughout summer 2007, varied considerably between individuals, but the average (median) length for the caterpillar, pupa and adult stage was 9, 10 and 12 days respectively (Table 1). The length of the caterpillar stage recorded in captivity was dependent on the size of the caterpillar when it was collected from the wild. The smallest caterpillars collected were 2 mm in length and these took an average (median) of 12 days to pupate. In contrast, caterpillars that were >9 mm in length when collected took an average (median) of 5 days to pupate. The length of pupation varied considerably (5 to 16 days) between individuals and also between the months that samples were collected. For example, caterpillars collected in July spent an average (median) 8 days as a pupa compared with 14 days for caterpillars collected in September. Similarly, adults that emerged from caterpillars collected during September lived considerably longer (median: 14.5 days) than those resulting from caterpillars collected during July (median: 7 days). Both *argoteles* and *monodactyla* spend the winter months as an adult.

Duration (days)	***Caterpillar**	**Pupa**	**Adult**
Average (Median)	9 days	10 days	12 days
Range (min to max)	3 to 18 days	5 to 16 days	1 to 25 days

*The duration was dependent on the size of the caterpillars when they were collected

Table 1. Information on the duration (no. days) of the caterpillar, pupa and adult life cycle stage when bred in captivity

Due to the relatively short life cycle of *Emmelina* and the fact that rearing the species is very straightforward, rearing caterpillars through to adult is not

arduous and does not require a high level of commitment. It would also be possible to collect eggs and rear these through to adult, but this has not been conducted by the authors of this paper.

How you can become involved

You could help to determine whether *argoteles* is confined to fenland at Wicken and Chippenham Fen or if it is indeed more widespread. This is essential in determining the priority of the species and setting objectives for its conservation. Your searches could be based around the Cambridgeshire area or further afield. Please remember that permission may be required from a site's owner/manager to conduct searches and collect material. If you collect caterpillars and rear them through, Jeff Higgott (see contact details at beginning of this paper) will be able to provide advice regarding dissections. Your searches could result in a new site record for the species and be fundamental in further understanding the distribution and requirements of this new British discovery.

Acknowledgments

The project is being conducted from the Centre for Environment and Rural Affairs (CERA) at Writtle College. Funding is being provided by SITA Trust, through the Landfill Communities Fund, and the British Entomological and Natural History Society (BENHS). We are grateful to Stuart Warrington and staff at Wicken Fen for all of their help and support and to the National Trust for allowing research access to Wicken Fen.

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Phenological Changes in Cambridgeshire

Gemma Hannant and Tim Sparks

Introduction

There has been recent and widespread evidence of changes in the timings of the life-stages of plants and animals, commonly known as phenology. For example, the average change in spring events across Europe was shown to be an advance of 2.5 days per decade (Menzel et al., 2006). Additional evidence of

advancing springs has been reported for North America and Japan, and phenological changes feature strongly in the recent Intergovernmental Panel on Climate Change report covering climate change impacts (IPCC, 2007).

The changes have not however been uniform across different species. Will these changes adversely affect organisms in the future? Problems could occur if organisms are breeding when conditions are no longer optimal, or if other organisms they rely on for food are no longer at their peak abundance around the same time of year.

What then have been the changes closer to home? Some regions of Britain have long and extensive sets of phenology, for example the two century Marsham record from Norfolk (Sparks & Carey, 1995) or the late Richard Fitter's record from Oxfordshire (Fitter & Fitter, 2002). In contrast, phenological records for Cambridgeshire seem to be more rare, or perhaps yet to be unearthed. In this short paper we compare one recently revealed record of phenological events in Cambridgeshire with a nearby record made over a century earlier. Our aim is to discover if the phenology of plants and animals has changed in our own backyard.

Materials and methods

Phenological data

Two sets of phenological data were compared; one from the twentieth century and one from the nineteenth century. The two data sets were recorded at sites within 4km of each other. The most recent data set was abstracted from diaries kept by John Clarke, a farmer and member of the Botanical Society of the British Isles, well known to readers of *Nature in Cambridgeshire*. These data were collected from Swaffham Prior and Burwell, Cambridgeshire (approximately 52.26°N, 0.30°E) between 1966 and 2004. The data contain records of the first occurrence of 568 plant, animal and farming phenology events. Data from 2004 were excluded due to the low number of recordings that year.

The earlier data were phenological observations made by Leonard Jenyns (later Leonard Blomefield) at Swaffham Bulbeck, Cambridgeshire (52.24°N, 0.28°E) and summarised by Darwin (1922). The data were collected between 1820 and 1831 and also between 1845 and 1849. Data were published only as the average date for each phenological event over the recorded years.

The events used in this study were those i) that occurred in both the datasets, ii) for which there were 20 or more years of Clarke data and iii) for which the Jenyns mean date was based on 10 or more years of data. This left a data set which contained a variety of events which occurred throughout the year, comprising the first flowering dates of 31 plants, the first sighting of four butterflies and the first audible or visual signs of nine migrant birds. All dates from both data sets were converted into days after 31st December before analysis.

Analysis

The mean dates from the Clarke data (1966-2003) and the Jenyns data (1820-1831, 1845-1849) were compared for each of the 44 phenophases. A preliminary examination suggested that the early years of the Clarke record were similar to the Jenyns record, but that the recent data would be more different. Consequently we decided to focus on a comparison of the Jenyns mean dates with the earlier (1966-1984) and later years (1985-2003) of the Clarke data separately. This was done using a one sample t-test with the Jenyns mean date as the mean under the null hypothesis. The significance threshold was taken as P=0.05.

Results

Phenological comparison with 1966-1984

For the 44 phenological events examined, 18 occurred on the same date or earlier during the early Clarke period (1966-1984) than during the Jenyns period (Table 1, Figure 1). Of these seven had changed significantly. Of the 26 later events, 13 were significantly later. The mean change across all the species was a delay of 1.3 days. A wide range of changes was observed with Myrobalan Plum first flowering showing the biggest advance (29 days), and Marsh Marigold first flowering showing the biggest delay (29 days). All the changes, and an indication of their significance, are shown in Table 1.

Latin name	Common name	**A** Jenyns	**B** Clarke (1966-1984)	**C** Clarke (1985-2003)	Difference **A-B**	Difference **A-C**
Plants, first flower						
Eranthis hyemalis	Winter Aconite	26-Jan	21-Jan	18-Jan	-5	-8
Galanthus nivalis	Snowdrop	30-Jan	20-Jan	10-Jan	-9	-19
Crocus sp	Crocus	20-Feb	14-Feb	08-Feb	-5	**-12**
Ranunculus ficaria	Lesser Celandine	28-Feb	15-Mar	11-Mar	**16**	**12**
Caltha palustris	Marsh Marigold	05-Mar	03-Apr	07-Apr	**29**	**33**
Viola odorata	Sweet Violet	05-Mar	18-Mar	24-Feb	**14**	-8
Narcissus pseudo-narcissus	Daffodil	12-Mar	06-Mar	27-Feb	-5	**-12**
Prunus persica	Peach	13-Mar	06-Apr	06-Apr	**24**	**24**
Tussilaga farfara	Coltsfoot	14-Mar	13-Mar	22-Mar	0	**8**
Prunus dulcis	Almond	28-Mar	14-Mar	28-Feb	**-14**	**-27**
Primula veris	Cowslip	01-Apr	07-Apr	01-Apr	**7**	1
Prunus spinosa	Blackthorn	04-Apr	11-Apr	28-Mar	**8**	-7
Prunus cerasifera	Myrobalan Plum	07-Apr	09-Mar	28-Feb	**-29**	**-38**
Pyrus communis	Pear	13-Apr	16-Apr	04-Apr	3	**-8**
Prunus cerasus	Cherry	14-Apr	16-Apr	06-Apr	3	**-8**
Anthriscus sylvestris	Cow Parsley	18-Apr	23-Apr	05-Apr	5	-12
Cardamine pratensis	Lady's Smock	19-Apr	22-Apr	22-Apr	4	4

Alliaria petiolata	Garlic Mustard	22-Apr	28-Apr	26-Apr	**7**	4
Viburnum lantana	Wayfaring Tree	02-May	08-May	10-May	**7**	9
Syringa vulgaris	Lilac	03-May	01-May	22-Apr	-1	**-11**
Aesculus hippocastanum	Horse Chestnut	05-May	05-May	25-Apr	1	**-10**
Crataegus monogyna	Hawthorn	07-May	09-May	26-Apr	3	**-10**
Laburnum anagyroides	Laburnum	11-May	15-May	04-May	**4**	-6
Salvia verbenaca	Wild Clary	12-May	22-May	17-May	**10**	5
Chelidonium majus	Greater Celandine	13-May	02-May	24-Apr	**-11**	**-19**
Leucanthemum vulgare	Oxeye Daisy	25-May	19-May	13-May	**-5**	**-11**
Astragalus danicus	Purple Milk-vetch	25-May	29-May	02-Jun	4	**8**
Sambucus nigra	Elder	31-May	27-May	15-May	-4	**-15**
Rosa canina	Dog Rose	09-Jun	02-Jun	18-May	**-6**	**-21**
Malva sylvestris	Common Mallow	11-Jun	17-Jun	08-Jun	**6**	-3
Lythrum salicaria	Purple Loosestrife	11-Jul	18-Jul	11-Jul	**7**	1
Birds, first seen/heard						
Phylloscopus collybita	Chiffchaff	07-Apr	13-Apr	29-Mar	7	-9
Phylloscopus trochilus	Willow Warbler	16-Apr	15-Apr	21-Apr	-1	5
Hirundo rustica	Swallow	21-Apr	22-Apr	23-Apr	1	2
Acrocephalus schoenobaenus	Sedge Warbler	27-Apr	27-Apr	13-May	1	**16**
Cuculus canorus	Cuckoo	29-Apr	25-Apr	29-Apr	-3	0
Delichon urbica	House Martin	01-May	01-May	12-May	0	**12**
Streptopelia turtur	Turtle Dove	08-May	02-May	05-May	**-6**	-3
Apus apus	Swift	14-May	04-May	10-May	**-10**	-3
Turdus pilaris	Fieldfare	17-Nov	24-Oct	08-Nov	**-24**	-9
Butterflies, first seen						
Gonepteryx rhamni	Brimstone	16-Mar	19-Mar	16-Mar	4	1
Aglais urticae	Small Tortoiseshell	24-Mar	06-Apr	20-Mar	**13**	-3
Inachis io	Peacock	06-Apr	11-Apr	23-Mar	5	**-14**
Anthocharis cardamines	Orange Tip	11-May	13-May	29-Apr	3	**-12**

Table 1. The mean dates of the phenological event for each species during the Jenyns period (1820-1831 and 1845-1849) and the two halves of the Clarke period. The species are organised into plants, birds and butterflies then arranged by the mean date of the event during the Jenyns period. The two difference columns indicate the difference between the mean date during the Jenyns period and the mean date during each half of the Clarke period, negative numbers indicate an earlier date in the Clarke data. Numbers in bold indicate that this difference is significant.

The different taxa (plants, birds and butterflies) varied in their magnitude of change. Plants showed the biggest range of responses, and also had most significant changes (16 out of 31). Three out of nine bird species had significantly advanced their arrival timing in the study area.

Phenological comparison with 1985-2003

Of the 44 species, 27 had advanced, 15 significantly so, between the Jenyns period and the later part of the Clarke period (1985 to 2003) (Table 1, Figure 1).

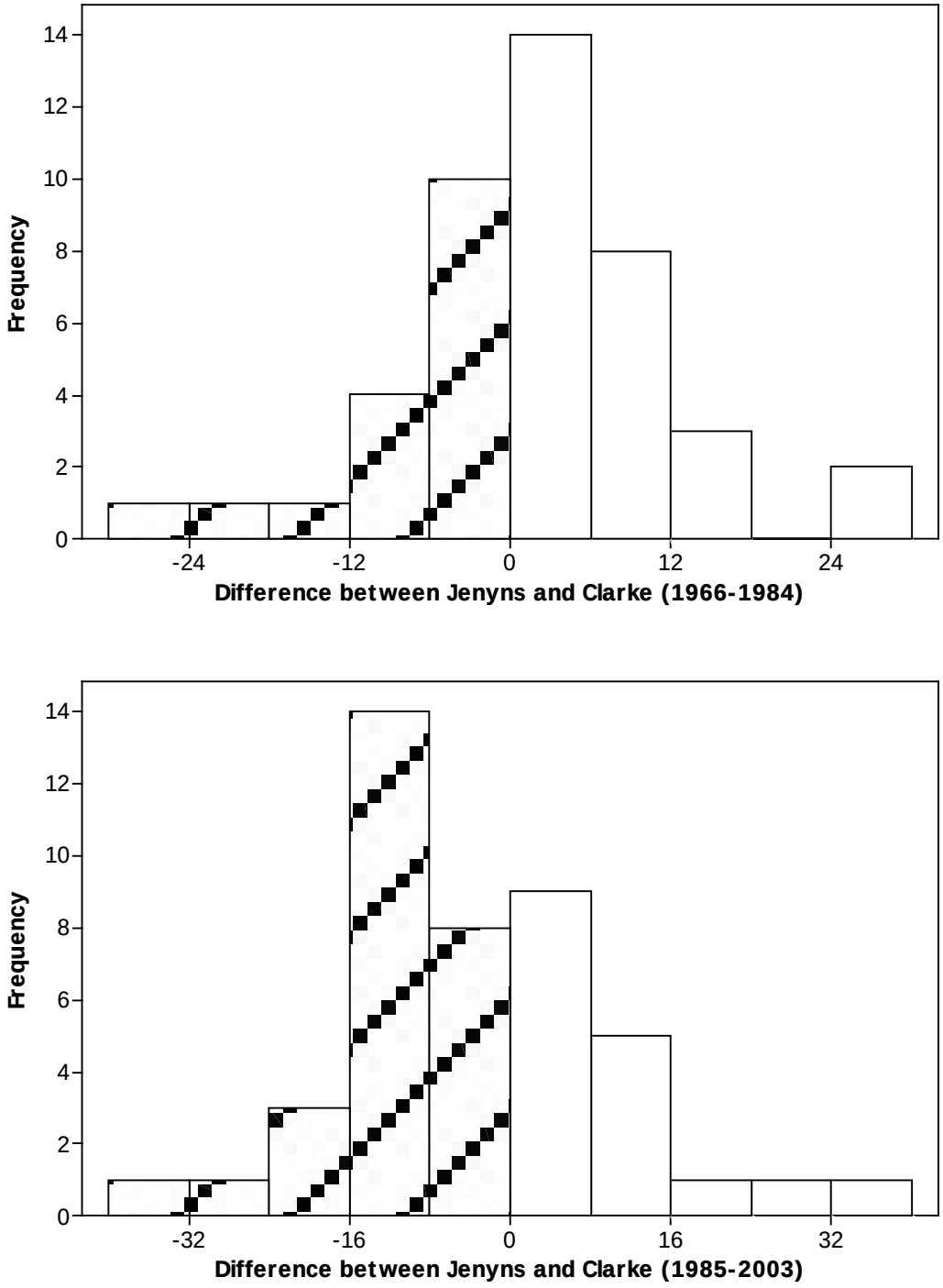

Figure 1. The differences between the Jenyns mean dates and the dates of the Clarke period when split into two, for all species. A negative difference shows that an event occurred earlier in the Clarke period than in the earlier Jenyns period.

Of the remaining 17 species seven had significantly delayed their phenology. The biggest changes were still for Myrobalan Plum first flowering (38 days earlier) and Marsh Marigold first flowering (33 days later). Of the 31 plants, 13 were significantly earlier and five significantly later. The appearance dates of Peacock and Orange Tip butterflies were both significantly earlier in the later Clarke period than in the Jenyns period. If anything, the migrant birds seemed to be a little later in this period. Across all the events the later Clarke period was 3.9 days earlier on average than the Jenyns period, with the plant events 5.0 days earlier on average.

A comparison of the two halves of the Clarke data showed that 27 of 31 flowering events, one of nine bird events, and all four butterfly events were earlier in the later period.

Conclusions

The comparison of phenological records taken at the two Swaffhams, shows that changes in phenology in Cambridgeshire broadly follow those recorded in studies all over the world, with many different species advancing their spring time activities. What is more interesting, however, is that when you split the more recent data set recorded by Clarke in half you see that a lot of the change has occurred in the last 20 years. Until around 1985, it seems that the timing of phenology was similar (or in some cases occurring later) to that recorded by Jenyns (who incidentally was an important influence on Charles Darwin) and summarised by Darwin's son, Francis. In the last 20 years, however, many of these species have advanced in phenology coincidental with a rapid increase in temperature (see article by Carroll et al. in this issue).

There are exceptions, and it is not always easy to explain these. Why has Marsh Marigold become later to flower? We cannot believe that either Jenyns or Clarke misidentified this species. Was there confusion in the name in the Victorian period? We don't think so because the likely alternatives were also recorded in the >1000 events recorded by Jenyns. One possible explanation is that Marsh Marigold has changed from being very common in the Swaffham area (Jenyns complained bitterly about both drainage and enclosure), thus being harder to detect, and thus recorded later. As Jenyns is unavailable for comment, we are unlikely to know for certain the cause of this change. Another plant that seems to be now flowering later is Peach, a possible reason for this could be that the trees were previously grown under glass so flowered earlier in the year.

A possible consequence of these changes is that different organisms may no longer maintain synchrony with each other if they advance at different rates. This could become a problem for Cambridgeshire (and elsewhere) in the future since plants and insects showed a general trend of advancing their phenology whilst some birds had delayed arrival (more so in recent years), thus possibly arriving later than the peak availability of food. We have seen that the patterns of timing can alter in as little as 20 years, so how will they change in the next 20 years? Will this lead to a disruption in synchrony between species? Or will adaptation iron out any problems?

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The rise and rise of the harlequin ladybird in Cambridgeshire

Peter Brown, Helen Roy and Michael Majerus

Much has been published about the arrival and spread of the harlequin ladybird, *Harmonia axyridis* Pallas (Coleoptera; Coccinellidae) in Great Britain (e.g. Majerus and Roy, 2005; Roy *et al.*, 2005 and 2008) and Cambridgeshire (Brown *et al.*, 2006 and 2007). Here we present a short update on the local situation with this alien invasive beetle.

The harlequin ladybird arrived in Great Britain in 2004, was first recorded in East Anglia and London and was found in Cambridgeshire in that year. It has since spread and increased in number and has been recorded in all but a few northern 10km squares in the vice counties of Cambridgeshire and Huntingdonshire (VC29 and VC31). It was the dramatic rise in abundance of the species that was noteworthy in 2007.

Summary data, from eight survey sites of various habitat types across the two vice counties, reveal a striking increase in the harlequin population from 2006 to 2007. In 2006 harlequins were found in very low numbers at two of these eight sites and overall the species was the 13th most abundant ladybird. In 2007, the harlequin was overall *the* most abundant ladybird at these sites, with 27% of all adult ladybirds, sampled from April to November, being harlequins. As would be expected, the pattern was not consistent across all habitat types and harlequins were present at five of the eight sites. They particularly dominated lime tree sites (perhaps because of high aphid abundance and the preference of the harlequin for arboreal habitats), but were also present in all three of the other habitat types surveyed (nettle beds, reed beds and Scots pine plantations). These

are all important habitats for native ladybird species, on some of which the harlequin is likely to have a seriously negative impact.

In 2007 in VC29 and VC31, larvae of the harlequin ladybird were recorded in every month from May to November. A similar pattern was reflected nationally and there is strong evidence that the species has two generations per year in Great Britain (Brown *et al.* 2008). This enables the harlequin population to build up very rapidly and gives it a major advantage over most native ladybirds, which only have a single generation per year; many native species require a winter dormancy period before they can reproduce (Majerus, 1994).

In Cambridgeshire in autumn and winter 2007, large aggregations of harlequins, in some cases comprising hundreds of ladybirds, were reported from buildings, the favoured overwintering place of this species in Europe. The impact on native species is being assessed, but the increasing dominance of the harlequin looks set to continue.

Acknowledgments

We thank all contributors to the Harlequin Ladybird Survey and in particular Robert Frost for his amazing commitment to the project, Remy Ware, Laura Jane Michie and David Roy.

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Grantchester Meadows
A report on the CNHS Survey project for 2006

Jonathan Shanklin

For its 2006 survey project the Cambridge Natural History Society visited the meadows along the Cam between Newnham and Grantchester. These have a long history, though some have suffered from neglect and others from

improvement. Altogether we found over 370 species of vascular plants, but failed to find 36 previously reported. This report gives some of the highlights from the monthly visits to the area. The complete listing over the flora is available on the CNHS web page at http://www.cnhs.org.uk.

The first meadow that you encounter when you take the footpath from Cambridge to Grantchester is Skater's Meadow (once known as Scudamore's Meadow), although this and the adjacent meadow are colloquially known as the Lamppost meadows as each has a lamppost at its centre. These are relics from 1920–1940 when, in the winter, the meadows used to be flooded with water pumped from the Cam and used for skating. There is an attendant's hut at the corner of the first field, where the fee of six pence for an evening's skating was collected. The lamppost was the stimulus for the imagination of Cambridge author C S Lewis who transported it to the Kingdom of Narnia. Today Skater's Meadow is in the care of the Wildlife Trusts. It is a good example of the type of grassland that was once common along the river. It has been managed in a traditional manner for the last 50 years at least, since it was purchased by the well known (at least to students) professor of geology, W B Harland. Once the meadow has dried out there is normally a summer hay cut (although not in 2006), then it is grazed until the end of the year. No fertilizer or herbicide has been used. Without doubt this makes it floristically the most interesting of all the meadows, though not necessarily the most diverse.

The adjacent meadow has received rather more variable treatment, and was not grazed in 2005. By 2006 it had a substantial coverage of sedge species, however it was opened up to grazing by the cattle in 2006 and had been completely levelled by the end of the year. Perhaps because of this variation in management we recorded slightly more species here than in Skater's Meadow, though many were ruderal. Neither of these two meadows is open for public access.

The track past the lamppost meadows emerges into open meadows stretching towards Grantchester. The first series of open fields separated by ditches are owned by King's College, which has suspended plans to build on them, giving them over to public access. They are only cut once a year, and consequently have become very rank. A relict stream crosses part of the first meadow and continues into the lamppost meadows.

Continuing along the footpath, there is a series of much improved meadows, which have a substantial drop down towards the Cam, indicating the western edge of the floodplain. The Cam here is at 7m above OD, whilst the highest part of the meadows is at 16m. The general features can be seen on the Enclosure Maps around 1800, and there are still traces of the medieval ridge and furrow of the former Audley's Close, adjacent to Grantchester Road. By the river is Little Fenn, a water-meadow that was recorded on Skinner's map of 1666. The meadow sequence ends with more water-meadows, mostly of much improved grassland, though the final one has clearly had slightly different treatment. The last feature of the main survey area is a relatively recent wood, although the medieval field boundaries remain.

The tracks from the roads to the meadow areas were also included in the survey, and these provided a further variety of habitats. Indeed more species were recorded along them than in any of the other areas.

Although not in the original survey area, Byron's Pool LNR, which comprises a wood, meadow, several ponds and the river, is close by. It was visited on the final formal visit to the meadows, primarily for its fungi. The area is named after the poet, Lord Byron (1788 – 1824), who is said to have bathed in the old weir pond when he was an undergraduate at Trinity. There used to be a mill at this point, owned by Merton College, Oxford; however all that remains are traces of the two fish ponds, where eels and other fish caught in the mill pond were stored until sent to the college for feasts. Formerly part of the Trumpington Hall estate, the wood was acquired by the Council in 1949 and declared a local nature reserve in 2005. Flooding used to be frequent in winter, but following improvements to the weir this is now rare. Today the meadow is managed by rotational cutting, whilst previously it would have been a wet meadow similar to Skater's. A few follow-up visits here were made; however, because of the late start this area was not as well surveyed as the meadows.

The footpaths across the meadows are becoming increasingly used by the ever-growing 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.

Jonathan Shanklin made a series of planning visits in October and November 2005, primarily to decide on how to sub-divide the area. The CNHS monthly excursions to sample the flora and some of the fauna throughout the year commenced in March 2006. Jonathan Shanklin also carried out several additional visits, either to check on areas that it wasn't possible to include on the programmed excursion, or to check on the presence or absence of species that had been seen in the majority of the other sub-divided areas. Charles Turner and Jonathan Shanklin were the main leaders for the excursions, but we had a few other experts along from time to time, whose help was much appreciated. Regular participants in the surveys included Kate de Courcy, Monica Frisch, Steve Hartley, Simon Mentha, Jonathan Shanklin, Charles Turner and "George".

The first formal visit in March was on an initially bright afternoon that turned to drizzly rain. The weather since the start of the year had been generally cold and dry, and spring had not advanced much since January. Perhaps the most interesting find was Ramsons (*Allium ursinum)*, growing in the wood. This is something of a Cambridge rarity, and may have been planted.

Further afternoon walks took place in April and May, with the first evening walk at the end of May. On each occasion the group concluded that Skater's Meadow was the most interesting, finding species such as Marsh Marigold (*Caltha palustris*), Ragged Robin (*Lychnis flos-cuculi*), Tubular Water-dropwort (*Oenanthe fistulosa*), Creeping Jenny (*Lysimachia nummularia*) and Spike Rush (*Eleocharis palustris*).

The memorial service for Max Walters, held at Grantchester church on 3rd June, provided an excellent excuse to follow in his footsteps, and Mark Hill, Alan Leslie, Jonathan Shanklin and Charles Turner walked back along the river

to Skater's Meadow. On the way we re-found Plicate Sweet-grass (*Glyceria notata*) and Round-fruited Rush (*Juncus compressus*), which had been reported by Max over 50 years ago.

Our July excursion was on the river by punt in sweltering heat, which allowed access to a few otherwise inaccessible parts of the area. We found several water plants including Shining Pondweed **(***Potamogeton lucens*), Fennel Pondweed (*Potamogeton pectinatus*) and Perfoliate Pondweed (*Potamogeton perfoliatus*), and this year the presence of Charles allowed us to confirm the identifications. There were a large number of Banded Demoiselles (*Calopteryx splendens*), and several hawker dragonflies (*Aeshna* sp.).

At midsummer the group started with a quicker than usual look round Skaters Meadow and reconfirmed the presence of both Fen Bedstraw (*Galium uliginosum*) and Marsh Bedstraw (*Galium palustre*). Monica Frisch found Pepper Saxifrage (*Silaum silaus*) in the second Lamppost Meadow, last reported on Grantchester Meadows in 1824! This was the only visit when we seriously surveyed for insects, though there were no real surprises for grassland. The sweep net kept filling up with the mirid bug *Notostira elongata*, both males and females. We found a single Sixteen-spot Ladybird (*Tytthaspis 16-punctata*), a relatively common grassland species and a couple of Seven-spot ladybirds. A cluster of iridescent green beetles on docks were identified as *Gastrophysa viridula* alongside several ladybird larvae and there were numerous cricket nymphs and flies turning up in the sweep net. Charles found a Hairy Snail (*Trichia hispida*), which is actually quite a common species.

We discovered a few unexpected additions on the August walk with Vervain (*Verbena officinalis*) found growing in the top meadow near Grantchester Road and Enchanter's Nightshade (*Circaea lutetiana*) found in the wood. We then meandered down the river, to the Lamppost meadows, finding Common Frogs (*Rana temporaria*) and a Grass Snake (*Natrix natrix*) on the way. Following a comment that there were interesting plants growing by the new footbridge over the Cam joining Coe Fen to Lammas Land, Jonathan Shanklin found a further six species for our Coe Fen list, including Indehiscent Amaranth **(***Amaranthus bouchonii*), Maple-leaved Goosefoot **(***Chenopodium hybridum*), Thorn Apple **(***Datura stramonium*) and Shaggy Soldier (*Galinsoga quadriradiata*).

The weather was mostly dry and warm over the next month, however heavy rain on the Friday before the September walk left muddy patches near the bridges. We found a few plants to add to the list, but generally few were still in flower. Surprisingly we did find Marsh Marigold (*Caltha palustris*) and Bulbous Buttercup **(***Ranunculus bulbosus*) in bloom. Fungi were also sparse, though we did find Snowy Inkcap (*Coprinus niveus*), Shaggy Bracket (*Inonotus hispidus*) and Yellow Fieldcap (*Bolbitius vitellinus*).

As part of the CNHS fungal foray weekend in mid October a large group, which included several youngsters (who proved most adept at finding fungi), were led by John Holden, Helene Davies and Lucy Evans. Although this final survey concentrated on fungi, a few plants were also added to the list. After lunch at the Red Lion we progressed to the meadows and wood near Grantchester. Finds ranged from tiny Fairy's Bonnets (*Coprinus disseminatus*) to

a large Horse Mushroom (*Agaricus arvensis*) nearly as big as the child who found it. Moving on to Byron's Pool, Toby Carter found a fungus beetle *Endomychus coccineus*. Several new fungi for this area were found and we also found the rare earth stars *Geastrum coronatum* and *Geastrum fornicatum*.

There were one or two surprising absences from the species found. In particular Germander Speedwell (*Veronica chamaedrys*) was not found in the meadows despite extensive searching, although it was present at Byron's Pool. Other common plants not found included Fat Hen (*Chenopodium album*)**,** Holly (*Ilex aquifolium*), Common Poppy (*Papaver rhoeas*) and White Campion (*Silene latifolia*). Nor did we find some of the more interesting species reported in Gigi Crompton's Cambridgeshire flora, such as Marsh Arrow-grass (*Triglochin palustris*) or Strawberry Clover (*Trifolium fragiferum*). The arrow-grass may well still be present in Skater's Meadow as it was reported as present in 1998.

Only one species for the area is listed in Part 1 (Rare species) of Gigi Crompton's Cambridgeshire flora at http://mnlg.com/gc. Long-stalked Pondweed (*Potamogeton praelongus*) was reported in 1959 as being 'in quantity' on the River Cam at Grantchester, whilst in 1940 it had been reported as 'Locally abundant in River Cam above Cambridge as far as Byron's Pool'. Sadly we did not detect it this year.

Coldham's Common
A report on the CNHS Survey project for 2007

Jonathan Shanklin and Steve Hartley

The Cambridge Natural History Society project for 2007 involved surveying the flora of Coldham's Common, Barnwell Lake and the Barnwell Local Nature Reserves. We logged around 470 species or subspecies, which exceeds the total for last year's survey of Grantchester Meadows, and also recorded some other phyla. There were six set areas for logging the species and individual record sheets are available for each: Barnwell East, Barnwell West, Barnwell Lake, Coldham's Brook and the Common north and south of the railway.

Over the past few years the Cambridge Natural History Society (CNHS) has selected a different area of the city each year and made regular survey visits to it over the course of the year. Primarily these surveys have concentrated on the vascular plants, however other phyla have been recorded on a sporadic basis. This year's survey covered sites in and around Coldham's Common. Parts of the area are City Wildlife Sites (CWS), and are surveyed by the Wildlife Trust from time to time, primarily for indicator species. These surveys are usually carried out over one or two days every seven years by one or two people and do not provide a comprehensive list of what grows on the site. Information from these surveys was incorporated into our list of species to look for, although we didn't find them all. The following site descriptions are taken from the Wildlife Trusts survey of 2005.

Barnwell East is a site of approximately 2.5ha and lies adjacent to Cambridge Airport, and close to Barnwell West LNR CWS and Coldham's Common CWS. It consists of a mosaic of grassland with scattered scrub, small dense blocks of scrub, and planted tree belts. Paths are maintained by mowing and cutting. Much of the grassland is tall (around 1 m) and dominated by False Oat-grass (*Arrhenatherum elatius*). Parts of the grassland have a lower (20-30 cm) and finer sward, and here indicator species, particularly of calcareous grassland, are more obvious, including locally frequent Common Bird's-foot-trefoil (*Lotus corniculata*) and Ploughman's Spikenard (*Inula conyzae*), and occasional Hawkweed Oxtongue (*Picris hieracioides*). Bee Orchids (*Ophrys apifera*) occur sporadically in the scrub/grassland edge; a handful of Common Spotted Orchids (*Dactylorhiza fuchsii*) occur in the grassland and in 2005 two Southern Marsh-orchids (*Dactylorhiza praetermissa*) were recorded for the first time by Ellis Selway. In places Michaelmas-daisy (*Aster novae-belgii*), Canadian Goldenrod (*Solidago canadensis*) and Rosebay Willowherb (*Chamerion angustifolium*) have invaded the grassland and are abundant. Control of these problem species by cutting or hand-pulling in the summer has slowly reduced their abundance. In general the grassland appears to have increased in diversity since the 1998 survey. Sections of the dense scrub, which consists mostly of Hawthorn (*Crataegus monogyna*), have been cut down annually for several years. The taller tree and scrub belts on the perimeter effectively shelter the site from wind across Coldham's Common or the airport. A platform with ramp has been installed at the pond. Plants such as Great Reedmace (*Typha latifolia*) and White Water-lily (*Nymphaea alba*) are becoming locally abundant. Submerged and floating plants include Rigid Hornwort (*Ceratophyllum demersum*) and Curled Pondweed *(Potamogeton crispus*). Several dragonflies and damselflies were flying at the time of the 2005 survey. Spawn from Common Frogs (*Rana temporaria*) has been observed in the pond for several years. This site qualifies as a CWS for calcareous grassland, and is close to qualifying for neutral grassland; additionally it qualifies for habitat mosaics.

Barnwell West is a site of approximately 3.1 ha lying alongside part of Coldham's Brook CWS, opposite Coldham's Common CWS, and close to Barnwell East LNR CWS. The site comprises a mosaic of dense scrub, less dense areas and clearings. Occasional trees such as Ash (*Fraxinus excelsior*) and Walnut (*Juglans regia*) have been planted throughout. Beneath the scrub and trees the ground flora consists mostly of Common Nettle (*Urtica dioica*) and Ground-ivy (*Glechoma hederacea*). The northern block is dominated by mature Hawthorn and Blackthorn (*Prunus spinosa*). A single large clearing at the north end has a tall ruderal community with a wet influence. On the banks of the East Main Drain below the footbridge, ferns are frequent including Hart's-tongue (*Phyllitis scolopendrium*), Male-fern (*Dryopteris filix-mas*) and Soft Shield-fern (*Polystichum setiferum*). The southern block has a more diverse structure. A path has been cut and surfaced along the western boundary with Coldham's Brook, and there are several clearings, all dominated by one or more tall ruderal

species. For example, the flora in the largest clearing, at the northern end, consists almost entirely of three metre high Hemlock (*Conium maculatum*) with an understorey of smaller species. Low scrub is invading others. The site qualifies as a CWS for scrub.

Coldham's Brook WS site is a stretch of chalk stream, a continuation of Cherry Hinton Brook CWS, which flows beside Coldham's Common CWS and also for part of its length beside Barnwell West LNR CWS. The channel is usually two to three metres wide, and the banks usually steep (45° or more). A short length runs across the verge of Barnwell Road. It is the first appearance of the stream from the culvert that swallows it just north of Coldham's Common. The water is clear and shallow and is unshaded, and there is frequent wetland vegetation, especially Greater Pond-sedge (*Carex riparia*) and Water-cress (*Rorippa nasturtium-aquaticum* agg.). The bottom is gravelly with Curled Pondweed (*Potamogeton crispus*) and Opposite-leaved Pondweed (*Groenlandia densa*).

Three sections run alongside Barnwell West. The first, about 110 m long, TL47715816 to TL47745825 has banks about two metres high and four metres wide. Both banks are steep and have mostly rank vegetation such as Common Nettle (*Urtica dioica*), with large patches of Bramble (*Rubus fruticosus* agg.), especially on the western bank. Marginal vegetation is occasional and mostly patches of Greater Pond-sedge; channel vegetation is abundant, particularly a Water-starwort (*Callitriche* sp.) and Water-cress. The water is clear but the bottom silty. The next 200 m, TL47745825 to TL47805845 is shaded by the dense scrub along its western bank, composed of Hawthorn and Bramble. The eastern bank is dominated by rank tall-herb vegetation, especially Creeping Thistle (*Cirsium arvense*) and Common Nettle. Wetbank species, principally Water Figwort (*Scrophularia auriculata*) and Meadowsweet (*Filipendula ulmaria*), are less common. Channel vegetation is occasional to locally frequent, principally a filamentous alga and a Water-starwort. The water is 30 cm deep and clear but the bottom is silty. This section had a Water Vole (*Arvicola terrestris*) population, but they have not been recorded here for the last three years. The final 250 m, TL47805845 to TL47795871 has lower banks. The southern half is heavily shaded by Hawthorn and Bramble from both sides and has no channel vegetation. The northern half is more open and only lightly shaded, with frequent marginal growth, especially Common Reed (*Phragmites australis*) and Reed Sweet-grass (*Glyceria maxima*), and channel growth, principally Water-cress, Pink Water-speedwell (*Veronica catenata*) and a Water-starwort, but the brook's water leaks away completely in this stretch so that at the northern end the bed of the brook is dry earth.

Turning west, the next 500m, TL47795871 to TL47355896 is heavily shaded by frequent shrubs and trees along or near to the southwest bank, including a line of mature Weeping Willow (*Salix* × *sepulcralis*) which grow every 30m along this section. This section has almost no water; at its wettest the bed is wet mud with a little standing water in only two places. The banks have similar rank vegetation to previous sections. Remarkably, channel vegetation is frequent and even abundant where there is wet mud or water, principally Fool's Water-cress

(*Apium nodiflorum*), Lesser Water-parsnip (*Berula erecta*), Water-cress, and unfortunately New Zealand Pigmyweed *(Crassula helmsii*). This section is marred by rubbish dumping, especially by the car park at the Abbey Pool, and by occasional herbicide spraying by neighbouring householders. Passing behind the Pool and playground for 150 m, TL47355896 to TL47215907, the Brook is heavily shaded by dense Bramble and Hawthorn on both banks, which also restricted access. Approximately half of this section was surveyed, revealing almost no channel vegetation, except for abundant New Zealand Pigmyweed at the start of the section. The water is less than 15 cm deep, stagnant with much leaf litter and silt. In places the bed is dry.

The final 45 m section before the Brook turns north, TL47215907 to TL47185908 has low banks dominated by Bramble which closes over the Brook along most of this section; Great Willowherb (*Epilobium hirsutum*) is also frequent. In the rare openings the channel vegetation is abundant, principally Reed Sweet-grass and New Zealand Pigmyweed. The water is 15 cm deep with very little flow. At the downstream end there is vertical wooden piling on the southwestern bank that continues into the next section. This runs north for about 360 m, TL47185908 to TL47255940 and has densely scattered trees and scrub, including Bramble and Sycamore (*Acer pseudoplatanus*), with tall wetbank vegetation along its eastern bank. The western bank is heavily poached and grazed by cattle from Coldham's Common, and has thinly scattered shrubs. This section has the most diverse and abundant channel vegetation of the whole brook, including one or more Water-crowfoots (*Ranunculus* spp.), Water-plantain (*Alisma plantago-aquatica*), a Water-starwort, Fool's Water-cress and Lesser Water-parsnip, as well as Reed Sweet-grass and Greater Pond-sedge. The water is virtually stagnant but is reasonably clear, and varies in depth from puddled mud to 30 cm. Slubbing has lowered the brook bed to such an extent that it is considerably lower than the culvert inlet which takes it to the East Main Drain, so that even when the water is reasonably deep, it cannot flow. This section is marred by rubbish, especially alongside the Abbey Stadium, where there is also high vertical wood and net piling which restricts marginal vegetation.

Old records for this site include the Endangered stonewort *Tolypella intricata*. The Nationally Scarce stonewort *Tolypella glomerata* and the common stonewort *Chara vulgaris* were recorded prior to the last survey. The Brook qualifies as a CWS because it is a chalk stream. It no longer qualifies for supporting breeding populations of Water Voles.

Coldham's Common itself is a large site covering approximately 39 ha, with extensive areas of grassland varying in quality from improved to highly diverse, and blocks of scrub and young plantation. Parts of the grassland are cattle-grazed and semi-improved, with indicator species generally at low frequency. Though the site is largely flat, in places hollows and ridges from old coprolite workings add some variation in habitat and there is also a large chalk mound that was once a rifle butt. The rest of the grassland is mostly used as sports pitches, with rank and scrubby edges, although these hold one area of high

diversity. Coldham's Brook CWS runs along the northern and western boundaries, and the CWSs of Barnwell West LNR and Barnwell East LNR, Barnwell Junction Pond and Barnwell Meadows are nearby.

Coldham's South Approximately eight hectares of the site lies to the southwest of the railway line. This area consists of moderately diverse neutral grassland, with some blocks of scrub around its edges. The grassland suffers from Creeping Thistle (*Cirsium arvense*) and topping to control this has left a heavy thatch in places. At the time of the WT survey the area had been grazed for some weeks, and the sward height was around 30 cm, although the Creeping Thistle was 50 cm. Grassland indicator species are generally local, although Meadow Barley (*Hordeum secalinum*) is frequent throughout. Hairy Sedge (*Carex hirta*) is abundant and Cuckooflower (*Cardamine pratensis*) is frequent in a wetter area close to the entrance on Coldham's Lane. Spiny Restharrow (*Ononis spinosa*) is frequent and Common Bird's-foot-trefoil (*Lotus corniculatus*) occurs towards the southeast end. Glaucous Sedge (*Carex flacca*) occurs within the northern curve of the railway, on a walkers' path which is also rabbit-grazed to below 5cm. Around the southeast end there are several exclosed areas of scrub and plantation in which the most frequent species are Hawthorn and Bramble. The irregular line of scrub along the southwestern boundary with residential gardens is now very thin, and suffers from occasional rubbish dumping.

The railway line has areas of dense scrub and rank grassland on its banks. A brief survey from one of the footbridges found frequent Hawthorn, Bramble and False Oat-grass. The rest of the site, to the northeast of the railway, is considered as five areas in the WT survey, although in the CNHS survey they were taken together as **Coldham's North**.

The northwestern area, of approximately eight hectares, extends south from the entrance on Newmarket Road, by the Abbey stadium, and around to the entrance by the Abbey Pool. It consists mostly of semi-improved neutral grassland, at times cattle-grazed, and exclosed areas of tall scrub and plantation. Average sward height was 15-30 cm, with some areas shorter. Meadow Barley is frequent throughout the grassland; Spiny Restharrow, Lady's Bedstraw (*Galium verum*) and Yellow Oat-grass (*Trisetum flavescens*) are locally frequent, especially in the south-eastern end. Much of the northern end has a lower quality sward, with the appearance of recovering after disturbance; Musk Thistle (*Carduus nutans*) is frequent. The strip beside Coldham's Brook CWS is annually covered in slubbings and has frequent Common Nettle and Creeping Thistle. Hawthorn and Bramble are the most common species in the exclosed areas. The western boundary is formed by a wet ditch, with a channel about two metres wide, joined halfway along by the East Main Drain which crosses the area. The ditches have steep banks and are mostly shaded by scrub, but towards the northern end there is less shade and the ditch here supports some submerged and emergent vegetation, especially Common Water-crowfoot (*Ranunculus aquatilis*).

To the southeast of the northwestern area lies approximately 13.7 ha of sports pitches, which are frequently mown to two to three centimetres and have only common lawn species. A low bank that runs southwest from the northeast side, dividing two levelled areas, has a few plants of Common Bird's-foot-trefoil.

To the southwest of the sports pitches is a mixed area of approximately 2.1ha, consisting of rank grassland, finer grassland, scrub and plantation. In the grassland there are anthills. The finer grassland, known as "the triangle", which is interspersed with and well sheltered by dense scrub, is of high quality; it is being managed by cutting back the scrub a little at a time. Spiny Restharrow and Upright Brome (*Bromopsis erecta*) are abundant, and Hoary Plantain (*Plantago media*) and Lady's Bedstraw are locally frequent. The ranker parts are as diverse but mostly lack indicator species; False Oat-grass (*Arrhenatherum elatius*) is abundant and Tall Melilot (*Melilotus altissimus*) is locally abundant, with Upright Brome being frequent, but in places Bramble and Large Bindweed (*Calystegia silvatica*) nearly dominate. The scrub and plantation have a variety of trees and shrubs with some exotics; Hawthorn, Ash and Blackthorn (*Prunus spinosa*) are the most frequent.

To the northeast of the sports pitches is an area of approximately 2.3 ha, consisting largely of tall (one metre) ruderal vegetation and including a BMX cycling track. The East Main Drain flows through this area. There are occasional trees and small areas of scrub, with denser scrub beside Coldham's Brook on the north-east boundary. The East Main Drain has dense scrub in places on its banks and almost no submerged, emergent or marginal vegetation other than locally abundant Common Reed; nevertheless a Kingfisher (*Alcedo atthis*) was seen fishing. At the southeast end, the ruderal vegetation gives way to rank grassland; here there are anthills, Upright Brome, Yellow Oat-grass and Wild Onion (*Allium vineale*).

The southeastern end of the site, covering approximately 9.2 ha, is sometimes cattle-grazed, and contains the chalk bank of the old rifle butts. There are belts of dense scrub along the northern and eastern boundaries, consisting mostly of Hawthorn and Bramble, and there are occasional planted trees. The southern end is bordered by a four to five metre overgrown hedge of moderate diversity. The main part of the grassland is mostly neutral to calcareous and moderately diverse. Indicator species include Spiny Restharrow, Upright Brome and Dwarf Thistle (*Cirsium acaule*). The average sward height was around 15 cm, after a recent topping. The dry ditch on the northwest side is a little more diverse. The rifle butts are surrounded by dense scrub, used as a track for scramble bikes. On the bank are areas of short (two centimetres), heavily rabbit-grazed, neutral to calcareous grassland of moderate to high diversity, suffering from encroaching low scrub and erosion, particularly on the south face, although this is being managed. Lady's Bedstraw is frequent, and Fairy Flax (*Linum catharticum*), Spiny Restharrow and Hoary Plantain are locally frequent. The Common qualifies as a CWS for neutral grassland and calcareous grassland.

Barnwell Lake lies adjacent to the Common and to Newmarket Road and is edged by the railway line. Once Gray's Clay Pit, working the Gault for bricks in

the nineteenth century, it had been dug to over 20 m, but was flooded by 1949. It was re-landscaped some years ago and is now a fishing lake. Two small pits at the south end provide some additional wetland habitat, though they are quite shaded by willow. Scrubby areas at the north and south ends add additional habitat.

Botanical recording on the Common has a long history. Ray visited the area and in his 1660 catalogue noted "Trifolium cochleatum folio cordato maculato *Heart-Trefoile or Clover* [Spotted Medick (*Medicago arabica*)] in the field on the right hand of the lane which leads from Barnwell to the Pesthouses, or the Common called Coldham's, on the green by the lanes side." It is still there! Martyn noted Greater Bladderwort (*Utricularia vulgaris*) in 1763, Relhan found Spiked Water-milfoil (*Myriophyllum verticillatum*) in 1785 and Babington recorded Meadow Saxifrage (*Saxifraga granulata*) in 1860. None of these survive today. Coprolite mining would have made dramatic changes in the second half of the nineteenth century, but marshy areas clearly remained. A large part was converted to playing fields in the twentieth century and it was not certain how many species from the historical record might remain.

Coldham's Common through the year

A few visits to the area were made prior to the formal start of the survey, either to set up procedures for the project or during conservation work. In June 2006 Steve Hartley led a CNHS excursion to view the chalk flora of the rifle butts and "the triangle". One unexpected find was Pyramidal Orchid (*Anacamptis pyramidalis*), which had previously not been recorded in this area of the city. During the summer, walks took place on Thursday evenings, but otherwise they were on Sunday afternoons, often with the enthusiasts meeting in the morning to cover an additional area. It frequently proved impossible to cover the entire Common in the allotted time, and so additional visits were made as necessary.

The formal survey began on January 1st 2007 on a mild sunny day. Altogether we identified over 150 species. We found over 20 that had never previously been reported from the Common; these included several garden escapes and common species, but also Creeping Jenny (*Lysimachia nummularia*) and Fiddle Dock (*Rumex pulcher*). The most worrying garden escape is Floating Pennywort *(Hydrocotyle ranunculoides*), which filled Coldham's Brook by the football ground, and was also present in the main drain, which leads across a corner of Ditton Meadows and Stourbridge Common to the Cam. It was noted as being present here the day before, so has clearly reached the Cam and will be multiplying furiously. Australian Swamp Stonecrop (*Crassula helmsii*), another escapee, was also present in the Brook just above the football ground and had increased substantially since Steve Hartley surveyed it in 2005. A couple of follow-up visits confirmed the presence of Soft Shield Fern in the Barnwell West drain and also found Butcher's Broom (*Ruscus aculeatus*) in scrub at the edge of the common. A fortnight later on another sunny day we visited the Common south of the railway and Barnwell Lake, and whilst recording these areas added a further 30 species to the list bringing the total to

over 180 species. We found another ten that had never previously been reported from the Common; though all were relatively common. Perhaps the most interesting was Winter Heliotrope (*Petasites fragrans*), which we found near Barnwell Lake. On the way back we stopped at the railway bridge to look for Comet McNaught, however the sky was too bright. We did however view the planet Venus.

The first general survey was on a fine spring day towards the end of March. The morning group headed for Barnwell Lake via the wooded path between Coldham's Brook and the Main Drain, but made slow progress as there was much to note. The afternoon session looked round Barnwell East and West, and then finished with a quick look at the Rifle Butts. Thirty eight additions to the flora list were made, and only nine of these had previously been reported. Most were of garden origin, but many had clearly made their own way out. Highlights of the day were finding pink Sweet Violet (*Viola odorata* var. *subcarnea*) on the bank of the main drain in Barnwell West, Dwarf Spurge (*Euphorbia exigua*), a red listed species, in Barnwell East and Stinking Hellebore (*Helleborus foetidus*) by the bridge in Barnwell West, which no-one had managed to spot on previous visits. In addition there was plenty of frogspawn in the Brook, and lots of 7-spot Ladybirds (*Coccinella 7-punctata*) enjoying the sunshine.

Another fine spring day at the end of April, in what was the hottest and driest April on record, saw a joint meeting with the Cambridgeshire Flora Group. A preliminary party met at 11am with a view to surveying Barnwell East and West, but never got beyond Barnwell East. Here we found several interesting additions, including Adderstongue (*Ophioglossum vulgatum*), Sanicle (*Sanicula europaea*) and Twayblade (*Listera ovata*). After a picnic in one of the glades we joined other members to head for the Rifle Butts and triangle. On the Rifle Butts we re-found Mouse-ear Hawkweed (*Pilosella officinarum*), but a group of party-goers lower down prevented complete exploration. Crossing to the triangle area we encountered abundant Field Wood-rush (*Luzula campestris*) and boots turned yellow with pollen from Bulbous Buttercup (*Ranunculus bulbosus*), but there was nothing outstanding in the triangle. Alan Leslie re-joined us here, having waded down the main drain in Barnwell West, where he had found large numbers of ferns including a solitary Maidenhair Spleenwort (*Asplenium trichomanes)* and eighty two Soft Shield-fern! Returning to the starting point via Coldham's Brook, we found a few flowers of Common Water-crowfoot (*Ranuculus aquatilis*), with Spike Rush (*Eleocharis palustris*) and Marsh Horsetail (*Equisetum palustre*). The dedicated remainder of the band then finished with further exploration of Barnwell West. There were lots of butterflies on the wing and we found an unusual form of the 2-spot Ladybird (*Adalia 2-punctata f* intermediate *annulata*). We recorded 105 species or sub-species of which 41 were new records for our survey, and of these 32 were new records for the area. A couple of visits were subsequently made to complete the April survey. The first covered the area south of the railway, and north up to Newmarket Road. Perhaps the best find was Whorl Grass (*Catabrosa aquatica*) found barely ten metres from where the CFG had joined the Brook.

The first of our evening walks took place in fine conditions at the end of May. It had been very wet during the previous week, and three times the normal rainfall fell during the month. We started by looking round the southern part of the common, which includes a children's playground. Somewhat to our surprise we found Spike Rush (*Eleocharis palustris*) in a slightly damper area of the playground. Elsewhere this part of the common had little new to offer, although we did find a small patch of Quaking Grass (*Briza media*). Crossing to the north we encountered a nice patch of chalk grassland near the hockey pitch, which added Yellow Oat Grass to the list. The mountain bike area added several ruderal species, and finally the triangle area contained some seedlings of an introduced whitebeam, the Service Tree of Fontainebleau (*Sorbus latifolia*).

The midsummer walk began with a tour round Barnwell Lake, and although the forecast suggested showers earlier in the afternoon, the first arrived as the party met by Newmarket Road. It took us a while to get beyond the gate with a selection of trefoils, and Hard Grass (*Catapodium rigidum*), a new addition to the site list, was found growing in the gravel. There was a solitary Great Crested Grebe (*Podiceps cristatus*) on the lake, and rather sadly we found feathers that looked suspiciously as if they might have belonged to its mate. We found several Blue-tailed Damselflies (*Ischnura elegans*) perching amongst the waterside vegetation, some in brilliant colours, but others very drab. A tall Bird's-foot-trefoil caused some head scratching, until the latest edition of Rose gave the answer "do not confuse with the introduced var. *sativus*", which it clearly was. We found a Broomrape (*Orobanche minor*) and a member of the group noted that some years previously he had found one growing by the ditch dividing the sports field from the rest of the Common. Much of the Brook near the football ground was choked with the two invasive waterweeds, but we did spot the Whorl Grass, and decided that the Water Speedwell was *Veronica catenata*. The wooded section proved rather disappointing, and whilst nothing new was found at the Rifle Butts, the chalk grassland was in good health, with several Bee Orchids.

Our final evening walk, in mid July, focused on Barnwell West, although we managed a brief visit to Barnwell East. The weather was fair, and although a few showers threatened it remained dry. Advancing high cloud from the deluge promised for the following day gave some good sky-scapes, with Swifts (*Apus apus*) screaming aloft. We started by looking at the roadside verge, which is maintained for wildlife, and also has some interesting "sowings". These included many traditional meadow flowers, but an addition to the list was the rayed subspecies of Black Knapweed (*Centaurea nigra* subsp. *rivularis*). We continued back down the verge to its crossing with the Brook, where Curled Pondweed (*Potamogeton crispus*) was present. Returning to the LNR proper, we found a swarm of hybrid willowherbs (*Epilobium* spp.), which clearly included American, Greater, Small-flowered and Square-stemmed amongst the parents. Coming back along the Brook we found the hybrid between the Hedge and Greater Bindweeds (*Calystegia* × *lucana*). Although it was beginning to get rather gloomy, we crossed the road for a brief look at Barnwell East where we hoped to confirm some previous suspects. The level of water in the pond had

dropped considerably, and we found some Water Plantain (*Alisma plantago-aquatica*). We were able to find the site of one suspect fairly quickly and this was identified as Corn Mint (*Mentha arvensis*). A further visit to Barnwell East took place a few days later, when we added several new species, including several brambles. Of particular note was the hybrid between Dewberry and Raspberry (*Rubus* × *pseudoidaeus*).

Summer arrived at the end of August, and our return to afternoon walks benefited from a fine day. We started with a tour round Barnwell Lake, where we saw several hawker dragonflies (*Aeshna* sp.). One new addition to the flora was Wych Elm (*Ulmus glabra*), which had somehow escaped notice on previous visits! We then walked along the Brook, stopping to identify one of the many grasshoppers, which the FSC card led us to name as the Field Grasshopper (*Chorthippus brunneus*). Leaving the Brook near the swimming pool, we checked on a section of ground recently turned over during the construction of new tennis courts. Here there were many arable weeds, including two C*henopodium* species and Field Pansy (*Viola arvensis*). At the Rifle Butts, Strawberry Clover (*Trifolium fragiferum*) was found on the west facing slope.

A bright autumn day at the end of September gave nearly ideal conditions for the survey. We meandered slowly round the southern part of the common, beginning with an apparently dead tree near Coldham's Lane. Charles Turner identified it as Elm from the tree rings and that it had probably died from Dutch Elm Disease from signs of beetle tracks. This was confirmed by the find of a small suckering shoot with leaves. Perhaps if it was fenced off from the cattle it would re-grow. Continuing on to the children's playground we looked at some of the common species around the margins, and then continued behind the houses, where we found Pale Willowherb (*Epilobium roseum*) and Welsh Poppy (*Meconopsis cambrica*), the latter a garden escape. Continuing round the common we came across a Harlequin Ladybird (*Harmonia axyridis*), which is now being seen in significant numbers around Cambridge. We didn't find anything new in the meadow area or the rifle butts, but whilst walking back across the meadow to the playing fields Charles found a patch of Salad Burnet (*Sanguisorba minor* subsp. *minor*). We concluded by looking at two unusual plants found by Jonathan Shanklin on a preliminary visit: Dittander (*Lepidium latifolia*), which was growing on the neglected ground between the playing fields and main drain, and Marsh Cudweed (*Gnaphalium uliginosum*) growing on disturbed ground created by construction of a new all weather sports pitch.

The final survey visit was a fungal foray and took place on another bright autumn day in mid October. Although there had been some heavy rain the previous week, the ground was still very dry, and most of the fungi were small and brown. Led by Helene Davies, a large group met outside Barnwell West and after a brief explanation, which included the warning that a blast on the whistle meant we had found something interesting, set off along the roadside verge. The first find was a small brown toadstool, but getting beyond genus proved difficult. Entering the scrub we soon found many more small fungi, including Jew's Ear (*Auricularia auricula-judae*), Dead Man's Fingers (*Xylaria polymorpha*) and Candle Snuff (*Xylaria hypoxylon*). With lots to try to identify,

progress through the wood was slow, but we eventually crossed the road to Barnwell East. By this time numbers were dropping, but several additions were found including Verdigris Agaric (*Stropharia aeruginosa*). In total we found over 30 species, but could only put names to 20. Surprisingly we also found a few vascular plants to add to the site list, including Spindle (*Euonymus europaeus*) with bright red berries.

Many people came out on the monthly excursions, with the principal contributors being David Barden, Monica Frisch, Steve Hartley, Alan Leslie, David Seilly, Jonathan Shanklin and Charles Turner (& George). With around 470 vascular plant species or subspecies being recorded we greatly increased the number of species known from the Common. It is however unlikely that the list is complete, as even after the formal close of the survey in mid October additional species were found, either during conservation work or during deliberate search. The search success rate declined approximately logarithmically and extrapolating this suggests that perhaps another 20 species could be found and that the vascular plant survey was complete to around the 95% level.

The 2008 survey area will be covering Stourbridge Common and Ditton Meadows. These flood meadows are unlikely to prove as diverse as Coldham's Common, however we should find some interesting water plants in the extensive ditch system of Ditton Meadows. Do come and join in. Dates for the monthly surveys, and flora lists for many of the wildlife sites near Cambridge are on the Society web page at http://www.cnhs.org.uk

A bumpy start: the founding of *Nature in Cambridgeshire* from the point of view of the council minutes of *Cambridge Natural History Society*

Dr Toby Carter, President, CNHS

"A Council Meeting of the Cambridge Natural History Society [CNHS] was held in the Botany School tea room at 5:15 pm on Thursday 13 June [1957]. The President, Prof. Wigglesworth, was in the chair." This was an important time for Cambridge Natural History Society, with 1957 being our centenary year. "The printing of Canon Raven's talk [On 100 years of Natural History in Cambridge] was discussed." Normal business continued: "The question of the missing molluscs was raised." New matters arose: "Dr S M Walters then raised two questions: 1. The possibility of publishing an annual report covering Natural History in Cambridgeshire with the Cambridgeshire & Isle of Ely Naturalists Trust [CAMBIENT] and the Camb. Bird Club. At present the Bird Club alone produce a report which saps the majority of their funds." The second point related to the publication of the CNHS record cards in time for the Tercentenary of John Ray's Flora of Cambridgeshire.

The minutes state: "Considerable discussion followed." Some things never seem to change: "Considering the first question the financial side must be

carefully explored. The treasurer was sure that participation in the publication of such a report would put too much strain on the Society's resources. If sent free to all members this would certainly be the case. It was felt that our society did not need such a report so much as for example the Trust [CAMBIENT], whose membership is more widespread. However Mr Palmer suggested it would be a pity if the CNHS was left out of a joint Trust – Bird Club report and asked Dr Walters to look into this further. To help Dr Walters further on the non-botanical side Dr Bainbridge, the President [Prof. Wigglesworth] and Secretary [D. Gobbett] were to form a sub-committee with him." Later in the same meeting "Mr Gilmour suggested that a tree be planted in the Downing Site as a memorial of the Society's centenary. This might well be a *Sophora japonica*." Certainly an important Council meeting for the CNHS.

By 26th November 1957 there was some progress: "The secretary [D. Gobbett] announced that the missing molluscs are in the care of Dr West [Geography] and gave the report of the sub-committee set up to discuss the publication of a joint report with CAMBIENT and the Bird Club. If it included the Bird Club report this publication would be of about 60 pages. The Trust [CAMBIENT] were prepared to spend £25 on this. The CNHS was in a position to contribute only £5 for the first year and would attempt to sell copies to its members at a cut price and return the proceeds, minus £5, to the editorial body. The publication would include our annual report and is hoped to be out between March 1st and May 1st 1958. The editorial committee consists of:- R. [*sic*] E. Vine, Phillip [*sic*] Hall (Editor) and Dr Walters."

"It was agreed that we [CNHS] go ahead on these lines suggested by the sub-committee and that Dr Walters (absent) should be informed of this via the secretary [D. Gobbett]."

This was certainly a serious matter for on the following February 20th [1958] under matters arising: "Following a request from Dr Walters (via the secretary), it was discussed whether £5 should be lent or given for the joint publication with the Trust [CAMBIENT]. It was decided that the £5 be given on the understanding that any profit arising from the sale of the publication should be shared by the contributing bodies in the proportions of their contributions. The secretary announced that the publication was to be entitled '*Nature in Cambridgeshire*' and was to sell at 2/- to members of the CNHS and at 4/- to the general public."

This was not the end of it however for on 4th November 1958 under the heading 'Support for the publication *Nature in Cambridgeshire*': "Dr Walters stated that CAMBIENT were within £4 of making up the outlay on the publication of the first volume of *Nature in Cambridgeshire*. This was excluding the £25 set aside for the purpose by the Trust [CAMBIENT]. The Council decided they would again contribute £5 on the understanding that if possible the money would be slowly paid back in the future. It was suggested that copies of the publication should be put on sale at society meetings."

The first volume of *Nature in Cambridgeshire* was duly published by CAMBIENT 'with the support of the Cambridge Natural History Society'. I feel that supporting the foundation of this journal, in addition to planting the

Sophora japonica, was an excellent way to celebrate the centenary of the Natural History Society. It is fitting that on the occasion of the 50th volume of this journal, and the Society's 150th anniversary, this relationship has been renewed after a break of some years. On behalf of the Council and members of Cambridge Natural History Society we hope that this fruitful relationship will continue through the next 50 years.

The Conversazione of the Cambridge Natural History Society

Henry T. Tribe

This event is an exhibition, displayed on laboratory benches, whose coverage includes all aspects of both traditional natural history and modern life and environmental sciences. After a start in 1913 the Great War intervened, and it was 1920 before a second start began what is very possibly the longest running annual exhibition of any Natural History Society. For it kept running throughout the Second World War, survived the perils of ennui that accompany a long period of peace, and will this year reach its 89th consecutive showing. Its host throughout has been the Cambridge University Department of Zoology, to whose succession of Professors the Conversazione owes its stability and continued existence. This symbiotic association with Zoology has now lasted over 100 years, for meetings have been held in the Department or Museum of Zoology right back into the Edwardian era. Every single programme of exhibits including the names of every exhibitor has been preserved, with the one exception of 1949.

This contribution is an updated account of the brief history that I wrote for the *Cambridge Review* in 1989. It is with some sorrow that I have to record the demise of the *Cambridge Review* - which also published Canon Raven's centenary account of the Society itself. It ceased publication in 1998 after 119 years. In his valediction the last editor, Nigel Spivey, noted that each year in recent memory subscriptions had declined.... “to lose money on the *Review* is not a novelty: the loss is arguably tolerable. To lose readers however, down to a dwindling number of several hundreds - is more conclusive. It seems in Cambridge we are not talking to ourselves, let alone to others.”

Meetings of the Society in the Edwardian age often consisted of lectures combined with exhibition of specimens. Some meetings were primarily devoted to exhibits. On 23rd May 1907 for example there were eight exhibitors: Mr Lamb, insects; Mr Keynes, butterflies collected in Switzerland; Mr Harding, birds from the fens and Madingley; Mr Pavey-Smith, a newt with larval gills; the Secretary (Mr William Farren) a long series of Acronyctapsi; Mr Fryer, some beetles from Chatteris and also a copy of the book *De Insectio* by Francesco Redi. Mr Imms (who later wrote the New Naturalist volume of 1947 on *Insect Natural History*) gave a short account of the tsetse fly with lantern slides and Mr Harding showed slides depicting Jamaican scenery.

In 1913 the meeting on 27th November took the form of an exhibition by various members. After the formal activity of reading minutes and electing new members “the rest of the evening was spent by a large gathering of members (numbering 56) in an informal inspection of particularly interesting collections of specimens.” Twenty-three members exhibited specimens and an abbreviated list of their exhibits was written out in the minute book. The Society was indebted to Prof Stanley Gardiner FRS for allowing the exhibition to be held in the Zoology Laboratory; “the exhibition proved such a success that it will undoubtedly become an annual event... our thanks are especially due to Mr Buxton to whose energetic organisation the great success of the exhibition was due”.

On 26th November 1914 however the meeting was in the older style: Miss Gardner exhibited a box of various insects, some of them imported with foreign fruit; Miss Britten exhibited living specimens of trap door spiders and ant lions; Lieutenant Disney exhibited - on behalf of Miss Sutton - a hair-ball from the stomach of a cow, and on his own behalf his own appendix (not in situ). Lt. Disney then gave a lecture 'Fossil digging in western Canada' to an audience of 31 and “enjoyed the honour of being the first member of the Society to address a meeting in uniform”.

Perhaps the custom of showing exhibits before a lecture took up more time than a lecturer generally appreciated, for in 1915 a rule was made that exhibits would in future be made at the close of meetings. But in early 1915 only 78 members were still in Cambridge, 54 being absent on active service, in February 1916 there were 67 and in February 1917 only 46 residential members. It was then resolved that no further meetings be held for the duration of the war.

The Society reconvened on 13th November 1919. The traditional programme of lectures continued until 27th May 1920 when a meeting was devoted to exhibits by various members. Mr P.A. Buxton had shortly before been elected President, and at his suggestion each member spoke for a few minutes about the specimen he had to show, before an informal inspection of the exhibits was made. Six members, including the President, exhibited, and ten members were present. “The exhibits were of great interest and many were of a very rare nature. They were worthy of a far larger attendance than was accorded them and it is to be hoped that more interest will be taken at future exhibition meetings”. It was!

On 18th April 1921 the President, Mr F.A. Potts, announced that the next meeting would be a conversazione on 12th May – the first use of the word in the Society's minutes. An 'exhibition and conversazione' was duly held at 4.30pm in the Zoology Laboratory by kind permission of Professor J. Stanley Gardiner FRS. Eighteen members exhibited and 125 members and guests attended the very successful meeting. Next year the same number of exhibits was shown, and thereafter the trend was upward. In 1926 “it is unfortunate that the meeting fell during the first week of the General Strike, when very many members were engaged in serving the Nation, but nevertheless it was attended by 96 members and guests, and of the 28 members and 4 guests who had promised exhibits, only four failed to bring them.” In 1927 “this is easily the most successful

Conversazione the Society has held" – there were 44 exhibits and 250 present. In 1930 there were 78 exhibits and more than 300 visitors, establishing a peak not equalled for 25 years, and this between the hours of 4 and 6pm. In 1931 the Conversazione started at 3pm, exhibits numbered 54, and this general level was retained through the thirties.

During the Second World War, the Society's activities and the Conversazione carried on. In 1941 the average attendance at general meetings had fallen to 63 – "despite the calls of Home Guard I feel this might be improved" was the Senior Secretary's comment. But the level of the Conversazione was maintained only a little below that of the thirties with the number of exhibits, also low in 1941, steadily increasing through the rest of the war years and after to reach a high plateau in the fifties and culminate in the all-time record of 112 exhibits in 1958.

The fifties were very good years. It was the custom then for the Conversazione Secretary to write quite a substantial report and some delightful passages occur in these reports. Thus, in 1954: "150 Invitation Cards were distributed this year against 125 last, but it should be decided before next year whether it is worth sending out so many, or whether the choice of recipients should be examined more closely. The feeling at the moment is that in many cases invitations were flattering but unnecessary." Also in 1954: "The same number of cakes as last year were ordered, we had a record gate and they went in miraculous fashion. If more were bought next year they would doubtless go at the same speed, but it is unlikely to affect the number of visitors or their enjoyment of the exhibition. Cost of cakes was down a little this year." In 1955 fewer invitation cards were sent out, "about 70 in all, but a number of people who should perhaps have received them were consequently left out. The Senior Secretary very kindly printed these cards on his own printing press and might be persuaded to do so again if asked sufficiently early". In 1957: "In future years a closing date for exhibits should be advertised if not actually enforced. This year several exhibitors' forms reached me as late as the day before the Conversazione, and I had to ask Mr Henderson to duplicate the programmes in a quite unreasonably short time." As late as 1958: "A mere 11% of the exhibits, albeit very good ones, were supplied by women - yet another indication of the deplorable sex-ratio in Cambridge." In 1959: "19% of the exhibits were supplied by women.... perhaps there is a move in the right direction at last..... "

During the fifties the Conversazione was an afternoon event, running on Wednesdays in late April to early May from 2.30 to 6pm. In 1959 the hours of 11 to 6 were tried out and the report commented: "This major change of policy was awaited with great interest by those who advocated it, and the general impression, even of those who thought it might spoil the social occasion, was that it was a good idea.... The morning viewing was leisurely and comfortable... the morning was the time to admire the exhibits and the afternoon the time to talk natural history with old friends, especially over tea. Neither exhibits nor old friends need have been neglected, as often happened in past years."

In the sixties a decline began. The reports died out. From the high plateau the numbers dropped and the trend continued into the seventies until, in 1974 and 1976 there were only 24 exhibits. It was said that everybody was now too busy,

that in this day and age students and research workers could not be expected to spend valuable time preparing exhibits for the Natural History Society. But some thought the problem was different: notices soliciting exhibits appeared on notice boards, yes, but no one came to ask in person any more. The author persuaded Council that Conversazione Secretaries should search out exhibitors and he volunteered to find whether people really were too busy, or whether they rather do like to show something that interests them but also like to be asked. They did like to be asked! Within two years the Conversazione was back to the fifties plateau and kept there well into the eighties.

In 1978 an enquiry was made as to possible expansion of the Conversazione into a two-day event, continuing from the Friday (having moved from Wednesday in 1968) to the Saturday. A circular was sent to recent exhibitors to sound out whether they would be willing to exhibit on two days. Of 104 circulars sent, 36 replies showed a preference for a two-day event, ten preferred one day and 58 did not reply. This was considered insufficient mandate for further exploration of the possibility and the Conversazione continued in the traditional manner.

There was change in 1988. Since the low point of 1976, it had been the custom to have three Conversazione Secretaries, one each in the University Departments of Zoology, Botany and Applied Biology. Mr Tim Benton, who had been Zoology Conversazione Secretary in 1987, had accepted from experience that others might help him to obtain exhibits and manage the Conversazione in a more professional manner. So in 1988 there were three secretaries in Zoology, two in Applied Biology and one in Botany – six secretaries being a larger number than ever recorded in the past. Then the traditional free programme of exhibits, a duplicated typescript that had remained unaltered from the thirties until 1987, was replaced by a printed programme for which a charge of 20p was made. These proved very popular and about 300 were sold, making a modest profit to offset the expenses of the Conversazione. Both entrances to the Conversazione were manned throughout the day and donation boxers at these entrances brought in another modest sum. The increased pursuit of exhibitors brought in 92 exhibits, the highest number for exactly 30 years and the second highest in the history of the Conversazione.

These numbers were excelled in the next two years, with 100 and 97 exhibits respectively, masterminded by Tim Benton and Ben Holloway in Zoology. The 1990 event included 23 exhibits of the 'Vintage Conversazione'. For Max Walters had discovered that he himself had been Conversazione Secretary in 1940. Fifty years had gone by and he decided to contact all extant 1940 contributors asking them either to contribute an exhibit again or to provide a copy of their own chosen publication written in later life. The response was magnificent: 18 came in person to exhibit and five sent an exhibit.

Over the period 1987 – 1993 Hilary Belcher took series of colour photographs of the Conversazione and gave sets for the archives. To our knowledge none is available for any earlier event

The very high numbers were not sustained after the exceptionally keen group of organisers based in the Zoology Department moved on. Further, the

Department of Applied Biology, which regularly supplied exhibitors, was closed. But more exhibits were now coming from outside Cambridge University. Good events with from 50 to 80 exhibits each year maintained the Conversazione as the major annual event in Natural History into the Millennium and to the present day.

In 1993 the Conversazione moved from May to June, because availability of the Zoology Laboratory had changed. For some years there had been a desire to extend the Conversazione to the Saturday, so that people who worked during weekdays could visit it. This important change occurred in 1998 when for the first time in its history the Conversazione extended over two days. In 2003 a further change was the move from Friday & Saturday to Saturday & Sunday. This however lost the visitors from the central laboratories adjoining Downing and Pembroke Streets who formerly spent their lunchtime (and perhaps a bit more) at the exhibition on their doorstep. For the Conversazione marking the start of our 150th Anniversary, Friday was added as a third day, from 1pm until 4pm. A Reception in the Zoology Museum from 4.30 onward was another anniversary feature, never held before, but a tremendous success. Both the three-day opening and the reception are to be repeated this year, at the Conversazione marking the end of our anniversary year.

It is most interesting to note the changes that have occurred in the Conversazione over nearly 90 years. The very strong entomological input, and demonstration of specimens in the early years have declined. The period includes enormous advances in technology and experimental methods that have deepened our understanding of natural history. The light microscope has been reinforced by the electron microscope, photography has advanced phenomenally and the computer and internet are bringing about a major revolution in dispersal of knowledge. So traditional natural history is supplemented by highly sophisticated modern life and environmental sciences. Conservation is now well to the fore and in modern times there has been more participation on behalf of societies and organisations not directly connected with the Natural History Society.

Throughout most of its existence the Conversazione has been run by students in Cambridge University but in recent times there has been input from the new Anglia Ruskin University, which evolved from the old Cambridge Technical College. Degrees in Natural History are now offered by Anglia Ruskin. Most of the Society's lectures were moved from the Zoology Department in the late nineties and are now hosted by that University.

There have been great changes in the nature of the lectures and field meetings of the Society's Programmes. In 1969-70, for example, three major lectures per term were held as general meetings in the C.U. Zoology Department, and some 13 – 15 sectional meeting talks distributed over five sections were held mostly in College Rooms. The two terms were Michaelmas and Lent. By 1991-2 there were two or three general meetings per term and eight sectional meetings in just three sections, these last now being held in the Zoology and Botany Departments, some being lunchtime meetings. Sections died out in 1999.

Easter Term Programmes are recent. They started as late as 1990 with an excursion, a buffet supper and lecture, a garden party and the Conversazione, and continued with a gradually expanding programme until the present day. In 2007 this programme consisted of one lecture, eleven excursions and five surveys of the annually chosen site, here Coldham's Common. The Autumn and Spring terms 2007-8 comprised 16 lectures, in addition to the fungus forays which have been annual since 1997. Close association with the Cambridge City group of Wildlife Trusts added another six lectures to the annual total.

The consequences of this evolution in the Society are that whereas until about 1990 the Conversazione was organised and exhibits were largely provided by Society members and others attached to Cambridge University, now the proportion of input from members in Anglia Ruskin University and Cambridge City is much greater. Indeed, Cambridge City Council has associated with the Society and the Council's 'Cambridge Sustainable City' logo has appeared on Conversazione Programmes since 2004. Nevertheless, the century-long symbiosis with the C.U. Department of Zoology continues and I can write with every confidence that our 89th consecutive conversazione will be held in the elementary laboratory there, by kind permission of the Professor of Zoology, Malcolm Burrows FRS.

The Cambridge Natural History Society One Century Ago

Henry T. Tribe

How was the condition of the Society 100 years ago? By 1901 it was still the Cambridge Entomological and Natural History Society but in 1902 its name was formally changed, on a motion by Dr Sharp seconded by Mr W. Farren, to the Cambridge Natural History Society.

The Minute Books of November 1900 to May 1907, and May 1907 to January 1913 and the Council Minutes 1896 – 1925 give us a picture of the Society as it was in Edwardian Times. Each meeting has its handwritten entry in the Minute Books as has each year's Annual Report. Loose-leaf sheets found between pages of the minute book were summaries of papers and discourses handwritten by speakers for the Hon Secretary to enter in the minute book. There were ten of these (two asking 'Will this do?') and they were transcribed word for word. (Mr Doncaster submitted a printed paper for his talk on colour inheritance in cats, but the Hon Secretary neither transcribed nor abstracted it!)

We begin at the Anniversary Meeting of 8th February 1901 (as the first February meeting of the year was then known). The Society comprised a President, three Vice-presidents, an Honorary Secretary and Treasurer, three Council Members and a Librarian. The previous year's President expressed his wish that the proposed compilation of a Fauna of Cambridgeshire might not be allowed to fall through. Mr Bonhole then read his paper 'Notes and observations

of birds at their breeding haunts' which was given a two-and-a-half page handwritten report.

There were ten meetings in 1901 and the Annual Report of 1902 stated that the proceedings and state of the Society compared very favourably with previous years. Meetings were on the whole far better attended and there was a welcome increase in the number of exhibits. Resident membership was 41 in 1901 as against 29 in 1900. Eight papers had been read, compared with two in the previous year, five being illustrated with “magic lantern slides”.

The Fauna (and Flora) matter took up time at four meetings, requiring so much time in one meeting that the speaker had to curtail his discourse. At five meetings members exhibited specimens: thus (for example) on 10th May, three exhibits were shown: some larvae of the common swift moth preserved in spirit, with *Cordyceps* fungus growing from them; a spirit-preserved specimen of a newt from caves in the Adriatic and from the taxidermist Mr Farren an almost white song thrush and photographs of birds’ nests. On 18th October there were some lepidoptera from Natal; a preserved larva and living pupa of *Sphinx convolvuli* from near Cambridge, plus some photographs, and some beautiful paintings of mollusca, done from specimens taken near Montreal.

In 1902 most meetings consisted of exhibits for examination and showings of lantern slides although the above-average number of exhibits was chiefly the work of a few people. Sometimes the exhibits were followed by a paper or discourse. Meetings were in the rooms of Alfred Jones ('dentist and lepidopterist', Raven, 1957) in Trumpington St. until 1902 when they moved to Dr Shipley's room in the Museum of Zoology. In these early years of the century we have a picture of comparatively few members, almost all with college affiliations, presented with a variety of specimens for examination and discussion. The meetings were more formal than today. Minutes of the previous meeting were always read and confirmed, new members were proposed and seconded, financial matters discussed, votes of thanks proposed, and (at the annual meeting) the Annual Report was read.

By 1903 the proceedings and state of Society compared fairly favourably with previous years “though the meetings on the whole have not been as well attended as might be”. Where recorded for 1902 attendances ranged from 11 to 18. But the Annual Report of 1904 recorded that the 1903 session had been a “down”. The fixture card had announced 13 meetings, the minute book recorded seven. At the first meeting which failed “four of us assembled to hear Mr Wallis read a paper, the reading of which paper it was decided to spare Mr Wallis - for half an hour we sat on the table, waiting for someone to turn up and discussing the chances of Cambridge in the forthcoming Varsity boat race, and sports. At the first meeting in May we again met, all 4 of us, and again sat on the table this time gloating over the results of the Contest discussed at the last meeting.” Two meetings out of four were successfully held in the May term, “after two more futile attempts - attended by 4 members - at which we sat round the fire and were much entertained by Mr Baker's recital of his adventures by land and water - <u>especially water</u> - on his recent bird photographing expedition in the United States of America”. However “In spite of the general slackness some important

business has been transacted, the management of the scheme for forming a collection of the fauna of Cambridgeshire has been taken over by the Council of the Society. Chiefly by the energy of Mr F.C. Morgan, whose final departure from Cambridge for his home in Canada is a great loss to the Society. A cabinet has been acquired to hold the Collection and by kind permission of Dr Harmer is placed in the Annexe of the Zoological Museum. An appeal has been made for a special subscription to defray the cost of the Cabinet, an appeal that has had a liberal response from several members. The amount received together with the funds in hand has enabled payment to be made for the cabinet before closing the account book for the year, leaving us however with the small balance in hand of £1 " 8 "7."

Thereafter however was "decided improvement". Membership steadily increased from 47 in 1905 to 93 in 1910, and attendance at meetings rose to an average of about twenty. Names and addresses of all new members were entered into the minute books. Over the nine decades of the Edwardian period, 154 members of colleges (all male) were elected but only nine town members, just two of whom were ladies.

A very noteworthy town member was Mr William Farren, the taxidermist in Regent Street, whose central position in the Society was emphasized by Charles Raven (1957). He was the combined Secretary and Treasurer from 1892 to 1896, for a short period in 1901 and then was elected again in 1903 and held the post until 1919. He was elected Hon Treasurer in 1921 when Mr M.G.S. Perkins became Hon Secretary.

It was noted at the meeting of 15th November 1905 that there being no paper the President (Dr Shipley) gave an interesting description of his fine collection of portraits of past and present Professors and introduced each with "the poker and an entertaining anecdote." We have a cosy coal-fire image of what was essentially a college Society whose town secretary was a professional naturalist.

The Annual Report of 1907 noted the very conspicuous absence of specimens exhibited by members. This was much to be regretted as "the exhibition of most simple natural object may lead to interesting and instructive discussion". By then the fauna collection was progressing slowly. Mr Tottenham of St Johns College had specially collected and contributed a large number of Coleoptera, a few birds had been added, and Mr Fryer had filed a large batch of records of Lepidoptera.

On 16th May 1907 a special meeting in the large lecture theatre of the Botany School was held to celebrate the 50th Anniversary of the Society, when a past President, Mr Theobald, gave his lecture on Sericulture and Silkworms. "There was a fair attendance of members and friends, including Mr John Brown the only surviving original member". In his Annual Report of 1908 William Farren noted that after the vote of thanks, with the aid of light refreshments the meeting then became social. However, "the faunal collection makes but slow progress".

The meeting of the decade was in 1908, when at the Anniversary Meeting of 13th February, 140 persons attended Dr Edward Wilson's lecture on the birds and mammals of the Antarctic, again held in Botany's large lecture theatre. But ordinary meetings had outgrown "our old and comfortable quarters in Mr

Shipley's room where we had been most kindly allowed to have meetings for 5 years" and were transferred to the Hopkinson lecture room in the Engineering Department, which "though fine and truly commodious was perhaps too large". The Library had been moved from Mr Jones' address in 1904 and "dumped" in Dr Sharp's room in the Zoology Museum.

The Era closed with 93 members in 1909, ten meetings and average attendance of 26. Among distinctions conferred on members during the year may be mentioned that Mr C.E. Raven (see 1957) was now Dean of Emmanuel. "Two members of the Society have been returned to Parliament. Mr Montagu retained his seat in West Cambridgeshire and Mr G.H. Verrall was elected for the Eastern Division of the County. Mr Verrall has practically assured the preservation of Wicken Fen for all time and Mr Montagu with others is actively engaged on a scheme which should convert Hickling Broad and the surrounding marshes into the most important bird sanctuary in the country. Financially we are in a sound position in spite of an unusually large number of members in arrears..... our balance in hand is £4 " 4 " 5½."

Reference.

Raven, C.E. (1957). The Cambridge Natural History Society. *Cambridge Review* October 12.

The *Cambridge Natural History Society* Year 2007-8

Dr Toby Carter, President, CNHS

A wine reception in the Zoology museum before the Conversazione is a great way to begin any year and for the Society's 150th anniversary year this was a wonderful start. Summer of 2007 saw more surveys of Coldham's Common and a long list of excursions including Maids Cross Hill, Haslingfield Pit, RSPB Lakenheath, Brampton Wood and Cherry Hinton Pits. The new society year has already seen some very exciting talks and excursions. Our fungus weekend was started by none other than Oliver Rackham OBE talking about Fungi and Woodland History and was followed by forays to the Botanic Gardens and Barnwell East LNR. Before Christmas we heard about Comets from Jonathan Shanklin, Flowers of the Languedoc from Monica Frisch and Barbastelle Bats from Chris Vine while Andy Brown told us about Carbon Footprints, Philip Pugh his ideas on Seahorse Biogeography and Richard Preece about Early Humans in Britain. The Christmas meal was very well attended with the members appetites whetted by the Presidential address on the topic of Cambridge Naturalists among the New Naturalists. Our Spring programme was started with an enthusiastic and inspiring talk on Apples by Professor John Parker, accompanied by juice and cider. Mike Majerus came back to talk about the Peppered Moth while Neil Renwick introduced us to the RSPB Fen Drayton Lakes Reserve in advance of a trip this summer. Owen Mountford took us exploring Nature in Romania, Laura Watson told us about Amphibians and

Reptiles in Cambridge and Gill Mallett fascinated us with a talk on Colour in Gemstones. Henry Tribe presented as Natural History of Molecules his Science Week exhibition of highly magnified molecules of life, including his updated model of the bacterium *Escherichia coli*. A new idea bore fruit in the spring with short talks under the heading of 'Members Enthusiasms'. Jo Darlington enthused on termite mounds, John Last on 25 years of diving and Simon Mentha on wild flower walks in Spain. We moved our surveys for 2008 to Stourbridge Common and Ditton Meadows and we have a long list of excursions over the summer including a trip to Wandlebury to look for ladybirds, RSPB Fen Drayton and Cherry Hinton Pits. We are now looking forward to another three day Conversazione to complete a very satisfying Anniversary Year.

Vascular Plant Records

Alan Leslie

In the list of records published in the last edition of *Nature in Cambridgeshire* a wealth of new hawkweeds was one of a number of notable features. Continuing the apomictic theme on this occasion are the promised results of Prof. John Richards's reassessment of the dandelion specimens in the University Herbarium (**CGE**). These are accompanied by a surprising number of records for new brambles in the county, some of which represent species a long way from their known core distributions and demonstrating that isolated patches on scruffy roadsides can repay attention!

However, for those without an enthusiasm for these critical and esoteric groups there is a leavening of new sites for a number of rare native plants, not least the welcome return of Bottle Sedge (*Carex rostrata*), which Jonathan Shanklin unearthed at Milton Country Park, and the discovery of the biggest population of *Polystichum setiferum* in the county, in the rather unlikely setting of Coldham's Common in Cambridge. There are also a few variants recorded for the first time and some new hybrid records, one of which – a hybrid between two introduced species of alder – appears to be the first British record. In addition there is the now customary stream of new aliens and in this connection Peter Reynolds has passed on a fine set of records from his home village of Kingston an area he evidently knows extremely well. Getting to know your own area in such detail can be immensely satisfying and rewarding, particularly when one moves from the basic listing of what occurs to a more complete knowledge of the local plant populations and the changes that take place in them over the years.

Our Cambridge Flora Group excursions in 2007 have yielded some good results, besides giving us the opportunity to see a wide range of Cambridgeshire habitats in good company. Not all these finds can be accommodated in the following list but notable amongst our records were the refinding of *Galium odoratum* in the little-visited Langley Wood and finding still more *Eleogiton*

fluitans at Whittlesey. At Horseway we extended the distribution of *Sonchus palustris* along the 40 Foot Drain in which we also identified *Potamogeton friesii* and *P. trichoides*. Horseway also produced genuine pink-flowered *Calystegia sepium* subsp. *roseata* (determined by Dr Dick Brummitt) and on later meetings we witnessed some of the bewildering series of intermediates that seems to exist in Cambridgeshire fenland between this and subsp. *sepium*. At the other end of the county, we saw good populations of *Bromus secalinus* and *Avena sterilis* subsp. *ludoviciana* in one cornfield at Croydon and subsequent field work by Nick Millar and myself showed these to be quite widespread on the heavy soils to the west and south-west of Cambridge. Anyone out in the field just before harvest this year could well keep an eye out for these, especially on those heavier soils: beware though of other oats and forms of *Bromus commutatus* that can lead one astray!

Significant progress has now been made in preparing accounts for a new Flora of Cambridgeshire as outlined in *Nature in Cambridgeshire* in 2006. Accounts of conifers (26 species) and ferns (38 species) have been written and the long journey through the dicotyledons has now begun. Inevitably the work throws up all sorts of questions and the Recorders are grateful to those who have begun helping to answer some of these in time for incorporation into the finished work. This list of queries will only continue to grow, so if you feel willing and able to lend a hand, perhaps in just chasing up an individual site, do let Nick Millar or myself know. Meanwhile a special thanks to Jonathan Shanklin and David Barden who between them have made a significant contribution to our records over the past year: what you see below is just the tip of the iceberg!

In the following accounts 'recent' implies records made from 1987 onwards.

Alnus cordata x *A. incana* One coppiced sapling, apparently having arisen spontaneously on waste ground, Barnwell East LNR, Cambridge, TL47965835, A.C. Leslie, 29 April 2007, **CGE** (specimen collected 2 June 2007). First v.c record and apparently first British record. Self-sown saplings of both parents are also present: both Grey Alder (*A. incana*) and Italian Alder (*A. cordata*) are planted in the vicinity and are now commonly seen planted as street trees around Cambridge This hybrid has been produced in cultivation by French forestry researchers but no other record of a hybrid occurring naturally has been traced.

Alnus glutinosa x *A. incana* One self-sown sapling on waste ground, Barnwell East LNR, Cambridge, TL47965835, A.C. Leslie, 29 April 2007, **CGE** (specimen collected 2 June 2007). First v.c record for a self-sown plant of this hybrid that has been recorded previously as a planted alien in Cambridgeshire; self-sown plants of both parents are also present and the hybrid may well have arisen *in situ*.

Althaea cannabina A single self-sown plant on abandoned allotments, Crane's Lane, Kingston, TL345549, P.J. Reynolds, 9 May 2004, still there 1 August 2006. First v.c. record for an elegant perennial mallow from southern and eastern Europe, which has never been grown on the allotments but is in cultivation elsewhere in the village (where it is known to self-seed).

Atropa belladonna var. *lutea* One huge plant on dumped soil, in the grounds of Girton College, Cambridge, TL42636094, A.C. Leslie (with E. Swale and H. Belcher), 28 June 2007. First v.c. record for this variant of Deadly Nightshade with yellow corollas and yellow berries, which will come true from seed. It is grown in the University Botanic Garden.

Campanula patula One flowering plant on the western slope of the old clunch pit, Orwell, TL363506, L. Evans, July 2006 (colour photograph conf. ACL), could not be refound June 2007, but there was some evidence the plant had been in at least one garden in the village. First record for Spreading Bellflower since 1857 when it was reported from the old clunch pit at Haslingfield.

Carduus tenuiflorus Thousands of plants towering above a rape crop in a field between Borley Wood and Balsham Road, Linton, TL57254863, A.C. Leslie, 20 June 2007, **CGE**. Second recent record; in this case presumably originating as a seed contaminant.

Carex otrubae x *C. remota* (*C.* x *pseudoaxillaris*) Three plants with both parents on a ride in Langley Wood, Camps End, TL60674237, A.C. Leslie (CFG excursion), 26 May 2007,**CGE**. Second recent record for the hybrid between False Fox Sedge and Remote Sedge.

Carex rostrata Milton Country Park, Milton (a) in a seasonal flush by a picnic lawn, TL479624 (b) in an inaccessible position at the edge of the main lake, TL481623, J.D. Shanklin, 4 June 2006, **CGE**; a further patch was found subsequently by the lakeside (ACL, 2007). Bottle Sedge was last seen in the county in 1966 when S.M. Walters found it in Burwell Lode; it was at one time more widespread in Cambridgeshire and could perhaps be overlooked elsewhere.

Cercis siliquastrum (a) self-sown plant (2ft tall) in a shrubbery by the cycle racks, at the north end of the Downing Site, Cambridge, TL45075820, A.C. Leslie, 29 October 2006, probable parent elsewhere on the Site (b) one small self-sown plant, in front of 28 High Street, Histon, TL4363, J.L. Sharman, 24 September 2007. First and second records for Judas Tree, which has subsequently also been found self-sown in Brandon Place in Cambridge (ACL, 2007).

Clematis recta Three plants self-sown in road gutters along Greenfields, Newmarket, TL65056324, A.C. Leslie, 5 May 2007. First v.c record for an herbaceous clematis which is native over much of the rest of Europe. These plants were all of the cultivar 'Purpurea' in which the new leaves and stems are deep purple.

Eleogiton fluitans Abundant in the shallow water in a drain, Underwoods Grounds, Whittlesey, TL271941-271948, CFG excursion, 15 September 2007; also in the deeper water south of the sluice at TL271939. More evidence that Floating Spikerush has a firm foothold in the Whittlesey area.

Epilobium tetragonum subsp. *tournefortii* A large population on a dry, sunny, south-west-facing bank on the north-east side of the Royston bypass, just south-east of the A10 roundabout, TL36394213-36594196, A.C. Leslie (with A. Stevenson), 6 August 2007, det. G.D. Kitchener, **CGE**. First v.c record (and first British record) for a subspecies of Square-stalked Willowherb native to southern Europe and North Africa, looking just like subsp. *tetragonum* but with out-facing flowers up to 25mm wide. A second population was found on a similar bank just north-west of the railway bridge over the bypass (TL36084235-35974240, ACL, 13 August 2007).

Eryngium campestre One good-sized flowering plant, on grassy verge towards the north-east end of the central reservation of the Barton Road, just north-east of the Granchester Road/Coton Road roundabout, Cambridge, TL423570, D.J. Barden, 30 June 2007,**CGE** (specimen collected by DJB & ACL, 5 July 2007). First v.c. record for the Field Eryngo, a species perhaps native in Kent, whose mode of introduction here in Cambridgeshire is far from obvious!

Eryngium planum (a) six flowering plants and c.10 rosettes, roadside verge, King's Hedges Road, Cambridge, TL458616, D.J. Barden, 28 June 2007, **CGE** (b) one flowering plant on verge of Soham bypass, TL60657285, Miss M.J. Burnhill, 29 July 2006, still there 6 August 2007. Otherwise only recorded from the A14 at Fen Ditton where it has been known since 2002.

Fumaria capreolata subsp. *babingtonii* (a) weed in allotments, behind the houses on the north side of Fanshawe Road, Cambridge, TL46545702, L.A. Spence, July 2007, conf. P.D. Sell (b) weed in gardens around Madingley Hall, TL3960, A.C. Leslie (U3A excursion), 18

June 2007, known here to the staff for some years but mistaken for *F. officinalis*. There are now four sites for Ramping Fumitory in and around Cambridge – is it lurking in other gardens and allotments?

Galium odoratum Two patches on the side of the main NW/SE ride through Langley Wood, Camps End, TL60784251, D.J. Barden (CFG excursion), 26 May 2007. Last reported here in 1932, Sweet Woodruff is very rare in the county as a convincing native plant, the only other extant locality being in Over Wood. There are a number of other sites where the plants are either probably or certainly introduced.

Geranium versicolor Three self-sown plants on the east side of Crane's Lane, Kingston, TL345549, P.J. Reynolds, 4 June 2002, still there 2007. First v.c record for Pencilled Crane's-bill; cultivated around Orchard Cottage in Crane's Lane and clearly self-sown from that population.

Holodiscus discolor One small self-sown plant on brick wall, behind The Gallops, Old Station Road, Newmarket, TL64906353, A.C. Leslie, 5 May 2007. Second v.c record for a deciduous garden shrub, sometimes treated as a *Spiraea*, and originally from North America. Previously recorded on a wall in Cambridge in 1940.

Hypericum maculatum subsp. *obtusiusculum* Abundant on track leading from Kingston Wood to the Old North Road, Bourn, TL322543, D.J. Barden, 25 August 2007, conf. ACL. This is a rare plant in the county and was last recorded in this area (although not this precise locality) by W.H. Mills in 1930.

Koelreuteria paniculata (a) one self-sown plant at field margin, east of The Leetes, Leetes Lane, Little Eversden, TL375534, P.J. Reynolds, 27 May 2006, still there 18 May 2007 and accompanied by 50 new one-year-old seedlings (b) one self-sown young plant in front of garage, off the south side of Hooper Street, Cambridge, TL46405800, A.C. Leslie, 2 September 2007. In both cases the probable parent trees are nearby. First and second v.c. records for the Pride of India, a Chinese tree with panicles of yellow flowers and conspicuous bladder-like fruits.

Lepidium bonariense About a dozen plants on gravelly ground used for parking farm machinery, north-east of Clayway Farm, Padnal Fen, Ely, TL57578329, A.C. Leslie, 19 August 2007, conf. E.J. Clement, **CGE**. Second v.c. record for the annual Argentine Pepperwort, which has at least the lower leaves bipinnate but is otherwise like a beefed-up version of *L. ruderale*.

Malva sylvestris var. *mauritiana* Spreading on to field margins from adjacent gardens (a) east of Crane's Lane, Kingston, TL34.54, P.J. Reynolds, 20 July 2005 (**CGE**), still there 2007 (b) east of The Leetes, Leetes Lane, Little Eversden, TL375.534, P.J. Reynolds, 3 July 2005. First and second v.c. records for a variant of Common Mallow with dark purple flowers and even darker veins, which can seed prolifically in gardens and soon become a weed.

Minuartia hybrida (a) wall above the stream on the south side of Station Road, just west of the B1052 crossroads, Dullingham, TL628578, D.J. Barden, 12 May 2007 – over 100 plants of all sizes (b) hipped roof of old building, 10 High Street, Willingham, TL403704, D.J. Barden, 31 May 2007 – c.9 plants on the lower part of the north-facing roof and hundreds more on the steeper upper part, plus a dozen or so on the gravelly ground below. Last reported in the Dullingham area in the nineteenth century and never before seen anywhere near Willingham.

Mirabilis jalapa Two white-flowered plants self-sown in paviour cracks, at the junction of Lisle Lane and Fore Hill, Ely, TL5480, J.L. Sharman, September 2007. Second v.c. record for the Marvel of Peru, which does indeed come from South America, and is used here as a bedding plant. Its flowers can be white, yellow or crimson or various combinations of these colours.

Ornithopus perpusillus Frequent in grassland developing on an area formerly used for storing farm machinery, by track to Gamlingay meadow, TL22065214, reported independently from here by both N.P. Millar and D.J. Barden, July 2007. Last reported at

Gamlingay near Little Heath Farm in c.1977, at the Cinques in 1958 and from Great Heath Wood in 1949; this new population must be currently the biggest in the county.

Poa bulbosa At least a dozen clumps on the roadside verge, east side of Trumpington Road (near St Faith's School), Cambridge, TL451565, A.C. Leslie, 13 May 2007, **CGE.** This little bulbous, summer-dormant grass is now well-known around Newmarket and on a concrete track near Little Wilbraham: it has not been seen in Cambridge before and may well be overlooked elsewhere.

Polystichum setiferum Over 70 plants of all sizes on the banks of a deep drain, running in scrub along the east side of Coldham's Common, Cambridge, TL477582-478584, A.C. Leslie, 29 April 2007 (surveyed by walking along the bed of the drain, the only ready means of access). This is by far the best site for Soft Shield Fern in the county; the outliers from this colony were first spotted near the footbridge at TL478584 by S. Hartley & D. Price in 2005, where they are accompanied by luxuriant Male Ferns and Hart's-tongues.

Potamogeton x *zizii* (*P. gramineus* x *P. lucens*) Scattered along a drain dominated by *P. natans*, Blackbush Drain, Whittlesey, TL257.944 and 257.946, N.P. Millar, 28 July 2007, det. C.D. Preston. Last seen in the Whittlesey area in 1972, the only other recent record being from Chear Fen in 1996.

Ribes alpinum One bush, apparently bird-sown, in woodland, Croxton, TL2533.6004, J.D. Shanklin, 18 May 2007, conf. ACL. Second recent record for Alpine Currant and the first that seems likely to have been bird-sown.

Rubus amplificatus A patch by the side of path through boundary woodland, east end of Girton College grounds, Cambridge, TL42.60, A.C. Leslie (with E. Swale and H. Belcher), 28 June 2007, det. A.L. Bull, conf. A. Newton, **CGE**. Second v.c. record.

Rubus dasyphyllus Straggling over shrubs on the south side of the B1085, just east of the entrance to Dane Hill Farm, Kennett, TL6903.6828, A.C. Leslie, first seen 28 October 2006, collected 12 July 2007, det. A.L. Bull, conf. A.Newton, **CGE**. First v.c. record since the nineteenth century for a species which is well distributed in most neighbouring counties, but has only been recorded twice before in Cambridgeshire.

Rubus halsteadensis Several patches at the north-east margin of Foxwarren Plantation, Newmarket, TL6627.6381, A.C. Leslie, 12 July 2007, det. A.L. Bull, conf. A. Newton, **CGE.** The *Atlas of British and Irish Brambles* (Newton & Randall, 2004) gave no records for this species in Cambridgeshire, although W.H. Mills recorded it in Over Wood in 1930 and near Borley Wood in 1955. The application of this name has been controversial so these earlier records may need to be re-examined.

Rubus leightonii Large patch on the west side of the disused railway, just north of Elm Road level crossing, north of March, TL4208.9944, A.C. Leslie, first seen 5 November 2006, collected 14 July 2007, det. A.L. Bull, conf. A. Newton, **CGE**: subsequently found all along the old railway up to the Chainbridge level crossing and beyond (to at least TF4246.0052), also along Elm Road, and along both Twenty Foot Road and Graysmoor Road where they run beside Graysmoor Pit. First v.c record for a bramble virtually unknown elsewhere in East Anglia.

Rubus newbouldii Scrambling through shrubs on the south side of Cambridge Road, Waterbeach, TL4896.6515, A.C. Leslie, 17 June 2007, det. A.L. Bull, conf. A. Newton, **CGE**; also a large patch on a ditchbank just round the corner on the east side of the A10 (TL4885.6520). First v.c. record for a bramble otherwise unknown in the south of England and with a distribution centred on the Pennines.

Rubus raduloides Scattered along the south-west margin of Thrift Covert, north-east of Ashley Heath stud, north of Cheveley, TL6792.6362, A.C. Leslie, first seen 16 October 2005, collected 12 July 2007, det. A.L. Bull, conf. A. Newton, **CGE**. First v.c. record for a bramble that has many other East Anglian records and here running along the line of the county boundary with West Suffolk.

Rosa 'Froebelii' (a) bird-sown in yew hedge by Romsey Town Labour Club, Coleridge Road, Cambridge, TL46.57, A.C. Leslie, 6 June 2007, **CGE** (b) bird-sown in Mill Road

cemetery, Cambridge, TL46.58, A.C. Leslie, 1 September 2007. First and second v.c records for a rose commonly used as a rootstock for cultivars, which often survives when the scion dies and can then produce fruit itself and be dispersed by birds. Distinctive in its sparsely armed, pale stems, pure white flowers and greyish green leaves. It is said to come from the Near East and is probably a distinct species.

Rumex acetosa subsp. *ambiguus* In several places along the new cycle path between Addenbrooke's Hospital and Little Shelford, TL4621.5451-4651.5460, A.C. Leslie, 26 August 2007. Second v.c record

Rumex conglomeratus x *R. crispus* (*R.* x *schulzei*) (a) one plant, with both parents, north side of shallow pool by Ely North Junction, Ely, TL5577.8105, A.C. Leslie & A. Stevenson, 6 August 2007 (b) one plant, with both parents, Eltisley Lane, Caxton, TL2995.5874, A.C. Leslie, 25 August 2007. First records since 1951 for what is perhaps an overlooked hybrid.

Rumex conglomeratus x *R. pulcher* (*R.* x *muretii*) Two plants, with both parents, Coldham's Common, Cambridge, TL4720.5933 & 4715.5925, A.C. Leslie, 29 July 2007. Second recent record.

Salix babylonica var. *pekinensis* 'Tortuosa' (*S. matsudana* 'Tortuosa') Single self-sown plant on waterlogged flat garage roof, Wychwood, Crane's Lane, Kingston, TL345.549. P.J. Reynolds, 27 June 2007. First v.c. record for a definitely self-sown plant of this widely grown willow with contorted stems and leaves. Growing here with self-sown *S. caprea, S. cinerea* subsp. *oleifolia* and *S. fragilis*.

Salvia verticillata One self-sown plant on abandoned allotments, Crane's Lane, Kingston, TL345.549, P.J. Reynolds, 9 August 2005. Second v.c record for Whorled Clary, a perennial sage from southern Europe; it had not been grown on the allotments, but is cultivated elsewhere in the village.

Sedum nicaeense (*S. sediforme*) Two plants on flat garage roof, Wychwood, Crane's Lane, Kingston, TL345.549, P.J. Reynolds, 20 July 2007. First v.c record for Pale Stonecrop, a Mediterranean species similar to *S. rupestre* but with very pale yellowish flowers. Presumably taken on to the roof by birds: the species was introduced to the garden of this property and is now a weed there, as well as in a neighbouring garden.

Senecio inaequidens Hundreds of plants on sidings to the east of the station, March, TL4212.9771, A.C. Leslie, 22 April 2007, also one plant along Station Road just to the south (TL4193.9753). Second v.c record for Narrow-leaved Ragwort, a South African plant, which has clearly been naturalised at this site for some time.

Sonchus arvensis subsp. *uliginosus* A small colony on the margin of the old moat, Caxton Moats, Caxton, TL2950.5870, A.C. Leslie, 25 August 2007, **CGE**. First v.c. record for a variant of Corn Sowthistle which lacks glandular hairs in the inflorescence.

Sonchus palustris A single plant in a reedbed on the margin of a flooded pit, Priors Fen, Thorney, TF2677.0104, D. Broughton, 24 July 2007. A new locality for Marsh Sowthistle, which otherwise has only been seen recently along the 16 and 40 Foot Drains near Horseway and by the Ouse Washes north-west of Littleport.

Stipa tenuissima Several plants on the site of a presumed cattle-feeding station, in a field at Croxton, TL2489.5964, J.D. Shanklin, 16 September 2007, det. ACL, **CGE**. First v.c. record for an ornamental American grass, currently much in vogue in gardens, where it all too readily seeds itself around.

Taraxacum. The following records, presented in a slightly abbreviated form to save space, represents species for which there are no other recently confirmed records for Cambridgeshire and which have now been identified by Prof. John Richards amongst the herbarium material in **CGE,** which he kindly reviewed in early 2007. In making the assessment as to whether any species is new to the county list, reference has been made to the *Vice-county Census Catalogue of the Vascular Plants of Great Britain* (BSBI, 2003) and Gigi Crompton's *Catalogue of Cambridgeshire Flora Records since 1538* (2004). Crompton's account was based upon the last of two revised lists sent to her by Dudman and Richards in 2000. The advice from these taraxacologists is to discount all earlier determinations, thus a few species

given for the county in *Nature in Cambridgeshire* 19:68-70 (1976) are listed here as re-instated on the v.c. list since the earlier determinations can not now be relied upon. In addition many of the individual dandelion records listed in Crompton have been redetermined by Prof. Richards, but only two species have been removed from the vice-county list as a result: *T. aurosulum* and *T. pectinatiforme*. The county now has a respectable tally of taxa but a great deal more work needs to be done to establish relative frequencies and distributions as well as bringing records up to date.

Taraxacum acroglossum Fox Hill, Orwell, TL366.513, P.D. Sell, no. 67/91a, 26 April 1967. First v.c. record.

Taraxacum acutifidum Kneesworth chalkpit, TL351.427, P.D. Sell, no. 67/233, 20 May 1967. First v.c. record.

Taraxacum acutifrons Dimmock's Cote, TL539.723, P.D. Sell, nos. 67/186 & 67/187, 12 May 1967. First v.c record.

Taraxacum altissimum Between Bassingbourn and Abington Pigotts, TL312.449, P.D. Sell, no. 67/243, 21 May 1967. First v.c record.

Taraxacum anceps (H.Øllg., ined.) Girton, TL46, F.G. Bell, no. 10, 2 May 1967. First v.c. record.

Taraxacum angustisquameum Fox Hill, Orwell, TL366.513, P.D. Sell, no. 67/93, 26 April 1967. First v.c. record.

Taraxacum atactum (a) between Isleham and Soham, TL637.752, R.R. Aitchison, no. 73/3, 22 April 1973 (b) Wicken Fen, TL563.706, Part II Botany Class, 30 April 1973. First and second v.c. records.

Taraxacum cophocentrum Girton, TL46, F.G. Bell, no. 9, 2 May 1967. First v.c. record.

Taraxacum hamiferum Wicken Fen, TL563.706, P.D. Sell, no. 67/176, 12 May 1967. First v.c record.

Taraxacum incisum Bassingbourn, TL316.449, P.D. Sell, no. 94/96, 19 April 1994. First v.c. record.

Taraxacum interveniens Site of Abington Pigotts Common, TL312.449, P.D. Sell, no. 96/32, 5 May 1996. First v.c. record.

Taraxacum lacerifolium (a) Bassingbourn, TL316.449, P.D. Sell, no. 94/95, 19 April 1994 (b) Hatley St George, TL281.505, P.D. Sell, no. 94/113, 28 April 1994. First and second v.c records.

Taraxacum lamprophyllum Between Abington Pigotts and Litlington, TL309.439, P.D. Sell, no. 67/108, 30 April 1967. First v.c. record.

Taraxacum landmarkii Wicken Fen, TL563.706, Part II Botany Class, no. 19/40, 30 April 1973. Re-instated on the v.c. list; the listing in 1976 was of an earlier record from the same site.

Taraxacum laticordatum (a) Soham, TL593.735, R.R. Aitchison, no. 4/74, 16 April 1974 (b) Histon, TL432.639, P.D. Sell, no. 00/45, 7 April 2000. First and second v.c records.

Taraxacum latisectum Welches Dam, TL471.853, P.D. Sell, no. 68/25, 25 April 1968. Re-instated on the v.c. list.

Taraxacum leucopodum (a) Soham, TL569.757, R.R. Aitchison, no. 73/15, 13 May 1973 (b) Histon, TL431.639, P.D. Sell, no. 00/43, 7 April 2000. First and second v.c. records.

Taraxacum longisquameum Kneesworth chalkpit, TL351.427, P.D. Sell, no. 67/232, 20 May 1967. Re-instated on the v.c. list, this being one of the specimens supporting its inclusion in the 1976 list.

Taraxacum macrolobum Cambridge, TL446.573, P.D. Sell, no. 67/82, 24 April 1967. First v.c. record.

Taraxacum pachymerum Litlington, TL323.410, P.D. Sell, no. 94/99, 21 April 1994. First v.c. record.

Taraxacum pannulatum (a) Litlington, TL323.410, P.D. Sell, no. 94/98, 21 April 1994 (b) Hatley St George, TL281.505, P.D. Sell, no. 94/111, 28 April 1994. First and second v.c. records.

Taraxacum planum Between Burwell and Fordham, TL680.630, R.R. Aitchison, no. 3/74, 12 April 1974. First v.c. record.

Taraxacum quadrans (a) Soham, TL609.727, R.R. Aitchison, no. 9/74, 29 April 1974 (b) between Burwell and Fordham, TL680.630, R.R. Aitchison, no. 2/74, 12 April 1974. First and second v.c. records.

Taraxacum rhamphodes (a) Fox Hill, Orwell, TL366.513, P.D. Sell, no. 67/90, 26 April 1967 (b) between Croydon Hill and Hatley St George, TL299.502, P.D. Sell, no. 94/109, 28 April 1994. First and second v.c. records.

Taraxacum stictophyllum (a) Great Widgham Wood, TL65, F.H. Perring, 15 May 1957 (b) Gamlingay Wood, TL242.534, P.D. Sell, no. 57/5, 30 April 1957. These determinations (of the same specimens) confirm those reported in the 1976 list and re-instate this species on the v.c. list.

Taraxacum subcyanolepis Stetchworth, TL632.601, P.D. Sell, no. 94/101, 22 April 1994. Re-instated on the v.c. list.

Taraxacum subhamatum (a) Cambridge, TL446.573, P.D. Sell, no. 67/84, 24 April 1967 (b) Litlington, TL327,403, P.D. Sell, no. 96/28, 28 April 1996. First and second v.c. records.

Taraxacum subundulatum (a) Wicken Fen, TL55.70, P.D Sell, no. 50/5, 10 May 1952 (b) Bassingbourn, TL329.438, P.D. Sell, no. 50/43, 2 May 1952. First and second v.c. records.

Taraxacum undulatiflorum (a) Milton, TL478.628, R.J. Pankhurst, no. 73/7, 15 April 1973 (b) Cambridge, TL456.599, R.J. Pankhurst, no. 73/21, 7 May 1973. First and second v.c. records.

Torilis arvensis A population extending over several metres of drain bank, north-west of Gorefield, TF3981.1303, J.D. Shanklin, 10 July 2007. A new site for a rare umbellifer, which seems to be surviving in a number of fenland sites.

Valerianella dentata Several plants on rough ground at track entrance, Roman Road west of Gunner's Hall, Balsham, TL5401.5106, J.D. Shanklin, 28 June 2007, det. ACL, **CGE**. A new locality for Narrow-fruited Cornsalad which has recently been recorded in only four other 10km squares in the county.

Bryophyte records

C. D. Preston and M. O. Hill

There are two remarkable records in the list below, both of epiphytes that in recent decades have been more or less restricted in the British Isles to N.E. Scotland. *Orthotrichum obtusifolium* was found in an orchard in the north of the county, and follows the equally notable recent discoveries of *Hypnum cupressiforme* var. *heseleri* in the same orchard and of *Antitrichia curtipendula* at Leverington. We also include records of *Leucodon sciuroides*, *Pylaisia polyantha* and *Zygodon rupestris* from Robin Stevenson's orchard survey. The second outstanding record is of *Orthotrichum speciosum* from Balsham Wood, the first confirmed record of this species in England since the mid 19th century.

Like most of the remaining records, this was found on the Cambs Bryological Excursions, which were again focussed on recording for the proposed new bryophyte flora of the county. On 10th February 2008 we celebrated the seventieth anniversary of these excursions with a visit to Little Widgham Wood, the venue for the first excursion on 5th February 1938 (Plate 6, back cover).

The number of species found in each 5-km square since the new Flora project started is shown in Fig. 1. All but five of the 134 squares have now been visited at least once, although this year's records show that there is still much to be discovered. The note on *Bryum caespiticium* below continues our review of misunderstood species in the county, in preparation for this Flora.

Mosses

Amblystegium humile Growing close to water level on two posts by River Great Ouse SE of Aldreth, TL463717, M.O.H., 8.3.2008. In recent years *A. humile* has only been seen in the county at two sites in and just outside the Ouse Washes.

Bryum caespiticium This species differs from similar plants in its dioecious inflorescence and small spores. Proctor (1956) described it as "Very seldom recorded, but certainly very common on walls, etc., in Cambridge, and probably elsewhere in the county". The reference to Cambridge is probably based on Rishbeth's (1948) paper on 'The Flora of Cambridge walls', in which it was reported from 32 sites between 1937 and 1940. By 1964 Whitehouse described it as "Abundant on walls. Frequent on banks in gravel- and chalk-pits and on paths and railway ballast. Occasional on stumps". However, it seems almost certain that the plants recorded as *B. caespiticium* on walls in this period included *B. radiculosum*, a smaller, tuber-bearing plant which was not really understood until Crundwell & Nyholm's (1964) monograph of the *Bryum erythrocarpum* aggregate. *B. radiculosum* is common on walls in the county but in 1964 it was only known from chalk grassland on the Devil's Ditch. By 1967 M.O.H., who knew both species well, concluded that *B. caespiticium* was "not really very common on walls" in Cambridgeshire. It is clear from Harold Whitehouse's list of records for the 1964 Flora that he was much more careful in accepting records of the species from 1959 onwards than previously. From this date all the listed records are of fruiting plants (including some grown on in captivity). However, he never sorted out the earlier records. There are twelve plants in his herbarium in CGE and these have been checked recently by M.O.H.; eight are correctly identified, three lack sex organs and one fruiting plant, collected near Moor Barns Farm in 1957, is probably *B. creberrimum* or *B. pallescens* but cannot be identified with certainty. We therefore think it is reasonable to accept the records Whitehouse lists as fruiting. There are additional specimens in BBSUK, E and herb. M.O.H. From the mid 1960s until 1999 we have less detailed information associated with the records, and we have only accepted records backed by herbarium material. When revised along these lines, there are acceptable records for the period 1950–99 from TL23, 24, 29, 33-38, 45, 46, 49, 55, 57, 59, 65, 67, 68, 76; TF 20, 30, 41, 50. The habitats include active and disused railway tracks, sandy soil in gravel pits, sandstone rocks in Cambridge University Botanic Garden, fallen tree trunks, rotten tree stumps and plank bridges; there are also *some* reliable records from walls. We have rejected the published records for this period from TL 25, 39, 44, 48, 54; TF31, 40. Since 2000 we have been careful in accepting only records based on the microscopic examination of fertile material.

Bryum pallens On wet rotting wood at ground level and on the exposed roots of a cut birch stump, Compartment 5, Wicken Fen, TL552701 & 551702, and on peaty mud, Compartment 2, Wicken Fen, TL548700, M.O. Hill *et al*., 19.4.2008. Rather surprisingly, this species has never been recorded at Wicken and it is rare in the county, only recorded from four other sites and last seen in 1978 as an introduction on limestone in the Botanic Garden, Cambridge.

Campyliadelphus elodes Amongst *Drepanocladus polygamus* at edge of ditch, Gardiner's Drove, Wicken Fen, TL559704, R.J. Fisk, 19.4.2008, det. M.O. Hill. This nationally scarce wetland species was last seen at Wicken in 1953 and in Cambridgeshire at Quy Fen in 1957.

Cinclidotus fontinaloides On wood of fishing platforms and boards edging the river, at and below water level, often in large quantity, N. bank of R. Nene near Fletton Parkway Bridge, Peterborough, TL19NE and E. of Peterborough, TL29NW, J. J. Graham, 25.5. & 31.5.2007. This species has hitherto been known in the county only from the River Great Ouse and the Ouse Washes; these are the first records from the Nene.

Didymodon nicholsonii Plants with frequent male inflorescences on compacted gravelly track by the Summer House, Anglesey Abbey, TL52936231, C.D.P., 24.3.2008. We know of only one previous report of male plants of this species in the British Isles, from a tarmac lane at Pucketty Farm, Faringdon, Oxfordshire.

Drepanocladus polygamus In some quantity at edge of ditch, Gardiner's Drove, Wicken Fen, TL559704, R.J. Fisk, 19.4.2008, det. M.O. Hill. This very uncommon wetland species was last seen in Cambridgeshire at Wicken in 1957, near the Hide on the Sedge Fen.

Herzogiella seligeri Decaying conifer log, Little Widgham Wood, TL664548, M.O.H., 10.2.2008. A very uncommon species in Cambridgeshire, only recorded since 2000 at Chippenham Fen and Hardwick Wood.

Leucodon sciuroides Small patch on trunk of medium-sized ash by footbridge over inflow stream, R. Cam, Tadlow Bridge, TL28314635, C.D.P., 8.12.2007. On one old Bramley apple tree, W. Norman's Orchard, Begdale Road, Elm, TL4606, C. R. Stevenson, 4.1.2008. In 2004 this species was found growing as an epiphyte in the county for the first time since 1933; these are the second and third such occurrences.

Orthotrichum obtusifolium 75–100 shoots spread over 25 cm^2 of a branch of a Bramley apple tree, growing with *O. diaphanum*, W. Norman's Orchard, Begdale Road, Elm, TL46130695, C. R. Stevenson, 31.12.2007, BBSUK, conf. G. P. Rothero (see *British Wildlife* 19: 217, 2008). The host tree is probably about 75 years old. An unexpected discovery of a rare British epiphyte with its only extant sites in eastern Scotland, although it was known in the 19th century in scattered sites in central and northern England. The only recent English record is an apparently casual occurrence of a single small tuft on a roadside elder in Norfolk in 1989.

Orthotrichum speciosum A few fruiting tufts on an ash trunk in a moist area of woodland, with *Amblystegium serpens* and frequent *O. affine*, Balsham Wood, TL58944953, M.O.H., 30.3.2008, BBSUK, conf. G.P. Rothero. The first vice-county record of a species which has its British headquarters in N.E. Scotland. It was last recorded in England in the mid 19th century, in Yorkshire and Sussex.

Orthotrichum striatum Over 100 freely fruiting tufts on a sloping ash trunk, with a little *Hypnum cupressiforme* and one tuft of *Ulota bruchii*, Balsham Wood, TL58694961, M.O.H., 30.3.2008. The third record of a species recorded previously from apple trees in a domestic garden in Cambridge in 1995 and an orchard in Leverington in 2006.

Plagiothecium undulatum Two small patches on decorticated rotting *Pinus sylvestris* log, Crishall Grange Plantation, *c*. TL455426, M.O.H., 26.1.2008. Large, vigorous patch on damp ground under brambles in an open area, Little Widgham Wood, TL662551, S. Damant, 10.2.2008. This calcifuge is common in Britain in the north and west but rare in Cambridgeshire, where it was last seen at Wicken Fen in 1999. It is not all that surprising to find it in the rather acidic Little Widgham Wood, but its presence in a plantation on the dry chalk uplands of southern Cambridgeshire is remarkable.

Polytrichum formosum Under Beech, Worts Causeway, TL4854, D.F. Chamberlain, 15.3.1961, E, det. M.O.H., 2007. When we revised the records of *P. longisetum* in the county (*Nature in Cambs*. 48: 97, 2006) we were unable to locate one from this site. We have

subsequently come across this specimen which was labelled *P. longisetum* but proves to be *P. formosum*, like most material from the county.

Pylaisia polyantha Fruiting plants on a branch of a Lord Derby apple tree, planted *c*. 1967, W. Norman's Orchard, Begdale Road, Elm, TL46090657, C. R. Stevenson, 26.11.2007. The second county record of a species discovered in Cambridgeshire in another orchard, at Wisbech St Mary, in 2004.

Tortula acaulon var. *schreberiana* On side of ditch, The Gault, Chattteris, TL38748659, C.D.P., 13.1.2008, BBSUK, conf. G. P. Rothero. This represents the first record from the county since Relhan's (1820) from Gamlingay Heath, but taxonomic doubts about the validity of this variety have discouraged bryologists from reporting it.

Zygodon rupestris On very old Bramley apple, Bunting's orchard, Popple Lane, Leverington, TL40820903, C. R. Stevenson, 14.11.2007, conf. C.D.P. Old Bramley apple, W. Norman's Orchard, Begdale Road, Elm, TL4606, C. R. Stevenson, 26.12.2007, conf. C.D.P. The second and third records of a species which was discovered in 2005 at the southern edge of the county

Liverworts

Cololejeunea minutissima Dense patches of plants with perianths and frequent gemmae, growing with *Dicranoweisia cirrata* and *Hypnum cupressiforme* on one willow in an area of *Salix* scrub in a low-lying disused brick-pit, Lattersey Local Nature Reserve, Whittlesey, TL28189652, C. R. Stevenson, 25.11.2007, BBSUK, conf. T. H. Blackstock. The first county record of a Mediterranean-Atlantic species which until recently had an almost exclusively coastal distribution in S. England and Wales. However, it is now spreading into more inland and northerly sites and we have been anticipating its discovery in Cambridgeshire for some years.

Riccia fluitans On wet peaty soil and in shallow water at the edge of a temporarily flooded arable field, with *Lemna minuta, Ranunculus sceleratus, Rumex palustris* and *Ricciocarpos natans*, between R. Great Ouse and R. Cam, Holt Fen, TL531744, C.R. Stevenson, 20.10.2007. This organically farmed field had been flooded as a control measure against eelworms and slugs. It is surprising to find *R. fluitans* and *Ricciocarpos natans*, both very scarce species in the county, in this transient habitat.

Sphaerocarpos michelii Abundant at edges of 'hoggin' path, Rose Garden, Anglesey Abbey, TL529622, D. Jordan, 24.3.2008, det. C.D.P. Vegetative *Sphaerocarpos* plants were first found at Anglesey Abbey on an excursion in March 2007 (see *Nature in Cambs* 49: 98, 2007). Shortly afterwards (23.3.2007) David Jordan found further plants here on the Rose Garden path, and this winter the Rose Garden population was much larger. By March 2008, when he showed the site to C.D.P., plants were frequent to abundant on the edges of the path for 30 metres, and thinly scattered for a further 25 metres. Both male and more numerous female plants were present. One capsule was ripe enough to identify the species as *S. michelii* at the time of collection but there were many green capsules and a further 15 were checked after they had been grown on to maturity. This is the second recent record of a plant first reported from the county in 1802 but not refound until 2006 (at Ashley).

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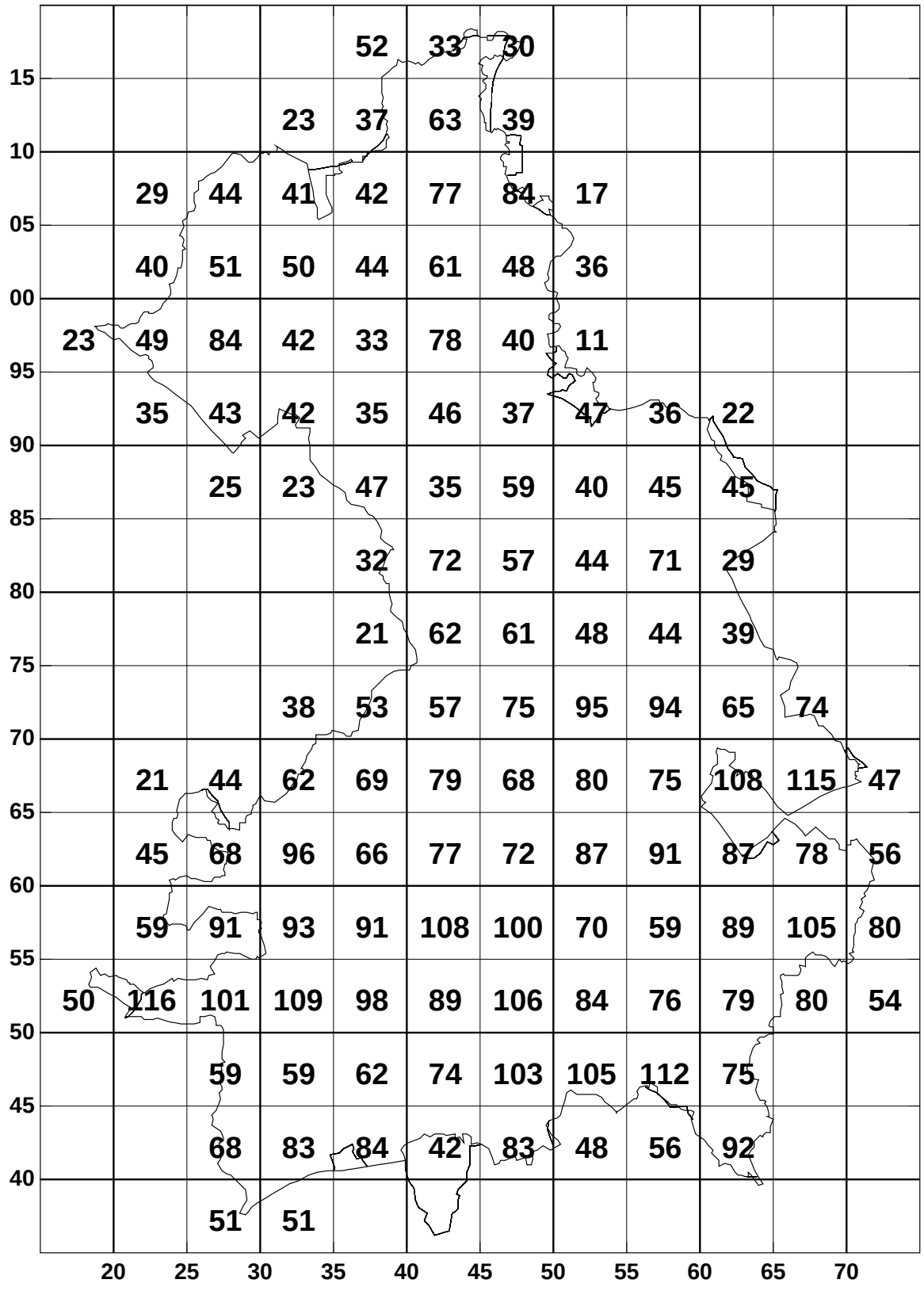

Figure 1. Number of bryophyte taxa recorded in each 5 x 5 square, 1 January 2000 – 20 April 2008.

Invertebrate records

Louise Bacon

This is the second of what will hopefully become an annual feature; records of invertebrates which have never or rarely been recorded in vc29, or showing unusual occurrence patterns from normal, or highlighting new recording / survey initiatives.

Contributions have come from various sources, mostly county recorders or other keen amateur naturalists, and have been compiled by the author. Records of significant invertebrates can be sent to the data officer at Cambridgeshire Biological Records Centre, Manor House, Broad Street, Cambourne (email via data@cpbrc.org.uk) and will be passed to county or national scheme recorders where appropriate.

Na and Nb are measurements of National scarcity based on 10km square distribution

Despite an apparently early start for some spring species, such as the early butterflies and bees, 2007 has not been a good year for invertebrate-studiers due to the cool, wet summer.

The main focus of the report this year will be on Longhorn Beetles (Cerambycidae) and also on Symphyta, where two individuals are starting out on the recording of this group and have made significant finds.

Lepidoptera (Butterflies and moths):

Migrant butterflies and moths were virtually absent, in sharp contrast to last year where several excellent migrant species were recorded (Bacon, 2007) The highlight of the year for some would be the addition of a new moth to the county list, albeit a small drab moth, but a significant find as it appears to be a wetland specialist – will we find it at other sites in the county? See ppxxx-y for a full report on the work underway on this species, *Emmelina argoteles*. So far, it has been found at Wicken Fen and Chippenham Fen.

Coleoptera, Cerambicidae (Longhorn Beetles):

The following records all come from a project being carried out by the Wildlife Trust Ecology Group on Boulder-clay Woodlands on this group of beetles and their relationship to flower-rich rides, woodland edges and woodland structure.

The two woods being studied are Gamlingay and Hardwick woods, and a team visited each wood during the main season of May to July, on a fortnightly basis, to perform visual searches for longhorns as well as investigating the effectiveness of other techniques.

Several good species, (Nationally rare or scarce) were recorded, including a new species for the county, which has been verified by the National recorder, Martin Rejzek of Norwich.

Gamlingay Wood:

Obrium brunneum (new to vc29) 17 June 2007, on Dogwood flower, Peter McMullen

Molorchus umbellatarum, (Nationally scarce Na, occasional in this area) 1 July 2007, on Hogweed flower, M. Faiers, P. McMullen, C. Newell

Anoplodera rubra, (vc31 part of wood) 15 & 29 July 2007, on Hogweed flower, J. Clark, M. Faiers, P. McMullen, C. Newell, D. Seilly. This species also recorded in 2006 at Diddington Wood, Huntingdonshire by V. Lea. These may constitute the first records for modern Cambridgeshire, but unfortunately, a few yards outside of vc29 in Gamlingay Wood.

Hardwick Wood:

Anoplodera livida (Occasional in this area) June 2007. Several sightings in the Toft / Hardwick wood area, C. Sinclair

Grammoptera abdominalis (Nationally scarce Na, rare in Cambridgeshire) Mere Way (Hardwick Wood), V. Lea, C. Sinclair, L. Bacon, Prof J. Baldwin, Dr J. Baldwin, A. Copping, D. Price. Has been recorded in the wood in 1985 and in the 19th century, when it was known as *G. variegata*.

Several other Nationally scarce longhorns, and the Monks Wood Beetle *Osphya bipunctata* (Nationally Rare RDB3) were found in these woods, but these records will not be included here.

Hymenoptera, Symphyta (Sawflies):

Symphyta are not an easy group to identify, but are important ecologically - they are either dead-wood feeders or leaf-eaters. The latter can be horticultural pests. Two local amateurs have started to record this group, and serendipitously have made several very important records, all of which have been verified by the National Scheme recorder, Guy Knight of Liverpool Museum Entomology collections.

The author has also been recording sawflies in several parts of southern Cambridgeshire, and whilst statuses within the county are very uncertain due to the low recording level in this group, will highlight the best finds here.

Cimbex lutea. Ian Barton recorded this species at Stretham on 8 July 2007. It is rarely recorded in the UK, and is a large, wasp-like insect, feeding on birch and poplars. There is a handful of records for the county, all in the Victoria County Histories (Cambridgeshire 1936, Huntingdonshire 1926), dating from the 19th Century, but his is the first record since then. Its rare, but more frequently encountered (since the late 1990s) relative, *Cimbex connatus*, was found in Cambridge in 1999 (Swale, 2000). This latter species has been found across 10 counties of southern England in the last ten years, following a half century of not being found.

Urocerus gigas (Giant Wood-wasp), whose larvae feed on wood rather than foliage, was also recorded by Ian Barton at Stretham in the summer, but is thought to have emerged from imported timber.

The third exciting find within this group was of a female of *Xiphydria longicollis*, again a wood-feeder. This species is very distinctive - large, black and cream with its spherical head on a stalk. There are two commoner *Xiphydria*, but this species was not recorded in Britain until 1984 when it was first documented from ancient Oaks in Windsor Great Park. Since then there have been 4 records, (Wisley, Harpenden, Maidenhead and Monks Wood). The author

identified this insect from the specimen found by Vince Lea in Hardwick Wood on 6th October 2007.

Allantus togatus, Gamlingay wood to MV light, 18 June 2007. Benson (1952) gives the status as local in England, and Guy Knight cites this as a species he rarely encounters.

Macrophya punctum-album, Hardwick Wood, May 2007, field observations. Locally common in England.

M. annulata, Coton, Field Observation, Late May 2007. Common north the Wash and Severn.

Priophorus brullei, Barton, April 2007, Field Observation. Locally common in England.

Hymenoptera, Aculeata (Bees and Wasps):

The bumblebee species *Bombus hypnorum* has been recorded for the first time in both vc29 Cambridgeshire and vc31 Huntingdonshire, this year. This species first appeared in the UK in 2001 and is the only UK bumblebee with ginger thorax, black abdomen and white tail. A nest was found in Huntingdon, vc31, by Henry Berman, the Huntingdonshire bee and wasp recorder. Singles were also observed on the lane to Hayley Wood (Mark Ricketts, Wildlife Trust) 27 June 2007, and at Over Railway Cutting (Trevor Grange, Volunteer Warden), 27 August 2007. Unfortunately, the latter site will have disappeared under a new guided-bus project by publication. This species will continue to spread, and has now reached the north Midlands, and further records are expected for the county in future years.

Dictyoptera Contributed by Dr Chris Preston

Australian Cockroach, (*Periplaneta australasiae* (Fabricius, 1775)). Collected in the evening in a newly restored glasshouse (westernmost house in main glasshouse range), Cambridge Botanic Garden, Cambs.,(vc29) TL453572, 23 August 2007, C.D. Preston, det. Peter Sutton.

The cockroach invited itself to a buffet supper. Records on the NBN Gateway include one previous record of this introduced cockroach from the Botanic Garden, a specimen collected in October 1893. There are records from a further 36 10-km squares in Britain, and the sites include the Botanic Gardens at Birmingham, Edinburgh and Kew as well as private hot houses and orchid houses.

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OBITUARIES

Margaret Stanier (1919-2007)

From the earliest days of the Naturalists' Trust Margaret Stanier, who died on 13th September 2007, made an important contribution to conservation in Cambridgeshire, especially on the Devil's Ditch, for which she was Honorary Secretary of the Management Committee (and its successor bodies) for 30 years, and Honorary Warden for much of the time. She was also Nature Trails Adviser to the Trust in the early 1970s, and Co-Editor of Volumes 8 and 9 of this journal (with Philip Hall, see his obituary below).

Margaret grew up in Winchester. Both of her parents were keen amateur botanists, and her mother a trained horticulturalist. While at St Swithun's College, Margaret won a Scholarship to Somerville College, Oxford, where she read Animal Physiology and Biochemistry. She began research in the Biochemistry Department of the Radcliffe Infirmary, and from 1947 to 1955 she was at Makerere College, Kampala, Uganda, teaching physiology to medical students and doing research. For her study of the blood proteins of a tribe with a high-protein diet she was awarded her D. Phil.

In 1955 she came to Cambridge to work in the University Department of Experimental Medicine, and from 1961 at the ARC Animal Research Laboratory at Babraham. From 1962 to 1984 she was a Fellow of Newnham College, College Lecturer in Physiology and Director of Studies in Medicine and Veterinary Sciences.

Soon after moving to Cambridgeshire she joined a group of volunteers who frequently ran conservation work parties at weekends, which were summarized in the Annual Reports of CAMBIENT in this journal. A photograph of a party of about 1962, including Margaret, hard at work in Coploe Pit, Ickleton, can be found on the inside of the back cover of No. 41 (1999).

In 1964 Margaret moved to Swaffham Prior, and was soon taking an active part in village life. On 14th May 1970 at a meeting in Burwell House she became an inaugural member of CAMBIENT's Management Committee for the Devil's Ditch, and from September 1972 Honorary Secretary. The Committee concerned itself with the state of the whole of the 11 km of the Ditch from Wood Ditton to Reach, and normally walked its length once a year to check on any developments affecting the plants and animals. However, its chief rôle was to determine what management should be done by the members of the Conservation Corps (later Conservation Volunteers) and other groups of volunteers on the section that runs southward from a little north of the defunct Cambridge-Mildenhall railway, over Galley Hill, to the 'Ditch Farm section' (TL574654 to TL589640). Efforts were made particularly to preserve the natural history interest of the grassland. Following myxomatosis in 1953-54 that had killed off the rabbits and allowed the growth of coarse grasses and scrub, invaluable conservation work on the S.W. slope of Galley Hill, and the N.E. slope north of the Burwell Road, had been funded and directed by Mr John Clarke, who owned and farmed the adjacent land. The Committee, which

included John Clarke, extended that work to stretches that were owned privately by other farmers or by the County Council.

Margaret threw herself into the work of the Committee. Whenever management was carried out (mostly flymowing of grassland and cutting back of scrub), she took an active part. In 1987, when the Wildlife Trust (which had succeeded the Naturalists' Trust) shut down most of its Management Committees, she was adamant that we should continue meeting (under the name of 'Devil's Ditch Committee') and within a few years the Trust was again seeking our advice. However, by February 1995 the Committee felt it had to disband itself, severing the remnant formal connection with the Trust, and began to meet as the 'Friends of the Devil's Ditch', continuing to record the state of the Ditch, keeping a record of photographs and newspaper cuttings, and making representations to relevant bodies. In 1988 the County Council had renewed the lease on Ditch Farm, and introduced sheep-grazing to the Ditch for first time since the 1930s, and the small amount of management by volunteers became focused on the sections still occupied by scrub. Margaret collected from Mr Andrew Hill, the tenant at Ditch Farm, detailed records of the grazing he had carried out. She was also the link between the Friends and those who organized the protracted discussions that eventually led to the setting up of the Devil's Dyke Restoration Project 2002-2006, funded partly by the County Council, Wildlife Trust and English Heritage, but chiefly by the Heritage Lottery Fund. Margaret resigned as Secretary in May 2002 (when she was 83!), but remained active as a Friend until prevented by ill-health in January 2006.

Margaret will be remembered particularly for her involvement in the earliest efforts to clear scrub and replace it with chalk grassland. The first stretch cleared (in the winter of 1970-71) was south of Galley Hill, and is still known affectionately as the Gobbett-Stanier plot, named for Margaret and the then Chairman of the Management Committee Derek Gobbett. They quickly found that ground bared of scrub was invaded not by chalk grassland plants but by Cleavers (*Galium aparine*), Sowthistle (*Sonchus asper*) and other vigorous weeds. After a few years the common perennial grasses found on roadsides became the long-term dominants, along with regrowth shoots of the shrubs. That set off a research programme led by myself, and the co-operation between researchers and conservationists which developed the practice of sowing onto the bared soil seed of Erect Brome Grass (*Bromus erectus*) which drives down the soil fertility level in a few years, and provides a suitable background for reinvasion by chalk grassland herbs. Margaret wrote enthusiastically about this work in her articles in this journal in 1989 and 1993.

Margaret possessed an extraordinary range of gifts and interests, being both a very practical person and an effective organizer. She loved woodwork, and made furniture and toys for her relatives. She learned to spin, and knitted beautiful garments from the spun wool. She became an expert on ringing both hand-bells and church-tower bells (though a friend does remember some rather dodgy rope-handling that terrified people around the diocese in her last years!). At Newnham she looked after the telescope, and introduced students to astronomy. She joined the British Sundial Society in 1990, and soon became the

Editor of the Society's quarterly Bulletin, to which she contributed many articles. She designed or made sundials for friends and relatives around the world. She loved travel, ranging from the rain forest of Tasmania to the muskeg of Alaska. Margaret was a very kind and generous person, who inspired affection and respect in all her fields of activity, and those who care about conservation are deeply grateful that she decided to direct so much of her energy to that cause. I am much indebted to Margaret's sister, Jean Velecky, for information on Margaret's early life.

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Peter J. Grubb

Philip Gibbens Hall (1918–2007)

Philip Hall was the first Honorary Editor of *Nature in Cambridgeshire*, taking on the task in 1957 and retiring from it in 1966 after editing nine issues, the last two jointly with Margaret Stanier (see her obituary above). He shared with me not only a Christian name and recruitment to this editorial role by Max Walters but also a clerical father, a background in Classics and residence in Panton Street, Cambridge.

Philip was born exactly one week after the end of the First World War, in Holcombe, Somerset. His father was a Methodist Minister who worked in rural Cornwall and Cheshire as well as Somerset and was later ordained a Priest in the Church of England, serving as a Curate at Hulme and as a Vicar in Bolton and Unsworth, Bury. Philip attended Seymour Park Primary School, Old Trafford, became a Foundation Scholar at Manchester Grammar School and from there won an Open Scholarship at Trinity College, Cambridge, where he gained first class honours in the first part of the Classical Tripos, going on to specialise in philology. This extremely shy young man was perhaps not best suited to so large a college, but he made a lifelong friendship there with the late John Ounsted, a notable botanist and pacifist who was later Headmaster of Leighton Park School, each becoming the godfather of one of the other's children. As a conscientious objector himself, Philip was drafted into forestry work in the Second World War, during which, despite the hard work of cutting pit-props, his longstanding love of the countryside developed into a deeper understanding of trees and wildlife. Based at Stocksbridge during part of this time, he strengthened his undergraduate acquaintance with Max Walters, also a pacifist (see *N. in C.* **48**: 3).

Not long after the war Philip returned to Cambridge to work for the University Correspondence College, specialising in Latin and Ancient Greek but

also overseeing modern languages, having some knowledge of 13 of them! In 1951 he married Catherine (*alias* Scilla) Murrell, an archivist whom he met at Little St Mary's Church. When CAMBIENT was founded in 1957 and Max Walters was keen to start a journal for it and the Cambridge Natural History Society, he asked Philip to become its Editor. When the U.C.C. became the National Extension College in 1965, Philip moved to Cheshunt Grammar School, commuting by train, and handed over the editorship of *Nature in Cambridgeshire* to Ian Hepburn, an author-naturalist who had recently retired from the post of Second Master at Oundle School. While at Cheshunt, Philip undertook some individual coaching in Latin for Cambridge University's History Faculty, including teaching mediaevalists; this he continued long into his retirement. When he left the school at the age of 60, he worked at Hobson's Press in Bateman Street close to his home, where he did some editorial work for the Careers Research Advisory Service.

For the first five issues of *Nature in Cambridgeshire* that he edited Philip found appropriate quotations from Roman poets to end his editorials, apparently expecting his readers to know enough Latin to understand them! (There is now no evidence whether he then ran out of suitable quotations or was persuaded to give up this practice.) Today three things stand out in these editorials – the fact that *Nature in Cambridgeshire* was then the publicity organ for the newly founded Naturalists' Trust (its objects being described as "to make the aims and activities of the Trust known to a wider public and to encourage an interest in the natural history of the county"), a concern for a better balance in its articles between the various branches of natural history (not just "plants and insects") and an interest in the wider national scene of nature conservation ("the fate of Dungeness", the first National Nature Week in May 1963, increased development in South-East England and growing concerns about the effects of pesticides). The editorial in No. 5 appeals to readers to "seize the opportunity of becoming Friends of Hayley Wood", CAMBIENT's first land purchase, and ends:

> "At rabidae tigres absunt et saeva leonum
> "Semina, nec miseros fallunt aconita legentis."
> (But ravening tigers and the savage offspring of lions are not found there and no aconites delude their hapless gatherers.)

Quoting these two lines from Virgil's *Georgics* (2: 151–152) to describe "this county of Cambridgeshire", Philip wrote "even if coypu turn up occasionally"; but he did not mention the Hayley Wood deer or the poisonous property of its Dog's Mercury!

Philip's interest in nature was shared by Scilla and has been passed on to his children and grandchildren. I am very grateful to Scilla for her help in drafting this obituary.

Philip Oswald

BOOK REVIEWS

Chapters in the life of Robert Marsham (1708-1797) By Tim Sparks & John Lines (2008). Published with assistance from the Woodland Trust and NERC Centre for Ecology & Hydrology. ISBN 0 9504499 6 2

'Very flat, Norfolk.' Stratton Strawless is on the high flat bit, between Norwich and the coast, where the large Marsham family held an estate. Robert Marsham (1708-1797) spent most of his long life there, much of it – almost from childhood – engaged in the planting of trees (as a means of soil improvement), and the study of their growth. He also diligently recorded, year by year from 1736, the dates of a number of 'signs of spring', a task that was continued by his family until 1958 'when they were advised that the records were no longer of interest'. Thirty years later the UK Phenology Network was started: Marsham, having started the longest British record of phenology known recorded in one place, is now widely regarded the father of British Phenology, A member of *Nature in Cambridgeshire*'s Editorial Board, in collaboration with one of our loyal subscribers, produced this small book in the tercentenary of Marsham's birth.

The book brings together such fragments as the authors have traced of Marsham's life and work – some in his own words, some from other sources such as the Norfolk Record Office, the *Transactions of the Norfolk & Norwich Nat Hist Soc*, and Marsham's own contributions to the *Phil Trans Royal Soc*, to which he was elected a Fellow in 1780. It also includes a history of the family and their doings, life and times in Norfolk, London and elsewhere.

To us in Cambridgeshire the interesting bits concern Marsham's interest in natural history, particularly in trees – he planted perhaps millions on the estate, as a means of improving the thin soils of the plateau – particularly the follow-ups – measurement and treatment.

Among surviving fragments are Marsham's annotations of his copies of Willughby & Ray's *Ornithology* (see Hall, 2002) and Gilbert White's *Natural History of Selbourne*. White and Marsham never met and 'discovered' each another only in old age, with a busy three-year correspondence until White's death. The fate of swallows in winter had just about been worked out by this time, but they were still sceptical. Minute observations on some birds implied that they were shot: of Fieldfares 'they taste very bitter'.

Humphrey Repton credited Marsham for several of his ideas on landscaping country estates and recognised some of his successes in getting trees to grow at all and the layout of plantings both for visual effect and success of growth.

Most of Marsham's plantings were clear felled for timber in both World Wars and so, like his writings and information on his life, only fragments remain. One proud survivor, the 'Stratton Cedar', planted in 1747 and now over 100 ft tall, stands proud of the younger woodland surrounding it. It is visible from the A140 as you drive from vc29 to the Norfolk Coast. Better still (in 2008), visit the Marsham tercentenary exhibition at the Church, where copies of this book are available; or send £5 (inclusive of p&p; cheques payable to

Stratton Strawless PCC) to Mrs Waddingham, Church Farm, Church Road, Stratton Strawless, Norwich NR10 5LN.

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Jane Bulleid

Nature of God's Acre: a wildlife survey of Cambridge's churchyards 2006. Cambridgeshire & Peterborough Biological Records Centre & Cambridge Greenbelt Project. 64pp. Available free from CPBRC, The Manor House, Broad Street, Cambourne CB23 6DH.

Churches have long been appreciated as buildings. In 'old' Cambridgeshire we are lucky in having a superb website (www.druidic.org/camchurch) which complements the dry architectural descriptions in 'Pevsner'. In recent decades the importance of the surrounding churchyards for wildlife has also become recognised. This attractive booklet presents the results of a survey of 20 cemeteries and churchyards in Cambridge city. Each account follows a standard pattern, and is illustrated by a map of the churchyard along the lines of a garden plan, showing paths, trees and herbaceous plantings. The accounts start with a General description, which often says who manages the churchyard. I had not realised that some city churchyards are managed by the council – indeed, the front of Little St Mary's churchyard is managed by the council and the (much more attractive) back by the parishioners. The introductory paragraph is followed by sections on the Flora and Fauna (which concentrates on trees and nectar plants) and on Management. The latter section includes some useful recommendations, but also a long and rather platitudinous sentence about lichens which appears in identical form in most of the accounts.

The age of a churchyard must surely influence its wildlife, and it is a pity that the accounts don't state whether the site has a Medieval, Victorian or more recent origin. It would have been useful to have some references to further reading, and in particular to *Wildlife in church and churchyard* by Nigel Cooper (ed. 2, 2001) and *The churchyards handbook* edited by Thomas Cocke (ed. 4, 2001), both published by Church House Publishing. I also missed any indication of the affection that churchyards evoke. We all have our favourites – I particularly like St Giles Cemetery and dislike the Round Church (perhaps because when I recorded mosses in the latter I had to avoid vomit on the perimeter wall!). The whole booklet is strangely impersonal, with no author and no mention of the people (presumably volunteers?) who carried out the survey. It also lacks any statement of publisher, printer, date and place of publication and ISBN number. Nevertheless, it is a welcome publication that has certainly encouraged me to ensure that I visit those sites I have not yet been to, and will, I hope, increase public awareness of these "oases for wildlife in a bustling modern city".

C. D. Preston

A History of Ornithology. Peter Bircham. New Naturalist Library No. 104. HarperCollins, London, 2007. Hardback: ISBN-10: 0007199694 ISBN-13: 978-0007199693 £45.00. Paperback ISBN-10: 0007199708 ISBN-13: 978-0007199709, £25.00

A stalwart of the Cambridgeshire birdwatching community for many years, who produced the most recent county avifauna in 1989, Peter Bircham has now ensured a legacy of future reference in the latest addition to the seminal New Naturalist series, *A History of Ornithology*.

Printed in the front of each New Naturalist publication is a mission statement stating *"The aim of this series is to interest the general reader in the wildlife of Britain by recapturing the enquiring spirit of the old naturalists"*. This volume certainly fulfils in charting the activities of Britain's birdmen (and it is near enough all men) from Anglo-Saxon times through to the modern day. By default the enquiring spirit of the old naturalists is presented and given ornithological context and narrative as it evolves with increasing speed and diversity through the centuries. Brief biographies, excerpts from publications, correspondence, anecdotes, analysis and generous illustration are used to breathe life into the characters that punctuate the study of British birds.

Bircham breaks up the 20 chapters into bite-size mini essays, often focusing on a specific individual and their contribution to the science. This contribution ranges from the unknown chronicler of Solan Geese (Gannets), Ernes (Eagles), Terns and Kittiwakes in the magical Anglo-Saxon poem *The Seafarer*, to the championing of John Legg's *Discourse on the emigration of birds*, a little known booklet from 1780 full of pioneering hypotheses on migration that "seems to have disappeared from the radar of many of the more recent writers".

As the archive of ornithology builds up the progression of knowledge is illustrated along several concurrent fronts. The relationships and influence of predecessors and peers is highlighted for most named players and key themes are discussed whilst a clear narrative route is maintained leading the reader towards the next era of discovery. This is a successful approach, particularly through the 17th, 18th and 19th centuries. However, through the 20th century, although the narrative remains intact the momentum seems difficult to maintain. Obviously there is far more material appearing at this time, but perhaps the lack of focus is also due to the author's caution not to repeat the content of two recent publications that document this period. Both in review and anecdotally, D.I.M. (Ian) Wallace's *Beguiled by Birds* and Stephen Moss's *A Bird in the Bush* are page-turners that give a vivid and punchy story of the broadening democratisation of birdwatching and field ornithology through the last century. Bircham's decision not to review or analyse the work of any living ornithologist is both diplomatic and informed but does leave the reader a little unfulfilled on completion of the final chapters particularly when, maybe unfairly, compared to the previously mentioned publications.

A notable thread through the ages, from the viewpoint of a Cambridgeshire birdwatcher, is the prevalence of Cambridge, its University and environs as a

focal point for ornithological pioneers. John Ray and Francis Willughby were both fellows of the University and their authorship of *The Ornithology* produced the first cohesive scientific work on British birds in the late 17th century. The British Ornithological Union emerged at Magdalene under the watchful eye of the grandfather of modern ornithology Alfred Newton, a brilliant man by all accounts: "*He was staunch in his friendship, firm in his opinions and he invariably followed with a dogged perseverance that which he held to be right*". The kind of man who in 1862 turned away from being ordained as Bishop of Ely and in 1863 (only 4 years after the publication of *The Origin Of Species*) received a letter from Charles Darwin thanking him for his unqualified support having published work specifically illustrating Darwinian principles. More recently Bernard Tucker, a great modern field ornithologist, was involved in the formation of the Cambridge Ornithological Club and the single-minded fieldwork of David Lack in the middle of the 20th century also had its roots at the University. Although eliminating himself from meaningful reference by still drawing breath, D.I.M. Wallace, certainly an influential ornithological character in the latter half of the 20th century, also studied at Cambridge.

Personal highlights through the book are many and include Thomas Pennant's description of the 18th century fenland avifauna awash with Black Terns, Black-necked Grebes, Avocets, Ruff and Godwits. There are also some well-chosen quirky and amusing quotations dotted around such as "*Your objections to Spain are, I think groundless. Garlic certainly exists but its consumption is by no means compulsory.*" and " *He kept badgers in his room, snakes also… on the roof of the cab, was a cage containing an eagle owl, and within the cab were two armadillos which subsequently ate the landlady's cat.*"

The volume is richly illustrated with many relevant portraits and examples of contemporary bird art, but on the downside, the space given to photographs is wasted at times. A brief search of the internet will reveal many excellent images of British birds produced by amateurs who would have gladly contributed their images for little remuneration. I believe the decision to include images of inconsistent merit by one main photographer has been to the detriment of the overall aesthetic and a missed opportunity to include some truly stunning images by a range of photographers. Another more fundamental grumble is the misidentification of an illustrated Black-throated Diver (from Ray/Willughby's *Ornithology)* identified as, and compared directly with, a Great Northern Diver. This misidentification also impacts on the historical British List compiled in the appendix as the first Black-throated Diver record should be dated 67 years earlier than it is.

Peter Bircham has certainly produced a labour of love in researching, collating, analysing and presenting a vast amount of material sourced from a millennium of human observation of our feathered friends. *A History of Ornithology* is successful in offering a concise, sequential overview of the published annals, their writers and their influence upon the unfolding body of knowledge. As a read it requires commitment at times, but I would agree with the editor's preface: "No reader will be left complacent, nor will they put this

book down without having extended their background knowledge, including numerous gems of revelation and surprise."

Duncan Poyser

Weather Notes from Cambridge University Botanic Garden 2007

John Kapor

The following account is based on the observations and records from the Botanic Garden during 2007. January was mild with -3.0°C being the sharpest air frost. There was 1 cm of snow on January 24th, but it was February when the garden took on a more wintry appearance with 3.8 cm of snow falling on Feb 8th and the sharpest air frost of the year was just prior to this with -7.4°C on Feb 7th. This didn't last, as by Feb 10th milder conditions returned and 12.9°C was reached on Feb 15th.

During March rainfall became less and this trend continued into April, which turned out to be exceptionally dry with only 1.9 mm of rainfall. There were 20 days from April 3rd to 23rd when there was no measurable rainfall in the garden. Consequently the garden started to take on a thirsty appearance and there were even patches of brown grass appearing and some of the herbaceous plants were already showing signs of stress. The first five days of May continued the dry theme, and then a significant change occurred as much more unsettled conditions became established and the remainder of the month saw bands of heavy rain and showers. This resulted in a very wet month for Cambridge with 131.1 mm falling and two note-worthy 24-hour periods were 21.4 mm on May 10th and 40.7 mm on May 27th. It is worth noting how exceptional it was to have one of the driest months for years followed consecutively by one of the wettest for a considerable amount of time.

June and July were both wetter than average, so despite the early dry start to the spring, plants and lawns were green and lush again. We had to wait until August 5th to get our highest summer temperature when 30.1°C was reached. Then by September conditions had settled down somewhat and the month ended with a total of 22 mm of rainfall.

October this year was cooler than the past two years with the temperature failing to reach 20°C and there was a slight air frost on the 20th of -0.2°C. Rainfall wise, more than half the month's rain fell on the 16th with 35.1 mm in 24hrs. Luckily the Garden's 11th annual Apple Day was blessed with perfect conditions with unbroken sun helping to pull in the crowds. November was drier than average and had six air frosts, but none of these were particularly sharp with the lowest temperature being -3.7°c. This meant that, like last year, because there were no sharp frosts the autumn leaves dropped only slowly and the colours lasted in patches for a longer period.

December was also on the dry side with a particularly dry spell between the 10th and the 23rd when only 0.6 mm of rain were recorded.

Monthly Mean Temperatures (°C) and Rainfall (mm) for 2007

Month	Maximum	Minimum	Rainfall per month (mm)
January	10.5 (14.5)	4.4 (-3.0)	55.7
February	9.8 (12.9)	2.9 (-7.4)	49.3
March	12.7 (18.4)	3.0 (-4.0)	21.4
April	18.1 (23.3)	5.5 (-1.0)	1.9
May	17.4 (25.0)	8.4 (1.9)	131.1
June	20.8 (24.3)	11.4 (4.8)	68.3
July	21.4 (24.6)	12.0 (6.5)	68.2
August	21.5 (30.1)	11.2 (6.2)	51.1
September	19.7 (25.6)	10.4 (3.2)	22.0
October	15.4 (19.4)	7.1 (-0.2)	55.2
November	11.1 (16.6)	3.3 (-3.7)	34.3
December	8.5 (14.7)	2.4 (-4.6)	38.7
Total			597.2

Figures in parentheses are individual highest and lowest temperatures

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Compiled by Dr Toby Carter

Editors of the Journal

Vols. 1 – 7 (1958 – 1964) Philip G. Hall
Vols. 8 – 9 (1965 – 1966) Philip G. Hall & Margaret Stanier
Vols. 10 – 17 (1967 – 1974) Ian Hepburn
Vols. 18 – 21 (1975 – 1978) Eric J. Wiseman
Vols. 22 – 42 (1979 – 2000) Philip H. Oswald
Vols. 43 – 50 (2001 – 2008) Henry R. Arnold

Index of general subjects

Index of people

Index of organisms

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Listed for the first word, excluding any definite or indefinite article.

Plate 3. Stellate Sturgeon (*Acipenser stellatus*) from Fenstanton (Photograph by Henry R. Arnold). See article on page 73.

Plate 4. The plume moth *Emmelina argoteles* from Wicken Fen. (Photograph by Jeff Higgott) See article on page 79.

Plate 5. Caterpillar of the plume moth *Emmelina argoteles* from Wicken Fen. (Photograph by Alan Roscoe) See article on page79.

Plate 6. Cambridge Bryological Society Seventieth Anniversary Excursion to Little Widgham Wood, 10th February 2008. See Bryophyte Records, page 124.