TRANSACTIONS of the NORFOLK & NORWICH NATURALISTS' SOCIETY

Volume 41 Part 1 2008

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Publisher: Norfolk & Norwich Naturalists' Society. ISSN 0375 7226

Arthur Patterson – the life of a great Norfolk naturalist

Presidential Address delivered to the Society on 20 November 2007

Mark Cocker
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Ladies and gentlemen it is a great honour to be standing here and talking to you as the President of an organisation I've belonged to and whose existence I've valued hugely for 20 years. It is also a great pleasure to be addressing you about one of your own, a person who, 150 years ago, would have been exactly four weeks and four days old today. The subject of my address once wrote: *The lives of good, interesting and unique individuals never ought to pass away unnoticed into oblivion.* My short talk is intended in a small way to ensure that such a thing shouldn't happen to Arthur Henry Patterson.

That was the name given to the baby boy born a century and a half ago. As many will already know he grew up to be one of the great Norfolk naturalists. The first question I want to tackle in the context of Patterson is how do we define what is a great naturalist? Is it the depth of her or his knowledge, the range of that knowledge, the range of output in terms of writings, collections and other physical products, or is it simply the depth of impact on people around him?

In the case of my subject I don't think it really matters how you choose to measure what makes a great naturalist, because Patterson would be judged one by any of these criteria. He was deeply knowledgeable about marine life and fish, both freshwater and salt, he was a skilled ornithologist and was passionate about almost anything that moves or grows.

He wrote articles for half a century in a range of East Anglian newspapers, and was the precursor, in fact in some ways he was the originator of the wildlife columns that still flourish today in the Eastern Counties Newspapers. In addition he wrote somewhere between - I find it difficult sometimes to decide whether it's a short book or merely a very long pamphlet - 20 and 30 titles on a huge range of subjects. These include primitive methodism, and how to become a puppeteer and create shadow entertainments, but of course

mainly about the wildlife around his native Great Yarmouth and Breydon estuary. The most important of his works are:

Catalogue of the Birds of Great Yarmouth 1901
Notes of an East Coast Naturalist 1904
Nature in Eastern Norfolk 1905
Wildlife on a Norfolk Estuary 1907
Man and Nature on Tidal Waters 1909
Rough Notes on the Fish and Fisheries of East Suffolk 1910
Wild-fowlers and Poachers 1929
A Norfolk Naturalist 1930

During his life he must have produced many millions of words. In turn these helped to seed the great efflorescence of interest and concern for wildlife during the course of the twentieth century. Another great Norfolk naturalist said of him:

> *He wielded this influence largely through the publication of fifteen books on these particular subjects between 1892 and 1930 - books racy in style and very full of incident, often characteristically Robinson Crusoe-ish in spirit, and they were illustrated in most cases with lively pen and ink sketches by the author.*
>
> *He adopted the pseudonym of 'John Knowlittle' in 1896 and contributed thousands of articles on Norfolk wildlife to local newspapers and to journals like the old* Zoologist, *the* Fishing Gazette *and* Country Life *for half a century. His bulky notebooks, preserved in Norwich Public Library, reveal a rich and varied natural history correspondence, and they record his contacts with an ever-growing number of visiting naturalists in the course of the years.*
>
> *He was skilled in producing life-like sketches of birds with lightning speed and it was his habit to illustrate the many public lectures that he gave in this way. He was a popular speaker at schools and village institutes up and down the county and did much to attract the attention of the local public to natural history - and these were the days before wildlife films and BBC talks had come to spread an educative influence in this field. Almost without exception, the envelopes of his letters were decorated with amusing sketches a propos of their contents He must have given pleasure to hundreds of postmen on their daily rounds and in so doing awakened further interest in the minds of strangers.*

The man who wrote this also learnt some of his trade at Patterson's shoulder,

and I'm tempted to say, at his heel, because Patterson referred once to the teenage Ted Ellis as 'his spaniel'. I think it was intended very affectionately and, of course, if Ted was his spaniel then I am in turn Patterson's Cocker spaniel.

So, to recap, Patterson was an expert, he disseminated his expertise and his love of wildlife as widely as possible and he put his expertise to good use in publication. I think, however, there is one other category that distinguishes Patterson's achievement from almost every other great early naturalist that I've come across, except perhaps the Victorian ornithologist and Audubon collaborator, William Macgillivray. Patterson was born into acute poverty. The fact that Patterson grew up at all seems to me to be a rather miraculous achievement, given that all of his other six brothers and sisters died, largely of tuberculosis, before the age of 21. Of the seven, he was the only survivor.

What does that tell us? It tells us I think that he was very fortunate. I think it also indicates where some of that irrepressible *joie de vivre,* which one senses in Patterson's writings, had its origins. I suspect he was determined not to waste a drop of his precious life.

I think it demonstrates equally the level of poverty that Patterson endured. His father and mother, both strict Primitive Methodists, lived in the Rows of Great Yarmouth, a notoriously cramped warren of small poor houses, with waste thrown into open gutters to run down to open drains on the quay. As a consequence, dysentery and other illnesses of damp, insanitary conditions were rife, including TB. His own mother died of it when AP was just three in 1860.

There is a photograph of him just before that age and in it the weary and prematurely aged mother Mary cannot be much more than 40. Yet she looks about 70. By that date, around 1859, four of the children were already dead. Henry senior kept naming sons after himself. It took three goes for that title to be carried forward into the next generation, and that only as AP's own middle name.

I think it is almost impossible for us now to bring into focus how much natural history was the preserve of the wealthy, usually the landed classes. Typically Charles Darwin the co-originator of the theory of evolution never had to 'work' in his life. He was a man of leisure and many of his peers were titled or landed aristocrats, who were in essence highly gifted amateurs. They were the ones who had time to develop the expertise and they had the wherewithal to convert knowledge into collections and publications. That Patterson was

able to find an outlet for his own words, latterly through the London-based publisher Methuen, is a remarkable achievement in its own right.

In his early life you can see Patterson trying to find a way to express his talents as a communicator. And this I think is his chief contribution. He was one of the earliest popularisers of nature and wildlife. But one of the more eccentric schemes by which he did this was accompanying an exhibition of a Minke Whale killed when it strayed into Yarmouth harbour. It was hauled ashore and preserved with nearly two hundredweights of preservative and then displayed in a shop at the foot of St Peter Mancroft's Church in Norwich. Later in May 1892, when he was 35, Patterson went on local tour with the whale, spending two weeks in Norwich and then travelling with the stuffed beast, first to Lowestoft and then Yarmouth for the summer season.

Patterson also had stints as an assistant keeper in Preston and Dublin Zoos, which he later put to good use in the second of his books *Notes on a Pet Monkey* and then in another called, *The Amateur's Zoo*. I think he strayed as far as possible from his core subject - the wildlife around his native town - simply because the outlets for an enthusiast like Patterson were so limited. Eventually he found a proper vehicle for real natural history in books such as *Catalogue of the Birds of Great Yarmouth* in 1901. But I think we need to bear in mind that, despite Patterson's huge output, he never earned anything from his publications. Towards the end of his life he calculated what he'd received for, and what he'd spent on, researching and writing his books. He estimated that he made £167. 15s from sales; unfortunately the expenses came in at £237. 10s.

That wasn't the only problem. He was so poor that in the early 1890s he allowed someone called WW Spelman to use his compiled list of fishes caught in and around Yarmouth as part of another publication. Shortly afterwards, the checklist was published separately *without* Patterson's knowledge and *without* any acknowledgement that the work had actually been done by him, under Spelman's pseudonym. I call that plagiarism.

In 1906 the London-based natural science institution, the Linnaean Society, received proposals for Patterson's elevation to associate member. He was one of the foremost naturalists at that time on the east coast, just about to enter the most productive phase off his life as an author. How long did the Linnaean wait before they bestowed the honour upon him? A year, five years, ten years, perhaps? They waited 29 years before Patterson was elected in 1935, just months before he died. I call that mean-spirited.

Even membership of the Norfolk and Norwich Naturalists' Society was a struggle for him. On the day he was elected he wrote in his diary:

> *November 26th 1889: This page ought to have been written in red ink, for tonight I was made a member of the Norfolk and Norwich Naturalists' Society - an unanimous vote running me in. I have to thank Mr. Southwell for this good and very unexpected (i.e. I never had hoped for such an honour) stroke of good fortune. I read a paper on Gulls and Terns; 25 minutes. Never felt in worse form; felt quite a dwarf amongst giants; small and insignificant. I wonder they tolerated me at all.*

Behind the remark was a class consciousness of his separation from the mainstream body of amateur naturalists, almost all of whom would have been from a different social stratum and in some sense wealthy by Patterson's standard. Behind it also was the knowledge that he couldn't even afford the Norfolk Nats' subscriptions - now that really is poverty! - and Southwell had to pay it for several years until he was eventually made an honorary member in April 1910.

Let's draw this theme to its conclusion. Poverty stemmed and hampered Patterson in a way that none of us here have probably ever been affected. He once wrote in his early years:

> *I never regretted more the lack of money - as an aid to Natural History research than now. What could I not do if I were a gentleman of means.*

I feel for him. But I also marvel at his achievement, and I marvel at it all the more for knowing the drawbacks he suffered.

Just to remind ourselves that Patterson was not just an outstanding naturalist but also a super writer. I want to do two short readings. One of them I suppose is among the most anthologised bits of John Knowlittle. Typically, and it is one of the elements that most distinguishes his writing, it dwells not on nature *per se*, but on a human community dependent upon nature. More than any bird or fish, a species AP found most captivating and worthy of record, when others did not, was a type of humanity best described as the punt gunner.

This community was made up from a very rough tough breed of men who lived on the edge of Breydon and the east Broads (and not forgetting their equally formidable partners and offspring), who were one part naturalist, one part hunter-gatherer. The notion that they were at all naturalists is one that would have been very strange to most members of the NNNS in Patterson days. But the idea was not at all strange to AP himself. In fact when one of

the last of these remarkable characters died in 1902, a man known as Little 'Pintail' Thomas, Patterson wrote a seven-page obituary for the man in the *Transactions*.

Of course they relied upon their expertise, not only in tracking and hunting birds and fish, but also in an ability to recognise what they had caught. Part of their business was the sale of rare birds or rare fish and other animals to taxidermists and to a middle-class version of the punt-gunner, an equally rapacious species known as 'the gentleman gunner'. He was often a wealthy collector willing to pay sizeable amount of money for exceptional specimens. So you had to know your wildlife to realise your profits.

In the first part of this talk I dwelt on what Patterson overcame to emerge as one of the pre-eminent Norfolk naturalists of the early twentieth century. In the second part I want to consider a question that is fascinating to me. It concerns where naturalists come from? Not, I hasten to add, in any obvious biological sense but rather what are the antecedents that shape that generic character type, of which we are all in some way an expression?

How did AP emerge as such a gifted naturalist? I want to illustrate some of the more obvious background factors. First of all, for his time and background he was fairly well educated in a local Primitive Methodist threepenny day school on Hog Hill in Great Yarmouth. Subsequently he became a ferocious auto-didact. His library comprised 500 books by the time of his death, pretty remarkable for such a relatively poor man with a wife and seven children, and one room of their small residence in Great Yarmouth, Ibis House, was reserved as AP's study and library. Patterson was brought up in a very strict Methodist tradition in what seems to have been a rather humourless household. Henry his father married a rather formidable widow after Mary died and this step-mother was largely responsible for Arthur's upbringing.

AP's relationship to Methodism is difficult to judge. I think he would have thought of himself as part of the body of the Chapel, he was himself a lay preacher but there is a fascinating photograph of him at a congregation meeting, in which he stands at an angle to the rest of the folk in the photograph. In a sense it makes Patterson as much a spectator of the other people in the picture, as he is a subject of that photograph himself. He stands slightly at odds to the body of the kirk and in some ways it symbolises how Patterson was both of his community and a little outside of it.

At the end of his life he once gave his answer in a diary to the occasional charge that AP was something of a show off. He wrote:

Some people seem to think I court publicity. I don't, only in one line - naturalistic, but then not for empty reputation; all my endeavour is and has been to make the people believe in and love Nature as I love her.

I think those word 'believe in' are highly revealing. Another key way in which Patterson differed markedly from his Christian familial context was his abundant humour. There is a remarkable warmth in almost everything he wrote. His lectures, his shadow puppet performances and his sketches are filled with an enormous playfulness. So I see him as not a conventional Methodist. He is a kind of pantheist who found a way to God through nature.

One of the key things he took from Methodism however was an enormous determination to improve himself through his own efforts. Patterson died at 77 yet he crammed into his life about 140 years' worth of effort. Here is a day's outline for 12 May some time during the 1880s:

4.30 am	Up and on Breydon. Saw spring migrants.
7.30 am	Home (on Denes) to breakfast.
9.05 am	At work at warehouse.
1.10 pm	Home to dinner. Pickled specimens in bottles.
2.15 pm	At work again. Sent 2 natterjacks to gentleman in London.
8.10 pm	Home. Sent to Norwich pickled specimens.
9.00 pm	Home again. Writing notes.
10.00 pm	Off to bed.

I want to turn in the final part of my talk to a question that fascinates me and for which I have, I confess, few concrete answers. Where do naturalists come from? What is it that means someone will grow up and retain a lifelong passion for a branch of natural history? What was it in Patterson's childhood that initiated that character trait and then cemented it as an abiding part of his make up. Was it in his DNA? Or are naturalists some kind of aberration, a behavioural eccentricity, a falling away from normal behaviour? A female poet recently read one of my books and commented that she was unsure what the birds were displacing in my life. As if to be interested in wildlife was a way of escaping something that ordinary people tackled head on.

I think it the context of Patterson's life the question is acutely relevant given the challenges he overcame, not merely to be a naturalist, but in becoming an adult of any kind. Something just seemed to burn within him and needed to find expression and an outlet. I think it is also fascinating because Patterson responded to that inner calling and became what is in many ways the forerunner

for a type of professional naturalist of which there are many today.

I think for my poet friend Patterson's example is the best answer one could give for the notion that somehow wildlife displaces human affections or the centrality of human relations in the naturalists' life. Patterson is as much a documenter of human character and behaviour, which he achieved in his books with great affection and insight, as he is a narrator of the wild. I think it is this duel focus which is at the heart of his evergreen reputation.

Variant Azure Damselfly

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On 9 September at Glaven Farm, Little Thornage, a private site close to the River Glaven, I found what appeared to be an unusual looking blue-form female Azure Damselfly *Coenagrion puella* which, with broken antehumerals and the marking on segment two of the abdomen, showed characteristics of a Variable Damselfly *Coenagrion pulchellum*. I took some digital photographs (opp. p16) and sent copies to Dr. Pam Taylor, the Norfolk County Recorder of the British Dragonfly Society. She agreed that if this indeed was a female *puella* then she had never seen one like it and, with my approval, decided to forward the digital images to some of the experts at the British Dragonfly Society for their opinion. It was unanimously agreed that this was indeed an unusual variant of the blue-form female Azure Damselfly. Evidently the broken antehumerals are a misleading feature, the hind margin of the pronotum and the amount of blue on top of the abdominal segments are clearly those of *puella.*

I imagine that if I had just had a very brief view of this individual I would quite likely have recorded it as a Variable Damselfly, which would have been a very good record for this part of North Norfolk. It goes to show that one must not assume that the apparently obvious is always correct.

Robert Marsham and his successors

This paper is a revised transcript of a talk given at the Robert Marsham tricentenary celebrations at Stratton Strawless Church on 7 June 2008. An account of the meeting will be found in the *Norfolk Natterjack* August 2008.

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As I had written a history of the succession of botanists which was published in the Flora of Norfolk in 1999, I was asked to give an account of Robert Marsham, the gentleman whose 300th anniversary we are commemorating today. However, I was dismayed to discover that Robert Marsham was not one of those mentioned in the account, though Thomas Marsham was given a mention as he became the first secretary of the Linnaean Society when it was formed. Even with the assistance of Bob Ellis, I have been unable to discover whether Thomas and Robert Marsham were related.

Robert Marsham had a valuable correspondence with Gilbert White of Selborne in Hampshire which gives us some insight into what the 18th century naturalist was doing and thinking. Pursuing this theme, I have made my way through the two volumes of the letters of the Rev Gilbert White, as edited by Thomas Bell and published in 1877, 84 years after White's death but full of interest none the less. Marsham did not appear as one of White's correspondents until 1790, just three years before the latter's death.

Their correspondence enables us to realise that even as late as the 1790s the leading lights of the day were not completely satisfied that all the hirundines migrated south in the autumn and returned in the spring, even though White's brother John, who spent some years as a chaplain in Gibraltar, informed Gilbert of the large numbers of hirundines and other birds going south, across the straits in the autumn and returning in the spring. As in this letter from Marsham to White, dated December 29th 1790.

> *From my own knowledge I can say but little, only that, on the 10th of last November a Swallow lay dead under the window of the room I live in, so we must see it the day it fell and, as the last of my Swallows appearing was on the 30th Sept., the bird was most likely in its torpid state when some accident removed it. The tail was short so I conclude that it was of*

the latter brood. But though I have had the eaves and roof of my house searched no bird can be found. Yet it seems so unlikely that a single swallow should hide for the winter when they are so companionable in summer that you may seldom then see a single bird. So I must conclude that others are hid near it."

In his next letter, White asks Marsham if he had tried to revive it.

Bell's notes on Robert Marsham state that: '*Though far less celebrated than his contemporary (Gilbert White), Robert Marsham is already known to most readers of Whites' posthumously published writings as one to whose opinions the latter often referred to in terms of respect.'* He entered Clare Hall at Cambridge University as a Fellow Commoner in February 1728 but it is not recorded that he ever took a degree.

In 1737 and 1738 he travelled through Switzerland, France and Italy amassing much knowledge that he was later able to apply in various ways. He succeeded to his father's estate at Stratton Strawless in 1751 and from that period seems to have travelled widely in England, particularly where any remarkable trees were to be seen. He was elected a Fellow of the Royal Society in June 1780 and admitted to the same on May 31st 1781 as a result of a number of papers on his experiments concerning the growth of trees, in the Philosophical Transactions from time to time. Some of the trees that he grew from seed are still flourishing, including a number on the boundary of Stratton Strawless and Horsford. His enthusiasm for planting did not dim with age as he started work on planting a new wood at the age of 85 as he states in a letter to White: *'I have just begun a new wood of some acres now I am 85 years old, which I attend twice a day and feel great pleasure in the work'*. To which White replied: *'I admire your fortitude and resolution, and wonder that you have the spirit to engage in new woods and plantations*'.

Next to planting trees, his greatest delights were pruning and thinning. In his letters to Gilbert White it soon becomes obvious that his trees needed plenty of space to grow into perfect specimens, hence his digging two spits deep round the bases of his plantings to the circumference of the root spread.

Marsham's 'Indications of Spring', in which he noted 26 regular occurrences and their dates every spring for 60 years, was a model of its kind. Presumably all these first occurrences were at Stratton Strawless. A person of my acquaintance has kept a chart of the arrival and departure dates of summer migrants for 72 years, but not always in the same county; partly Suffolk, partly Essex and more recently in Norfolk so, although there has been

continuity of effort, the effect of moving an overall distance of some 80 miles as the swallow flies means that both arrival and departure dates are somewhat distorted by the distance factor. Also, the numbers of birds arriving in the present Norfolk locality has dwindled dramatically over the past ten years I am told. For the past between two and five years, no Willow Warblers, Lesser Whitethroats, Sedge Warblers or Spotted Flycatchers have returned to the locality so are only recorded when the recorder is away from home.

Some birds, such as the Nightingale have declined since Marsham's time. The Nightingale's first song was one of Marsham's 26 indicators but, in more recent years at least, Nightingales have been few and far between. I heard my first Nightingale on a wet April day in 1944 and when I got home and told my parents they would not believe me as it was so many years since one had been heard in that mid-Suffolk parish. However, 1944 proved to be the year of the Nightingale with us. One was heard from the house that very evening and within a week or so every thicket seemed to have one. We had a searchlight battery just across the road in a meadow surrounded by blackthorn fences and a Nightingale at either end. When the searchlight generators started up, the Nightingales seemed to sing that little bit louder to make themselves heard and were shouting at the very tops of their voices when a doodle-bug thundered over.

Being an arboriculturalist, Marsham was also a botanist and passed on his knowledge to others. I understand that he taught the landscape gardener Humphrey Repton when he was living at Sustead. An important botanical link with the more mainstream Norfolk botanists of his day came through his friendship with the Rev. Benjamin Stillingfleet who was tutor to William Windham of Felbrigg, another of Marsham's local friends. It was while Stillingfleet was staying at Stratton Strawless that he wrote his *English Calendar of Flora'* published in 1761.

There was also an arboricultural connection with Windham, who was for many years MP for Norwich and served in various posts in the cabinet between 1783 and 1807. One of Windham's ancestors was a considerable planter of Chestnuts.

Certainly Robert Marsham was extremely well connected. On one occasion he writes: *'I had occasion to write to the Duke of Portland and I ventured to recommend the Natural History of Selborne to his Grace'* and on another: *'While I was with my worthy friend Mr Naylor at his castle of Hurstmonceaux in Sussex.'* However, when Gilbert White asked: *'Did you know Sir John*

Cullum of your part of the world? He was an agreeable, worthy man and a good antiquary', Marsham replied:*'I know that there is a baronet in Suffolk called Cullum but I have never seen him'.* I find this somewhat curious, considering Marsham's connections. Sir John Cullum was Rector of Hawstead in 1762 and Vicar of Great Thurlow in 1774, both near Bury St. Edmunds. He wrote the history of Hawstead Parish and also of Hardwick Hall, but more importantly from our point of view, he wrote *Observations of Cedars* and also *Yew Trees in Churchyards*'. He was also responsible for about 500 first records of Suffolk plants.

Both Gilbert White and Robert Marsham had very strong views about another Suffolk character who many will have heard of. Arthur Young, the travelling Agricultural 'expert' whose works included : *A Tour Through the Southern Counties* (1768), *A Tour Through the North of England* (1771), *The Farmer's Tour Through the East of England* (1770-71), *Travels in France*, *A Tour in Ireland*, *The Farmer's Kalendar* and *Agricultural Surveys of Eight English Counties*. White writes to Marsham Nov.3rd 1792: *Have you read Mr Arthur Young's 'Travels through France?* and on page 543, when speaking of the French clergy:

> *One did not find among them poachers or foxhunters who, having spent the morning scampering after hounds, dedicate the evening to the bottle and reel from inebriety to the pulpit. Now pray, who is Mr Young? Is he a man of fortune, or one who writes for a livelihood? He seems to reside in Suffolk, near Bury St. Edmunds so probably you can tell me somewhat about him.*

Marsham did not acknowledge this in his reply of Dec.10th 1792 so on Jan.2nd 1793, White writes:

> *You have not told me anything about Arthur Young. You cannot abhor the dangerous doctrines of levellers and republicans more than I do. I was born and bred a gentleman and I hope I shall be allowed to die such.*

He goes on, referring to a moan that Marsham had had about ingratitude in some local character:

> *The reason that you have so many bad neighbours is your nearness to a great fractious manufacturing town. Our common people are more simple minded and know nothing of Jacobin clubs.*

Marsham replied on Feb.20th.

> *As to Arthur Young, I never saw the man, but by the accounts of others and*

what I have read of his works I conclude him an abominable coxcomb. We have a story of him that a foreigner, a Russian, curious in husbandry, went to see him in Suffolk. He not being at home, the stranger enquired of his wife, 'how many potatoes he had that year to fatten his swine (500 I think)'. She answered 'none, they did not use potatoes'. He gives some descriptions of noblemen's and gentlemen's houses and properties and many of these are very erroneus. A friend told me that no dependence could be had on his veracity. Lies from a pettyfogging writer like Farmer Young do not signify much (though he is a voluminous man).

Arthur Young, English Agriculturalist, born in London spent his boyhood at Bradfield near Bury St. Edmunds where his father was Rector. In 1763 he rented a small farm of his mothers on which he is said to have carried out over 3000 unsuccessful experiments. Between 1766 and 1771 he failed with a farm in Essex, had two years in Ireland 1776-78 and then resumed farming at Bradfield. In 1793 he was appointed first secretary to the Board of Agriculture. This has a 20th Century parallel whereby quite a number of farmers who had gone bust during the depression and were 'between jobs' when war broke out in 1939, soon found work on the War Agricultural Executive Committees, telling the farmers who had survived the slump how to farm. In fact, latter day Arthur Youngs - who would have no doubt aroused Marsham's contempt! This may seem far from natural history but is still part of the story of Marsham as landowner rather than naturalist.

Marsham's knowledge of birds was similar to that of most of his contemporaries. On October 20th 1792 he writes:

My man just now shot me a bird that was flying about my house. I am confident that I have never seen its likeness before, but on application to Willughby (Ornithologia, 1676, page 99 translated from the Latin by Ray) *I conclude it is the Wall Creeper or Spidercatcher. I find he had not seen it in England. 'They say it is found in England but we have as yet not had the hap to meet with it.'*

This occasioned several notes to and fro and Marsham had a young lady draw a wing of his bird which White agreed was indeed the wing of a Wall Creeper. White himself also shot small birds to identify them - 'what's hit is history, what's missed is mystery'. In fact it was White who first realised from the different songs, and from shooting the songsters and examining them, that there were three species of Willow Wren - the Least Willow Wren which he also called the Chiff Chaff, the Middle Willow Wren now called

the Willow Warbler and the Great Willow Wren which was more difficult to see - or shoot - because it stayed near the tops of his beech trees and now is, of course, the Wood Warbler.

White also gives a description of a bird which he had in his garden and was new to him, saying that he had no doubt but what it was the Pettychaps, several of which his brother had sent him from Gibraltar. White's description agrees with that of Lesser Whitethroat. He did not mention the Pettychaps in his letters to Marsham, but in considering the history of Natural History reasoning since the late-18th Century, it is amusing to reflect on a heated altercation in the correspondence column of the East Anglian Daily Times in the mid-1940s on the true identity of both the Greater and the Lesser Pettychaps between a trio of ornithologically minded parsons of that time. The final result of the vigorously contested point came down to agreeing with the Rev. C.A Johns (*British Birds in their Haunts,* 1865) that the Greater Pettychaps was the Garden Warbler and the Lesser Pettychaps was the Chiff Chaff. In view of Gilbert White's description of the Pettychaps, I doubt if he would have agreed.

Marsham, in his first letter to White, mentions his 'Indications of Spring' saying that he had kept it for above 50 years:

> *By that, I find that Linnaeus' disciples and their followers are mistaken in their supposed rule of Nature that all plants must follow in order. You will see from Indications of Spring that there can be reverses of many days.*

One might confirm this by reciting 'The Ash before the Oak and we shall get a soak, the Oak before the Ash and we shall get a splash' meaning a wet or a dry summer. Though quoted regularly, my own personal observation suggests that the Oak leafs before the Ash in nine years out of ten.

Before we leave White and Marsham to follow various lines of descent to the present day, I have decided to include a comparison of quoted tree sizes and ages planted by these two gentlemen though I must confess that Marsham's only cover two Oak trees (Table 1). White measured his trees at one foot above the ground . The first column gives the year of planting, the second column gives the girth at one foot above the ground in 1790 and the third column gives the girth of the same trees as measured by Thomas Bell, then living at Selborne rectory in 1876. Measurements in feet and inches.

White adds:

> *The great Oak in the Holt (forest) which is deemed by Mr Marsham the*

greatest in the land, measures 34 feet in circumference at 7 feet from the ground. It has in old times lost several of its boughs and is tending to decay.

Mr Marsham computes that at 14 feet length the Oak contains a 1000 feet of timber, (I assume this to be cubic feet).

Table 1 Growth of trees planted by Gilbert White

Tree	Year planted	Girth 1790	Girth 1879
Oak	1730	4ft 5in	8ft 5in
Ash	1730	4ft 6½in	8ft 8in
Spruce	1751	5ft 0in	8ft 2in
Beech	1751	4ft 0in	11ft 9in
Elm	1750	5ft 3in	10ft 9in
Lime	1756	5ft 5in	Not traced by Bell

As a very modest successor to these two gentlemen, I planted a small grove (much too close together) in 1983 mainly from seedlings planted after being brought home to identify. In the case of the native Black Poplar, I collected some 30 cuttings from shoots at the base of an ancient fallen giant that I had known from childhood in mid-Suffolk and some 24 of them struck. Two I planted and the rest were taken back to Suffolk by Peter Lawson who at that time was working for Suffolk Wildlife Trust. Some were planted on their reserves and I believe two were planted at the Agricultural College at Otley near Woodbridge.

Out of interest, I measured some of the trees in my 25-year old grove recently, all at a height of five feet except the Hornbeam which was measured at three feet as it had a bulge at the top of the trunk at five feet.

Turkey Oak	2ft 10in	Black Poplar	5ft 6in
Pedunculate Oak	3ft 7in	Hornbeam	3ft 10in
Pedunculate Oak (2)	3ft 7in	Alder	2ft 0in
Ash	3ft 7in	Sallow (female)	3ft 5in
Ash (2)	3ft 7in	Douglas Fir	2ft 11in
Douglas Fir (2)	3ft 5in		

The native Black Poplar is of course my favourite, but the most remarkable of these is the Sallow with a very straight trunk and, like all the others, probably 50-60 feet high.

Gilbert White's brother John had correspondence on various matters with

Carl Linnaeus himself. These letters are to be found in the Gilbert White Letters Volume 1, but only the first was in English, the others being in Latin and not transcribed. The reason for mentioning this is that, on the death of Linnaeus and the premature death of his son, all Linnaeus' collections were bought by James Edward Smith of Norwich, later Sir J.E.Smith and author of *English Botany* (though this is invariably called Sowerby's English Botany after its illustrator). The collections arrived safely in London from Sweden in 1784, and in 1788 Smith arranged a meeting in which the Linnaean Society of London was formed. Earlier, influenced by Benjamin Stillingfleet, Smith visited the London apothecary William Hudson who had been induced to publish *Flora Anglica* (1767), 'the first true attempt to set forth the British Flora according to the system and nomenclature of Linnaeus.' Many of the first naturalists to join the Linnaean Society were from Norfolk or Suffolk and local field meetings were held from time to time.

The Rev. William Kirby from Barham near Ipswich, whilst visiting his sister, wife of the Rev. Charles Sutton from Holme next Sea and then living in Norwich, wrote in his diary.

> July 12th 1797. *We breakfasted and spent the morning with Dr. Smith and examined the Linnaean Apes* (bees - Kirby was an entomologist). *The Smiths dine with us and then we go in the evening to Thorpe by water.*
>
> July 13th. *Engage in a botanical expedition to Newton St, Faiths. Our party consisted of Dr. Smith, Mr Marsham (*Thomas*) Mr Pitchford, Mr Foster, Mr Weston Junior* (Smith's brother-in-law) *Mr Sutton and myself. The plants gathered were numerous, and many rare. Polypodium oreopteris, Polypodium filix-mas, Osmunda spicant, Brachythecium glaucum, Satyrium viridis, Orchis conopsea, Carex vesicaria, Carex hirta, Carex limosa, Linum radiola, Serapias palustris, Peplis portula, Comarum palustre, Menyanthes trifoliata, Gentiana pneumonanthe, Alisma ranunculoides, Tillaea muscosa etc. We returned in the evening after being consulted by the villagers as learned doctors.*

Most of the plant names in Kirby's list have since changed.

From these beginnings there followed a long line of distinguished names down through the 19th and 20th Centuries:

> The Hookers, father and son, father born in Norwich and son at Halesworth and both eventually directors of Kew Gardens;
>
> H. D. Geldart of Norwich; the Rev. Francis Galpin who published *The*

Flowering Plants and Birds of Harleston and its District;

The Rev. Kirby Trimmer, author of the first Flora of Norfolk published in 1866;

Arthur Bennett who visited Norfolk on a regular basis from his home in Croydon and, looking at likely sites in Broadland for the Holly-leaved Pondweed which he had found in Holland and whose daughter dredged some up as they were following the channel from Whiteslea into Hickling Broad. In 1912 he read a paper to Norfolk and Norwich Naturalists' Society in which he suggested that a number of the counties rarer species were even then heading for extinction.

William Nicholson who came to Norwich from Cheshire to work for Gurney's bank and later published the second Flora of Norfolk.

W.G.Clarke and W.H.Burrell, the latter from Thetford and the former from Yorkshire who studied Breckland especially. Clarkes' *In Breckland Wilds* remains a classic today.

Charles Plowright, M.C.Cooke and G.Cooke (not related) were all mycologists.

Dr.C.P.Petch, Plowright's grandson, and Eric Swann who together published the third Flora of Norfolk.

J.H.Gurney senior and W.R.Fisher who published an account of the birds found in Norfolk in 1846 and who were followed by Henry Stevensons three volume Birds of Norfolk published between 1866 and 1890.

B.B.Riviere whose *History of the Birds of Norfolk* was published in 1930.

Ernest Daniels who kept copious notes on anything that caught his eye from hybrid willowherbs through caddis flies to birds.

Ernest Daniels' diaries were probably nearest in style to Marsham and White, whereas most of the names mentioned would have been writing strictly about their own particular subject. But all their works are of value in showing us what the flora and fauna of our countryside was like at various times over the past three centuries almost to the present time. I say *almost* deliberately as I would suggest that, the last real disciple of the Gilbert White and Robert Marsham tradition was the late Ted Ellis. No, he did not write lengthy letters to chosen correspondents. Yes, he did keep his notes on the backs of fag packets, but left a whole library of fascinating notes on all aspects of wildlife in his daily column in the Eastern Daily Press from 1947 until his death some 40 years later.

Phenological changes in Corpusty, 1970-2008

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In 1736 Robert Marsham began to record the dates on which twenty-seven natural events, as diverse as the time of leafing of beech and the first call of the cuckoo, occurred at his home in Stratton Strawless. Not only did he continue recording these through his lifetime but successive generations of his family continued to do so until 1958 when they were advised that the observations were no longer of interest (Sparks and Lines 2008). Of even greater significance was Marsham's decision to publish the records made in his lifetime in the hope that it would 'afford some amusement' (Marsham 1789). It has done very much more than this (Sparks and Carey 1995) and has established Robert Marsham as the 'father of phenology'.

Although changes in day-length are the primary cues employed by plants and animals to synchronise their life-cycles to seasonal changes, temperature may also play a part and in some cases explain yearly fluctuations in timing. With the exception of warm-blooded vertebrates (birds and mammals) the internal temperature of most organisms is very close to that of their environment. Since the rates of chemical processes on which all life depends are markedly temperature-dependent it is to be expected that there will be an influence of temperature on the timing of events.

In the 52 years covered by Marsham's own data, first leafing dates for oak varied from April 1st to May 15th. Plotting these dates against February to April mean temperatures for these years reveals a linear correlation with a 1^0C rise in temperature leading to an advancement of just over eight days. It is apparent that different events show different degrees of enhancement, something which could affect the populations of organisms dependent on each other by destroying the necessary synchrony. One example is the problem that could be faced by single-brooded Great Tits whose nesting time might not advance by as much as the abundance of the small caterpillars which are an important prey species (Visser *et al.* 1998). In the present period of global warming this has important conservation implications.

Sparks & Manning (2000) reported and analysed first-flowering dates for seven species from 1965 to 2000 in Norwich. Over a similar period, Anne Brewster has been recording the times of nearly 40 natural events in the village of Corpusty, 9 km south-west of Holt in North Norfolk (and 14 km north-west of Stratton Strawless):

> *'My interest probably started from childhood when I received the* Wonder Book of Nature *from my grandparents. Growing up on a farm the seasons were part of our life.*
>
> *'When my children were very young I found myself spending more time walking around the village. From 1973 our Agricultural Engineering business gave me access to local farmland. I have always observed wildlife and made many notes including dates of seasonal events. I had no idea that use would be made of these records, or that I would continue making theme for so long.'*

RESULTS AND DISCUSSION

The events noted are listed in Table 1 and the dates in Appendix 1. In 2004,

Table 1. Events for which dates were recorded

Abbreviation	Event
Acon	First Aconite flower open (garden).
Bcap	First Blackcap seen or heard.
Bbel	First Bluebell flower open (Mossymere).
Brim	First Brimstone butterfly seen.
Chif	First Chiffchaff heard.
Comm	First Comma butterfly seen.
Cblu	First Common Blue butterfly seen.
ComFt	First Common Footman moth seen.
Croc	First crocus flower open (garden).
Cuck	First Cuckoo heard.
Daff	First daffodil flower open (same clump, in garden).
Ffar	First Fieldfare seen in autumn.
Frog	First frog spawn seen in garden pond.
GVW	First Green-veined White butterfly seen.
Hmar	First House Martin seen.
Hblu	First Holly Blue butterfly seen.

Abbreviation	Event
Lcel	First Lesser Celandine flower open.
Lbir	First 7-Spot Ladybird seen.
Lawn	First date of garden lawn mowing.
Mbro	First Meadow Brown butterfly seen.
Mmar	First Marsh Marigold flower open
Newt	First active Common Newt seen in garden pond.
Otip	First Orange-tip butterfly seen.
Plad	First Painted Lady butterfly seen.
Peac	First Peacock butterfly seen.
Prim	First Primrose flower open.
Radm	First Red Admiral butterfly seen.
RedwA	First Redwing seen in autumn.
RedwD	Last Redwing seen in spring.
Sedw	First Sedge Warbler seen (in Norfolk).
Snow	First Snowdrop flower open (in garden).
Spot	First Spotted Flycatcher seen
STor	First Small Tortoiseshell butterfly seen.
Swal	First Swallow seen.
Swif	First Swift seen.
Tads	First free-swimming tadpoles seen in garden pond.
Tdov	First Turtle Dove seen or heard
Viol	First Sweet Violet flower open.
Wthr	First Whitethroat seen or heard.
Wwar	First Willow Warbler heard

Phil Croxton, working at the Centre for Ecology and Hydrology, analysed these results.

It is apparent that many of the events recorded are ocurring progressively earlier in successive years. For example, the dates on which the first Swallow (Figure 1) and the first Orange-tip (Figure 2) were seen have both advanced by approximately 20 days between 1970 and 2005. A possible reason for this is that the changes are responses to rises in temperature which have occurred during this period. To test this possibility, the dates on which Orange-tip *Anthocharis cardamines* and Marsh Marigold *Caltha palustris* flowers were first seen have been plotted against temperature (Figures 3 & 4). The

temperatures used are the CET (Central England Temperature) series which typify the temperatures over much of Britain. It is apparent from the regression lines shown that there is a positive correlation between advancement of the date and the mean temperature.

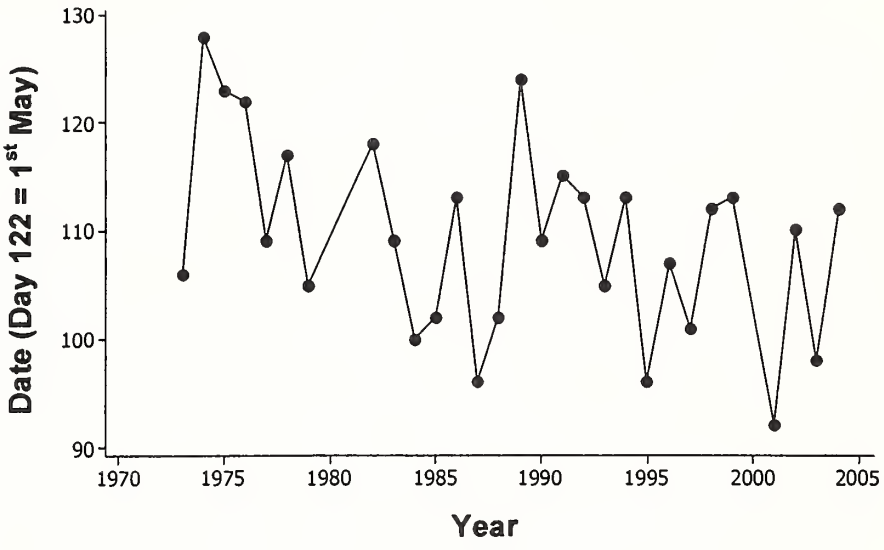

Figure 1 Dates of first Swallow seen.

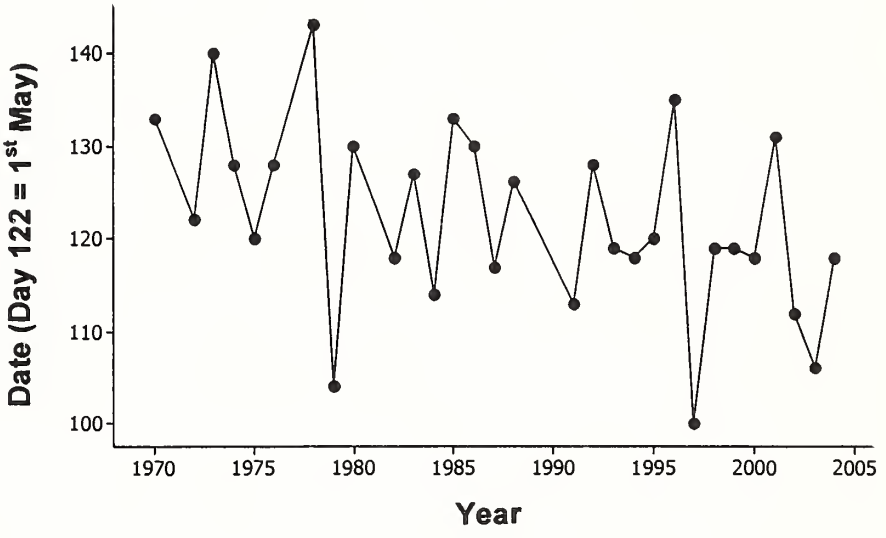

Figure 2 Dates of first Orange-tip butterfly seen.

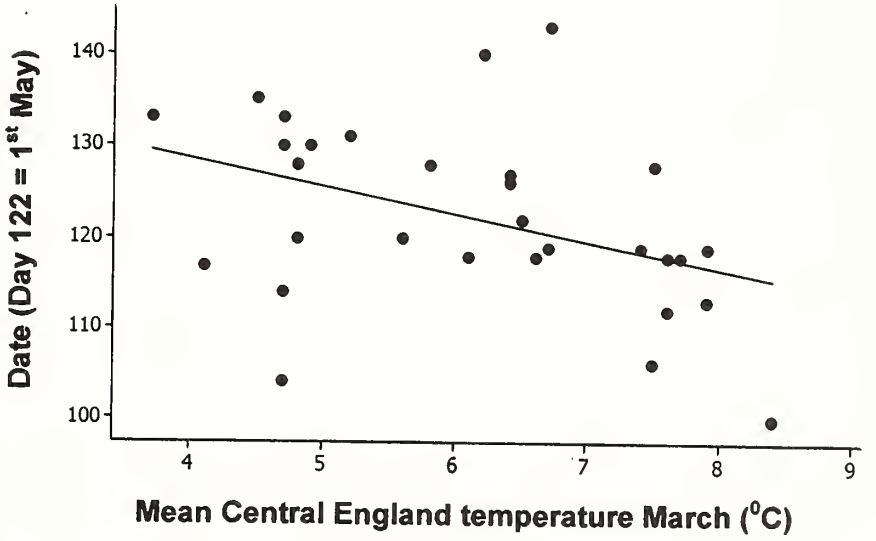

Figure 3 Plot of date of first Orange-tip butterfly seen against mean March temperature.

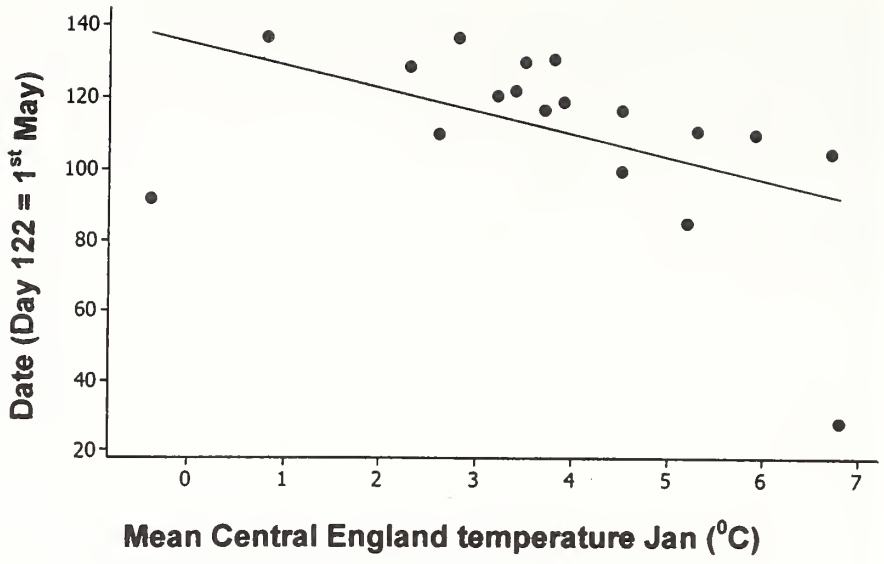

Figure 4 Plot of date of first Marsh Marigold flower open against mean March temperature.

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Appendix 1: DATES OF EVENTS (see Table 1 for details)

Event	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
Acon			15 Mar			6 Jan	22 Jan		21 Feb	27 Feb
Bcap				11 May	6 Nov		8 May		5 May	4 Apr
Bbel						2 Apr			15 May	
Brim	3 May	27 Aug	15 Mar	23 Mar		22 Apr	26 Feb	29Apr	23 Apr	12 May
Chif						30 Apr	5 Apr	18 Apr	7 Apr	9 Apr
Comm	16 Aug	19 Aug	2 Aug	25 Aug	27 Aug	6 Aug	29 Jul	15 Aug		
Cblu	5 Jun		11 Jun		8 May	27 Jun	21 Jun			
ComFt										
Croc			15 Mar			22 Jan				6 Mar
Cuck	19 Apr		1 May		22 Apr	25 Apr	29 Apr	18 Apr	25 Apr	19 Apr
Daff						12 Feb	4 Apr		14 Mar	31 Mar
Ffar	16 Oct	25 Sep	20 Oct	17 Oct		15 Dec	3 Dec		22 Oct	16 Nov
Frog			31 Mar			2 Apr	14 Mar	10 Mar	6 Mar	26 Mar
GVW					12 Aug	26 May			14 Aug	15 May
Hmar	27 Apr		1 May	24 Apr	10 May	24 Apr	30 Apr	18 Apr	24 Apr	23 Apr
Hblu			1 May							
Lcel	11 Apr		14 Mar						25 Jan	2 Apr
Lbir		8 Feb	16 Mar	9 Mar	20 Mar	27 Jan	26 Feb	22 Feb	28 Feb	
Lawn										
Mbro			11 Aug	21 Jun	29 Jun	27 Jun	20 Jun			
Mmar	13 May		28 Apr	27 Apr	20 Apr	20 Feb		17 May	2 May	2 Apr
Newt						9 May		24 Feb	17 Apr	21 May
Otip	13 May		1 May	20 May	8 May	30 Apr	7 May		23 May	14 Apr
Plad						27 Aug	27 Jun	14 Sep	27 Aug	
Peac	14 Apr	20 Sep	1 May	22 Mar	25 Mar	18 Apr	1 Apr	16 Apr	28 Apr	10 Apr
Prim	1 Apr		5 Mar		20 Apr	22 Jan	4 Apr	19 Mar	22 Mar	
Radm	6 June	28 Aug		16 Jun	12 Aug	21 Aug		3 Sep	4 Sep	16 Aug
RedwA	7 Nov		14 Nov	17 Oct		29 Dec	31 Jan	13 Nov	9 Nov	
RedwD	1 Apr		19 Jan			19 Mar	1 Mar		12 Mar	
Sedw	6 May			11 May	1 May	30 Apr	11 May	10 May		16 May
STor			13 Mar	22 Mar	26 Mar	18 Apr	1 Mar	16 Apr	9 Mar	10 Apr
Snow				6 Feb		16 Jan			21 Feb	23 Feb
Spot						23 Jun	14 Jun	1 Jun	18 Jun	2 Jun
Swal	29 Apr			16 Apr	8 May	3 May	1 May	19 Apr	27 Apr	15 Apr
Swif			13 May	15 May	11 May	14 May	7 May	20 May	16 May	13 May
Tads					3 Apr	8 May	5 Jun			18 Apr
Tdov	1 May		13 May	5 May	13 May	3 May	4 May	10 May	3 May	4 May
Viol	1 Apr									
Wthr					18 Apr	22 Apr	7 May	17 Apr	9 Aug	26 Apr
Wwar						30 Apr	20 Apr	18 Apr	25 Apr	

Appendix 1: DATES OF EVENTS (continued)

Event	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Acon	26 Jan	11 Jan	1 May		6 Feb	4 Feb	3 Feb	23 Jan		18 Jan
Bcap		30 May	19 Apr	23 Apr	20 Apr	26 May		25 Apr	21 Apr	
Bbel	14 May		28 Apr	17 May	13 May	19 May	10 May	8 May	12 May	
Brim	12 Apr	1 Oct	14 Apr	15 Apr	12 Apr	31 Mar	19 May	23 Apr	3 Apr	17 Mar
Chif	18 Apr	8 Apr	3 Apr	14 Apr	12 Apr	18 Apr	4 Apr	6 Apr	1 Apr	1 Apr
Comm	13 Oct	28 Sep	24 Mar	21 Aug	14 Apr		11 Jul	19 Apr		19 Jul
Cblu	7 Jun		20 May	1 Jul	15 Jun		18 Aug	9 Jun	14 Jun	9 Aug
ComFt									20 Jul	10 Jul
Croc	7 Feb				1 Mar					14 Feb
Cuck	24 Apr	10 May	24 Apr	21 Apr	25 Apr	17 Apr	3 May	22 Apr	8 Mar	25 Apr
Daff	7 Mar	26 Feb		8 May		5 Apr	11 Apr	19 Mar	13 Mar	20 Feb
Ffar	30 Oct	24 Nov	22 Feb		21 Nov	30 oct		4 Sep	12 Oct	28 Dec
Frog	11 Mar	12 Mar	17 Mar	9 Mar	26 Mar	26 Mar	29 Mar	3 Apr	16 Mar	20 Feb
GVW	28 May	1 Jul	28 Apr	25 May			19 May	16 Jun	25 May	16 May
Hmar	1 May	6 May	4 May	18 Apr	9 May	24 Apr	22 May	18 Apr		24 Mar
Hblu			27 Apr	2 Jun	2 May		18 Aug			
Lcel		8 Mar					2 May			
Lbir					21 Apr	3 Apr	4 Apr	5 Apr	25 Mar	6 Mar
Lawn				11 Mar		5 Apr		18 Apr	29 Mar	6 Mar
Mbro	3 Jul			8 Jul	5 Jul	15 Aug	8 Jul	2 Jul	20 Jun	26 Jun
Mmar	8 May		20 Apr	15 Apr	10 May	17 May	10 May		20 Apr	
Newt	17 May		31 May	14 Apr			27 Apr	2 Apr	5 Jan	26 Mar
Otip	9 May		28 Apr	7 May	23 Apr	13 May	10 May	27 Apr	5 May	
Plad	30 Jul		8 Aug	16 Aug		14 Jun	1 Aug		21 May	
Peac	15 Apr	27 Mar	24 Mar	15 Apr	12 Apr	5 Feb	1 Aug	19 Apr	3 Apr	30 Mar
Prim			13 Apr	24 Apr	23 Mar		27 Apr	12 Mar	28 Feb	11 Feb
Radm	1 Sep	21 Aug	4 Aug	8 Jun	22 Jul		26 Jun	8 May	13 Jun	7 Aug
RedwA		24 Nov							8 Nov	
RedwD					29 Mar					11 Mar
Sedw	12 May		22 Apr	25 Apr				27 Apr	25 Apr	15 May
STor	26 Mar	27 Mar	24 Mar	9 Apr	12 Apr	2 Apr	17 Mar	8 Apr	22 Mar	
Snow	9 Feb			1 Mar	1 Feb		28 Feb	8 Mar	8 Feb	
Spot	23 May	19 May		26 May	26 Jul	2 Jun	4 Jun	25 May	11 Jun	4 Jun
Swal			28 Apr	19 Apr	9 Apr	12 Apr	23 Apr	6 Apr	11 Apr	4 May
Swif	9 May	7 May			10 May	17 May	13 May		13 May	
Tads			12 May		12 Apr		22 May			
Tdov	7 May	12 Apr	21 May	25 Apr	7 May	24 Apr	2 May	13 May	6 Jun	12 May
Viol					7 Dec		1 Jan	25 Dec	8 Feb	11 Feb
Wthr	2 Apr		5 May		2 May	13 May	30 Jul		6 Jun	3 May
Wwar	18 Apr	8 Apr	27 Apr	14 Apr	19 Apr	26 Apr	23 Apr	14 Apr	17 Apr	20 Apr

Appendix 1: DATES OF EVENTS (continued)

Event	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Acon	6 Feb	23 Feb	18 Jan	11 Jan	13 Jan	14 Jan	12 Feb	6 Feb	11 Jan	17 Jan
Bcap		26 Apr		24 Apr	14 May	7 Apr	3 Feb	6 Apr		9 Apr
Bbel	12 May	13 May		10 May	10 May		20 May	20 Apr	30 Apr	
Brim	12 Mar	12 Apr	17 Mar	11 Mar	27 Apr	1 May	8 Apr	11 Mar	28 Mar	17 Apr
Chif	19 Mar	2 Apr	1 Apr	19 Mar	27 Mar	22 Mar	14 Apr	11 May	22 Mar	30 Mar
Comm	22 Feb	18 Mar	19 Jul	22 Jul	27 Jul	9 Apr	8 Apr	3Aug	25 Jul	31 Mar
Cblu	21 May	14 Jun	9 Aug		19 Apr		20 Jun	15 Jun	25 Aug	14 Jun
ComFt	15 Jul	10 Jul	2 Jul	17 Jul	13 Jul		28 Jul	10 Jul	20 Jul	
Croc	7 Mar	25 Feb	14 Feb				16 Feb			6 Feb
Cuck	19 Apr		22 Apr	22 Apr	24 Apr	23Apr	15 May	27 Apr	2 May	26 Apr
Daff	18 Feb	12 Mar	3 Mar	20 Feb	16 Apr	11 Mar	11 Apr		12 Feb	
Ffar	23 Oct	7 Dec	11 Jan		13 Oct	24 Dec	23 Nov	24 Oct	27 Oct	15 Oct
Frog	6 Mar		8 Mar	14 Mar	27 Mar	9 Mar	8 Apr	15 Mar	13 Mar	18 Mar
GVW	28 May		25 Apr		12 May		26 Apr	1 May	14 Aug	
Hmar	11 Jun			25 May	12 May	22 May	9 Jul	9 May	8 May	10 May
Hblu		12 Apr	19 Apr	29 Apr			14 May	9 Apr	28 Apr	30 Apr
Lcel	16 Feb		17 Mar	12 Mar			11 Mar			5 Mar
Lbir	23 Mar	10 Apr			26 Jul	16 Feb				
Lawn	8 Mar	11 Mar	2 Apr	8 Mar	20 Mar	11 Mar	20 Apr	20 Mar		
Mbro		8 Aug	21 Jun	28 Jul	6 Jul	2 Jul	1 Jul	15 Jun	2 Jul	14 Jun
Mmar		23 May	26 Apr						26 Mar	5 Mar
Newt		15 Mar	17 Mar	15 Mar	28 Feb	25 Feb	29 Apr	6 Mar	5 Mar	29 Apr
Otip		23 Apr	7 May	29 Apr	28 Apr	30 Apr	14 May	10 Apr	29 Apr	29 Apr
Plad	20 Jun	26 Aug	10 Jun	7 Aug	20 Jul	27 May	9 Jun	15 Jun	17 Jul	
Peac	13 Mar	11 Apr	4 Mar	11 Mar	21 Apr	5 Apr	16 Apr	31 Mar	5 Feb	17 Mar
Prim	1 Apr	8 Mar	17 Mar	19 Apr	2 Apr	19 Feb	6 Apr	12 Apr	22 Mar	10 Mar
Radm			19 Aug		8 Jul	22 May	5 Jul	24 Jun	25 Jun	1 Jul
RedwA	23 Oct	10 Dec	29 Dec		13 Oct		21 Oct		17 Nov	
RedwD			20 Jan	15 Mar	14 Mar	3 Mar	14 Apr	3 Apr	17 Jan	
Sedw	11 Jun		23 Jun			1 May	26 Apr	4 May		20 May
STor	13 Mar	13 Mar	9 Mar	14 Mar	10 May	6 Apr	14 Jul	11 Mar	24 Feb	19 Mar
Snow	6 Feb	23 Feb	5 Feb	19 Jan	13 Jan	14 Feb	12 Feb	6 Feb	12 Feb	6 Feb
Spot	11 Jun	25 May	3 Jun	25 May		14 May	17 Jun	26 May	25 May	12 May
Swal	19 Apr	25 Apr	22 Apr	15 Apr	23 Apr	6 Apr	16 Apr	11 Apr	22 Apr	23 Apr
Swif	11 Jun			10 May		5 May	19 May	18 May	7 May	20 May
Tads			23 Apr		29 Mar	9 Apr		2 Jun	19 May	30 Apr
Tdov	1 May	28 Apr	28 Apr	22 Apr	28 Apr	28 Apr	2 May	28 Apr	5 May	20 May
Viol	1 Jan	2 Jan	5 Mar	19 Jan	16 Jan	16 Apr		14 Apr		
Wthr	11 Jun		26 Apr	30 Apr		21 Jun	25 Apr	11 May	9 May	
Wwar	18 Apr	10 Apr	14 Apr	12 Apr	8 Apr	20 Apr	14 Apr	11 May	9 Apr	16 Apr

Appendix 1: DATES OF EVENTS (continued)

Event	2000	2001	2002	2003	2004	2005	2006	2007	2008
Acon	27 Jan	11 Feb	28 Jan	14 Jan	17 Jan	9 Jan	26 Jan	9 Jan	11 Jan
Bcap	7 Mar	23 Mar	8 Apr	9 May	15 Apr		14 Mar		27 Mar
Bbel	6 May	6 May		13 May	9 Apr		30 Apr	14 Apr	26 Mar
Brim	4 Sep	1 Apr	13 Mar	21 Mar	9 Apr	20 Mar	26 Mar	11 Mar	9 Feb
Chif	15 Apr	3 Apr	23 Mar	25 Mar	2 Apr	19 Mar	5 Apr	31 Mar	29 Mar
Comm	22 Apr	19 Jul	21 Sep	14 Jul	14 Au	8 Sep	2 Jul	25 Jun	
Cblu	31 Aug			3 Jun	11 Aug	1 Jul	5 Aug		
ComFt	7 Jul		13 Jul		6 Jul		2 Jul	14 Jun	
Croc	8 Mar	7 Feb				31 Jan	20 Feb	22 Jan	30 Jan
Cuck	20 Apr	23 Apr	24 Apr	22 Apr	24 May	15 Apr	20 Apr	14 Apr	23 Apr
Daff	8 Mar				17 Mar		25 Mar	25 Mar	21 Feb
Ffar	21 Nov	30 Oct	31 Oct	23 Oct		20 Nov		7 Dec	
Frog	12 Mar			10 Mar	16 Mar	11 Mar	14 Mar	2 Mar	23 Feb
GVW	25 May	13 Jun			10 May	17 May	3 May	25 Jul	2 May
Hmar	6 Apr	29 Apr	21 May	29 Apr	15 May	3 May	2 May		
Hblu	4 Aug	5 May	4 Apr	4 May	10 May	21 Apr	27 Apr	15 Apr	3 May
Lcel		2 Mar	26 Feb	25 Feb	11 Mar	8 Feb	18 Mar	30 Jan	
Lbir	7 May		4 Mar		16 Mar	18 Mar	31 Mar	6 Mar	18 Feb
Lawn				22 Apr	18 Mar		30 Apr	12 Apr	
Mbro	25 Jun	1 Jul	20 Jun	2 Aug	22 Jun	21 Jun	23 Jun	20 Jun	
Mmar		1 May		11 Mar		12 Apr	30 Apr	10 Apr	27 Apr
Newt	26 May		29 Apr	19 Mar					
Otip	27 Apr	11 May	22 Apr	16 Apr	27 Apr	29 Apr	5 May	23 Apr	28 Apr
Plad	20 Jul	10 Aug	11 Jun	14 May	20 Aug	28 Jul	19 Jun	9 Jun	
Peac	18 Apr	6 Apr	28 Mar	23 Mar	16 Feb	23 Mar	2 May	14 Jul	21 Apr
Prim	3 Feb	7 Apr	25 Feb	21 Jan	2 Apr	16 Jan	12 Feb	23 Mar	13 Feb
Radm	15 Jun	27 Jun	8 Jun	21 Jun	6 Jun	3 May	3 May	1 May	
RedwA		27 Sep		25 Oct	13 Oct	27 Dec	27 Dec	11 Dec	
RedwD		4 Jan	12 Mar	7 Mar	3 Jan	13 Jan	13 Jan		
Sedw									
STor	6 Apr	6 Apr	28 Mar	17 Mar	16 Mar	18 Mar	18 Mar	5 Apr	29 Mar
Snow	27 Jan	12 Feb	4 Feb	25 Jan	25 Jan	20 Jan	30 Jan	15 Jan	14 Jan
Spot	30 May	21 May	14 Jun	16 May	26 Jun	6 Jun	6 Aug		
Swal	2 May	2 Apr	20 Apr	8 Apr	21 Apr	21 Apr	25 Apr	13 Apr	16 Apr
Swif	23 May	18 May	15 May	14 Jun	23 May		7 May	14 May	5 May
Tads				25 Mar		12 Apr	4 Apr		
Tdov	27 Apr	13 May	28 Apr	29 May	5 Jun	4 Jun	12 May	17 Jun	
Viol	3 Feb	16 Feb	4 Mar			21 Jan	24 Mar	13 Mar	8 Mar
Wthr	27 Apr	22 May	9 May		3 May		10 May		
Wwar	30 Apr	29 May	19 Apr	20 Apr	2 May				

Frog spawning dates

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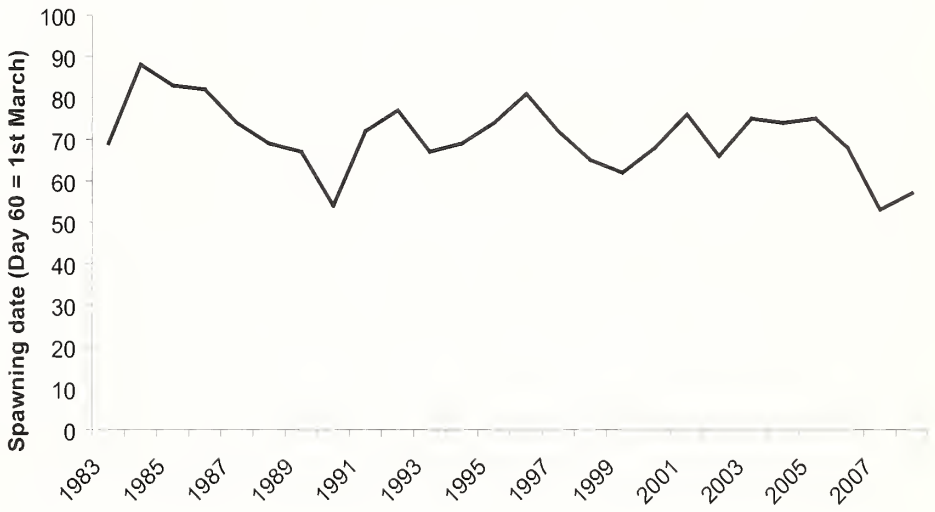
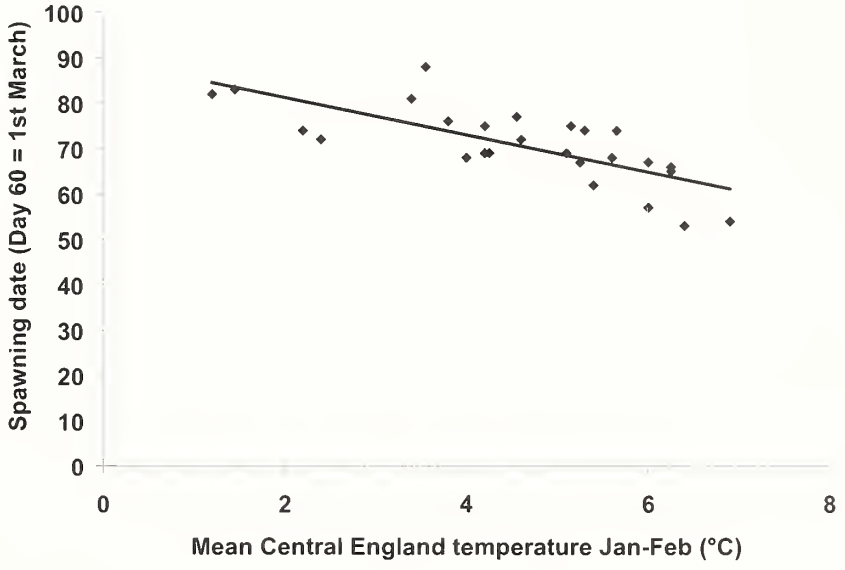
Since 1983 I have recorded the first date on which frog spawn appeared in my garden pond in Norwich (Fig. 1).

Fig. 1 Date at which frogspawn was first seen.



Even over this relatively short period there appears to be a downward trend – the date of spawning is getting earlier. The most likely explanation for this is temperature and when these dates are plotted against temperature, the correlation is highly significant (Fig.2).

Fig. 2 Spawning date plotted against mean Jan -Feb temperature.



New and interesting Norfolk fungus records, 2000-2007

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Of the 12000 species of fungus estimated to have been recorded in Britain (Spooner 2005), over 3000 have been recorded from Norfolk. The first really comprehensive list was made by Charles Plowright (1872) who published over 800 names, with brief details of location. Just twelve years later he was able to add nearly 700 more species to the Norfolk list (Plowright 1884). Inevitably, taxonomic revisions based on improved knowledge have eliminated some of these records and made others impossible to assign but the majority can be matched with currently accepted taxa.

The Norfolk fungus list was revised and extended in a series of papers by G.J.Cooke (1937, 1938, 1939, 1940, 1941) although this appears never to have been completed. From the early 1930s Ted Ellis began to record fungi in Norfolk and continued until the mid 1980s. In 1976 Reg and Lil Evans returned to Norfolk after playing a major part in the production of Fungi of Warwickshire (1980), the first separately published county mycota. During the next 27 years they made more than 37000 records of fungus species, place and date. Once these had been transferred to a computer database they formed the basis of the Norfolk Fungus Record Database (NFRD) which has been maintained by Richard Shotbolt and is regularly uploaded to the Norfolk Biological Records Centre. The NFRD now contains over 61000 records of nearly 3200 species and has been added to by many naturalists. At the end of 2000, a small group of interested persons formed the loosely-constituted Norfolk Fungus Study Group which has sought to maintain and extend the database. A Norfolk mycota (fungus flora) is in preparation.

The purpose of the present review is to highlight records made since the inception of the Norfolk Fungus Study Group and to initiate what it is hoped will be an annual report in these pages. Comments on some new additions to the list are presented in a series of discursive sections but the names of all

240 species of true fungi and 22 myxomycetes added to the Norfolk list since January 2000, together with the location and name of the finder, are listed in Appendix 1. The English names used are those recommended in Holden (2000).

NEW AGARICS

Members of the kingdom Fungi exhibit a very wide range of size and form but possibly the most familiar are the agarics. These are the mushrooms and toadstools, fleshy fungi, typically with a stem (or stipe) beneath a cap under which radiating gills or an array of tubes produce the spores.

Amongst those recently recorded as new to the County have been a surprising number of the large, white-spored species with rings around the stem in genera which include *Leucoagaricus*, *Chlorophyllum, Macrolepiota* and *Lepiota*. Although Alec Bull's finding of *Leucoagaricus sublittoralis* at Blakeney in 1999 predates the present review, he found it again at Gressenhall Old Carr (TF9717) in 2001. Trevor Dove kept the ball rolling when in 2000 he found *L. barssii* (then called *L. pinguipes*), which has now been placed in the 'near threatened' category of the provisional Red Data List, at Holkham dunes. He also spotted *L. subcretaceus* in a Norwich garden while delivering letters. A fourth rare species, *L. melanotrichus,* from this genus was collected from Shouldham Warren in 2002 by P.E.G. Walker and confirmed by Sheila Wells of the Huntingdon Fungus Group. Finally, *L. americanus* was recorded by Jonathan Revett in a supermarket car park in Downham Market in 2005 where he describes it as 'looking a bit like a *Macrolepiota* but bruising red and ending up a lovely burgundy colour all over'. As with most of the half-dozen or so other British records it was growing on woody debris.

The grassy heaths of the Stanford Battle Area (STANTA) are rich in fungi but poor in mycologists because of controlled access. Alec Bull has had a pass to enter the area since 1965 and has recorded many species including several of the genus *Macrolepiota*. As well as the widespread Parasol *M. procera* and Shaggy Parasol *M. rhacodes*, he has recorded both Slender Parasol *M. gracilenta* and *M. mastoidea* from a number of sites although these two species have now been synonymised under the latter name (Legon & Henrici 2005). In 2004 Alec Bull collected *M. permixta* from STANTA, a scarce UK species and a first for Norfolk. In the taxonomic confusion that seems rife in this group this species is not now considered to be authentically British and it should probably be referred to *M. fuliginosa* (Legon & Henrici 2005).

When *M. olivieri* (known also as *Chlorophyllum olivieri*) was found at

Blickling (TG1728) by Geoffrey Kibby during the 2003 British Mycological Society (BMS) Foray (see below) it was assumed that it was the first Norfolk record as no entry existed for it on the NFRD. This was the third British record and it subsequently transpired that the first British record had been made at Heggatt Hall (TG2717) by Malcolm Storey in 1971! A similar story concerns *Lepiota ochraceofulva*, a big 'parasol' with creamy-orange gills and a smell of Plasticine. It was found at Lynford Arboretum (TL8294) in 2006 by Jonathan Revett (and a few days later at Brandon Country Park (Suffolk) by Richard Shotbolt and Alan Robbins) and was assumed to be a new county record until it was realised that eminent amateur mycologist (and friend of Ted Ellis) Peter Orton had recorded it from Honingham (ca.TG1010) in what appears to be its first British site.

The Pink Waxcap *Hygrocybe calyptriformis* is an attractive and distinctive grassland species which was once thought to be quite rare but an awareness campaign for the plight of grassland fungi has revealed so many new records for the species that it has been removed from the Biodiversity Action Plan species list of fungi. It was disappointing, however, that this species had not appeared in Norfolk – until 2004 that is. In October of that year J.S.G. Worton found the species in front of Felbrigg Hall and just a few weeks later it was collected by Alec Bull at Foulden Common (TF7600), making it the eighteenth *Hygrocybe* to have been recorded there and confirming it as probably the best waxcap site in the county.

Also pink, but even scarcer that the above, is *Bolbitius coprophilus*. It appears to have been recorded from only five sites in Britain but, visiting Norfolk at Easter in 2005, Anne Andrews came upon a huge manure heap 50-100 yards long near Honing absolutely covered with this fungus which she describes as 'a bright pink toadstool resembling *Hygrocybe calyptriformis* from a distance though closer examination showed it was more like *Coprinus.*'

Boletes are fleshy fungi with stems which produce spores in tubes under the cap rather than on gills, giving the underside a spongy appearance. Although the Golden Gilled Bolete *Phylloporus pelletieri* (formerly recorded as *P. rhodoxanthus*, a North American species unknown in Europe) is indeed a bolete, it has gills but reveals its links as these anastomose near the stem to form a few large tubes. The first Norfolk record was by Tracy Money at Holt Hall in 2002 and it was subsequently found at Thursford Wood (TF9733) in 2006.

Inocybe (fibrecaps) is a large genus (with 115 species and varieties recorded

in Britain) of small, mostly brown, toadstools. No fewer than eight have been added to the Norfolk list since 2000 with Holkham Meols providing four of these. The majority of the new records were made by participants on the BMS Autumn 2003 Foray (see below) but Alec Bull found *I. cincinnata* var. *major* there in the previous year. His other addition to the Norfolk *Inocybe* list, *I. arenicola* ought to have been found there but wasn't, for it is otherwise only known from a small handful of sand dunes in association with Marram *Ammophila arenaria*! Alec found his specimen, the identity of which was confirmed by Reg Evans, at East Tuddenham in 2000.

One rewarding aspect of public fungus forays is that rarities can be found by anyone (even if identifying the find does require rather more expertise). *Tricholoma viridifucatum* (fourth UK record) was brought to Tony Leech on such a foray at Sheringham Park in 2007. Neither is maturity of years a prerequisite; five-year old Rebecca Rushforth collected *Pholiota spumosa* from scattered woodchips on a Norfolk Smallholders Association foray at Lynford Arboretum in October 2007. Originally thought to be a new addition to the County list, an entry in the national Fungal Records Database of Britain and Ireland (FRDBI) indicated that it had in fact been recorded in 1987 'on a bag of composted conifer bark originating from near Thetford' but with no further details.

WOODCHIP AGARICS

The large-scale use of woodchips in gardens and municipal areas since the mid-1980s has led to the appearance in Britain of a significant number of fungi not hitherto recorded here (Marren 2006). Many of these are large and striking in appearance so that it is inconceivable that they would have been overlooked. Some are previously only known from the Southern Hemisphere (hence the term 'woodchip aliens' for these new arrivals) but they often appear in large numbers. It is unlikely that these fungi have been introduced from abroad on the woodchips since these have often been produced on-site or locally. No theory for their recent appearance has proved entirely plausible but it seems likely that freshly-chipped wood provides an ideal substrate, largely devoid of competing species, well aerated and with an appropriate level of available nutrients. It is possible that the spores could have travelled from their source in the upper atmosphere or been introduced in some unknown way through man's actions.

In August 2001, Francis Farrow collected a purple agaric that was growing on a large pile of woodchips which had been produced during the previous

winter on Beeston Common (see photo between p.32 and p.33). Although superficially similar to Plums and Custard *Tricholomopsis rutilans* it differed in a number of ways including its clustered growth. The fungus appeared very similar to an illustration of *Gymnopilus purpuratus*, in Breitenbach and Kränzlin (1995) however Alick Henrici at Kew was able to identify it with certainty as *Gymnopilus dilepis*. This fungus had been first recorded in Britain growing on the soil around a *Philodendron* sp. in an Edinburgh garden centre in 1997 (Watling 1998) but it was later realised that its first recorded occurrence in Britain was at Brentmoor Heath, Surrey by Ray Tantram in 1994 in circumstances very similar to those on Beeston Common (Tantram 1998). In 2002 the fungus made an appearance, again prolifically, on a large pile of woodchips on Holt Lowes (TG0837). Subsequently, a photograph taken by Bernard Dawson in July 2001 showed that the fungus had appeared at Holt Lowes at virtually the same time as it had on Beeston Common, just 8km away. In both cases the fungus had made its appearance only a few months after the chips had been produced. Since these discoveries, *G. dilepis* has occurred on woodchips elsewhere in Britain and in 2006 was recorded from Mousehold Heath (TG2410) by Trevor Dove.

One interesting development from the publication of the Beeston Common record (Leech 2003) was the request by Bettye Rees, an Australian mycologist, for dried material from both of the Norfolk sites which she extracted DNA. She was able to confirm that the Norfolk specimen was conspecific with *G. dilepis* which occurs in Australia (and widely through the Far East) but was unable to examine the type material for this species (from Sri Lanka) (Rees et al. 2004). Intriguingly Rees found that the Beeston Common and Holt Lowes specimens differed by one base in the DNA regions sequenced and showed small microscopic differences suggesting that they may have originated from different populations.

The Holt Lowes woodchip pile has continued to produce fruiting bodies of *G. dilepis* although less abundantly as it has rotted down. Another scarce fungus to have appeared there is the Lilac Mushroom *Agaricus porphyrizon* which was first recorded in the county by Alec Bull at Bunkershill Plantation in 2000 and has been seen elsewhere since (although not on woodchips). In 2006 a clump of the startlingly yellow Plantpot Dapperling *Leucocoprinus birnbaumii* was observed by Anne and Simon Harrap on the same woodchips (see photo between p.32 and p.33). This record is remarkable not so much for the rarity of the fungus but for the fact that this is only the second time it has been recorded in the open in Britain; all other records refer to soil indoors

Azure Damselfly *Coenagrion puella.* The upper and lower left photographs show the variant female with broken antehumorals (stripes along sides of thorax). The lower right photograph is of a typical female. *Photos*: Bernard Dawson.

Top: Plantpot Dapperling *Leucocoprinus birnbaumii* on woodchips at Holt Lowes. *Photo*: Simon Harrap. **Bottom:** *Gymnopilus dilepis* on woodchips at Beeston Common. *Photo:* Tony Leech. In both cases these were the second outdoor records for Britain.

Top left: Hoof Fungus *Fomes fomentarius* at Roydon Common. **Top right**: Sandy Stiltball *Battarraea phalloides* at Drayton. *Photos:* Tony Leech. **Bottom**: Nipple galls on *Ganoderma applanatum* at Strumpshaw. *Photo:* Hatty Aldridge.

Russula ruberrima One of two *Russula* spp. new to Britain found at Kelling Heath during the 2003 British Mycological Society's foray. *Photo:* Geoffrey Kibby.

Agrocybe rivulosa, at Gressenhall. The first Norfolk record for a rapidly spreading woodchip alien. *Photo:* Tony Leech.

Typhula phacorrhiza in Edgefield. The first Norfolk record for 60 years. *Photo:* Tony Leech.

or under glass. In 2007 Julie Pleasants found this fungus in a more typical habitat, sharing a pot with her *Monstera* plant in Brundall (TG3208)

In October 2006, Pat Lorber sent Tony Leech a photograph of clusters of large brown-gilled agarics on a pile of woodchips at the Rural Life Museum at Gressenhall. A visit confirmed his view that they were *Agrocybe rivulosa*, a species only described (from the Netherlands) in 2003 since when it has been recorded from sites across Belgium and Luxembourg and in 2005 made its first recorded appearance in Britain, in Staffordshire (see photo opp.). By spring 2006 it had been found at two sites near London and in Somerset. During the autumn of 2007 it fruited abundantly on woodchips covering the roundabout at the Heartsease junction in Norwich (TG2509).

A second species new to Norfolk growing on the same woodchips at Gressenhall was *Clitopilus passeckerianus*, a pink-spored fungus which lacks a stem and resembles a small oyster fungus. It more usually occurs on mushroom beds but is beginning to be recorded increasingly from woodchips.

INKCAPS: *Coprinus, Coprinellus, Coprinopsis and Parasola*

The addition of DNA sequencing studies to the armoury of taxonomic techniques has thrown up some fascinating results that have sometimes had to result in the loss of familiar names. The old genus *Coprinus*, known generally as inkcaps, consisted of a large number of species, many of them delicate and growing on dung. In many ways the most familiar, the Shaggy Inkcap *C. comatus* was one of the least typical, being stout and not growing on dung. This was supported by the DNA evidence that showed that it was not closely related to most of the other members of the genus (Redhead et al. 2001). The straightforward solution of creating a new genus for this species and its close relatives was not available as *C. comatus* is the type on which the genus was created so the other members of *Coprinus* had to be 'rehomed' and the genera *Coprinellus, Coprinopsis* and *Parasola* were created.

The identification of inkcaps is challenging. It is not that they lack distinctive characters but good literature was not accessible until recently and the smaller ones have to be looked at within an hour or two of collection. Jonathan Revett has risen to these challenges and has added no fewer than six of the ten species new to the County list since the turn of the century. The fact that five of these were from Welney where he lives did at least reduce the time taken between collection and study.

A GREENHOUSE *Conocybe*

The genus *Conocybe* consists of a large number of small brown agarics with conical caps so the identity of the rather stockier flat-topped agarics which appeared with a potted *Brugmansia* plant at Holt in 2002 was not initially sought in this genus (see photo between p.32 and p.33). However, when Tony Leech showed his puzzling find to Alick Henrici he instantly identified the fungus as *Conocybe intrusa*, an American species first recorded from Europe (Czechoslovakia) in 1947. The first British record came from Edinburgh Royal Botanic Garden in 1958, since when it has been collected from Kew and from Somerset, Shropshire and Surrey. All records have been from glasshouses except that from Somerset in 1980 where it occurred outdoors on manured soil.

NOT SINCE PLOWRIGHT

Although the period under review begins nearly 120 years after the publication of the second part of Plowright's list (1884), a number of prominent fungi have escaped detection in this time. The most remarkable 'rediscovery' must be that of Oak Polypore *Piptoporus quercinus* by Martyn Ainsworth in 2003. He had just begun working for English Nature on Biodiversity Action Plan fungi and was aware of Plowright's (1872) record given only as 'Castle Rising. September 1871'. After visiting the County for a meeting on the North Norfolk coast, Martyn suggested a visit to the village and walked to the nearest woodland where he found the fungus on the sawn end of a well-seasoned oak trunk section in nettles lying by the roadside!

A rather different scenario led to the re-discovery of another bracket fungus, Hoof Fungus *Fomes fomentarius* (see photo between p.32 and p.33). Unlike the *Piptoporus*, this is a common fungus in some parts of Britain, especially in the Scottish Highlands where it is a parasite of birch and very conspicuous. It is being increasingly recorded over central and southern England where it is more likely to be seen on Beech *Fagus sylvatica.* In 2006, after Tony Leech had given a talk on fungi, a member of the audience asked the identity of a bracket fungus she had seen nearby which she described as 'like a beehive skep'. It was clearly *F. fomentarius* and a few days later this was confirmed when it was seen *in situ* at the edge of Roydon Common (TF6922) (see photo between pp.32 and 33). Plowright (1872) records it from birch at Stratton Strawless and oak (an unusual host) at Thorpe Market. Ash Murray, Site Manager at Dersingham Bog NNR, subsequently informed me that he knew of its occurrence there (TF6628) but had not realised the significance of this. An even more widespread bracket fungus which had not been recorded since before

1872 (on ash at Buxton) is *Penniporia fraxinea* which was found by Alec Bull at Buckenham Tofts (TL8496) in 2003 and identified by Trevor Dove.

Bracket-like, but not a true bracket fungus, a nationally widespread agaric which had somehow escaped notice since Plowright is Split-gill *Schizophyllum commune*, noted by him (on a felled tree at Cossey (sic)), 1853 and by Kirby Trimmer in a similar situation at Arminghall, 1861. It was recorded on a log at Felbrigg Hall (TG1939) by Sherry Stannard during the BMS Autumn Foray (see below) but is now much more likely to be seen bursting through polythene-covered silage bags as it was when Pat Williamson photographed it at Briston (ca.TG0632) in 2006. The inhalation of spores from this fungus has caused pneumonia and even brain lesions.

It was thought that the Devils's Bolete *Boletus satanas*, reputedly the only seriously poisonous bolete in Britain, found by Alec Bull at Cranworth (TF9804) in 2002 was the first record for this species from Norfolk but once again Plowright (1872) got there first with no fewer than three localities (Gillingham, Stockton and Raveningham). Remarkably the same roadside bank at Cranworth, which had already been designated a Roadside Nature Reserve by virtue of its chalk flora, also produced in 2002 *Russula rubra*, a species with apparently only one other British record (from Buckinghamshire in 2001) (see photo between opp. p.81). However, this species has recently been synonymised with *R. pungens* for which there are a few more British records.

A quite different fungus, but one which is fairly widespread in Britain, is Bog Beacon *Mitrula paludosa* (see photo opp. p.81). This is an ascomycete, a few centimetres high which is found, usually in troops, in very shallow, slow-moving water – a very unusual habitat. The discovery at Edgefield Heath (TG0836) in 2001 was the first for 137 years since Plowright found it at North Wootton Heath in 1864 (Plowright 1872).

BRACKETS AND RESUPINATE FUNGI ON WOOD

It has become increasingly apparent that the growth forms of basidiomycete fungi, on which earlier classifications were based, do not correlate with modern views on fungal relationships. This has left us without useful general terms for the larger groups. Bracket fungi grow horizontally from their wood substrate and bear spores on their lower surface, usually in pores. Resupinate fungi are generally adpressed to the surface (usually wood) on which they are growing and bear spores on their upper surface. However some, very closely related fungi, do grow horizontally and bear spores below – and

some produce spores from pore-like structures on their upper surface. The widespread Common Mazegill *Datronia mollis* is a case in point; it is usually described as a 'lumpy bracket' but it can be resupinate. *D. stereoides* is similar in form but rather more resupinate; but whether it is British or not is debatable. Alec Bull reported what might be the second British record (the first being from the Cotswolds) from East Walton Common in 2003 but the fungus is listed on FRDBI as 'not authentically British - no records have been traced'.

Definitely resupinate, and distinctively electric blue, is Cobalt Crust *Terana caerulea*, another 'new to Norfolk' fungus found by Alec Bull, this time at Gressenhall Old Carr in 2003. This is predominantly a species of the south and west but with scattered records from Yorkshire. It has subsequently been found at Strumphaw (TG3406) by warden Tim Strudwick.

GASTEROMYCETES

Norfolk has always been rich in gasteromycetes, the heterogeneous group that includes puffballs, earthballs and earthstars as well as more bizarre forms. This may be due to the light soils that some of the scarcer species prefer but then, as Norfolk mycologists have taken a special interest in them, records have proliferated.

In 2000, Trevor Dove found a single specimen of the Sandy Stiltball *Battarraea phalloides* at Stoke Holy Cross (TG2301) at what might well have been the site at which Sir W.J.Hooker (Director of Kew Gardens) found it in the early nineteenth century. Also in 2000, Jonathan Revett found another site for this fungus at Cockley Cley (TF7804) and the next year Trevor Dove made his second discovery nearby at Narborough (TF7711) bringing to five the total number of sites at which this nationally rare species currently occurs in Norfolk (see photo between pp.32 and 33).

Holkham (TF9045) is the only site in Britain where the Tiny Earthstar *Geastrum minimum* has been recorded with certainty (Pegler et al. 1995) and where it continues to survive at four discrete, but close, sites. During the British Mycological Society's Spring Foray in 2002 an old earthstar was collected by Tony Leech in the pines at Holkham and taken to Brian Spooner who pronounced it to be a specimen of the Elegant Earthstar *G. elegans,* adding a fifth earthstar to the Holkham tally. Shelley Evans found a second specimen nearby in the following year but these were not the first Norfolk records; J.T. Palmer had recorded it in 1892 at Great Massingham. Subsequent finds of the Striate Earthstar *G. striatum* and the Crowned

Earthstar *G. coronatum* in 2003 by Tracy Money and Trevor Dove raised the total of earthstars at Holkham to seven and then in 2006 Paul Sterry found an earthstar he could not identify near to one of the *G. minimum* sites. Once again, Brian Spooner was consulted and was able to determine it as the Field Earthstar *G. campestre*, an earthstar once thought to be extinct in Britain but which has now been recorded from four localities (including this one from Norfolk) since 2000. Eight earthstar species from one locality must make Holkham one of the top sites for these fungi.

A surprise occurrence of the Weathered Earthstar *G. corallinum* in a greenhouse in Edgefield (TG0934) in 2006 provided the second record for this species in Norfolk, previously only recorded by Ted Ellis at Wortwell (TM2080) in 1983.

Tulostoma brumale is quite widespread along the coast in north-west Norfolk but Max d'Ayala extended its range when he found it at Grimes Graves (TL8189) in 2002. The very much rarer *Tulostoma melanocyclum* was found at Holme (TF7144) in 1958 and then by Jonathan Revett (and confirmed by Peter Roberts) in 1999 since when it has been seen annually. At the autumn BMS Foray (2003, see below) it, too, was recorded from Holkham and in 2004 at Burnham Overy Staithe (ca.TF8645) by Tom Pallister and Old Hunstanton (TF6943 etc) by Alec Bull.

CLAVARIOID FUNGI

Critical identifications of clavarioid fungi (club fungi, spindle fungi and coral fungi) have been hampered by the lack of available modern accessible literature. Until the monograph in preparation by the Kew mycologists is available we have to rely on Corner's work (1950) and a draft key by Alick Henrici (1997). After discovering Ochre Coral *Ramaria decurrens* in the county for the first time in 1998 at Norton Subcourse (TM4098), Trevor Dove has either found, or confirmed the identity of, this fungus at seven sites between 2000 and 2007. Whether it is becoming commoner or just better recorded is not clear. Although the 'normal' habitat' for this species is gardens or woodland it was found in dunes on Blakeney Point in 2004. In 2006 Alec Bull found *Ramariopsis pulchella* in the Stanford Battle Area, another new record for Norfolk.

Although the strong colour of Violet Coral *Clavaria zollingeri* makes it instantly recognisable, it has been found only once in Norfolk, by J. Williamson on East Walton Common in 2001. *C. incarnata*, more delicately pink-coloured, was one of several scarce grassland fungi collected from a field at Bergh Apton in

2007, together with what has been tentatively identified as *C. krieglsteineri*. The record for *C. incarnata* appears to be the first since 1879 when William Phelps reported it at Terrington St. Clement. The same field also produced the earthtongue *Geoglossum fallax*, an ascomycete new to Norfolk, collected and identified by Anne Andrews. What was so remarkable about this site, which in a single visit produced three species of waxcap, two earthtongues and three spindle fungi, is that less than twenty years ago it was an arable field. Ironically, the planting of trees on the field to create a millennium wood will in time eliminate the unusual fungi! Conforming to the 'principle' that rare fungi suddenly become commonplace, *C. krieglsteineri* turned up again a week later at Briningham (TG0334) on a lawn that had also recently been reclaimed from arable cultivation. In the past this species may have been erroneously recorded as *C. argillacea* or *C. tenuipes* but the true status of *C. krieglsteineri* in Britain is not clear.

The term 'club fungus' is nowhere better applied than to Giant Club *Clavariadelphus pistillaris*, which can be over 15cm high and 3cm in diameter at its tip. The first Norfolk record was made under somewhat strange circumstances in 1994 at Holt Country Park: a participant on a public fungus foray produced a specimen but was unable to locate precisely where he found it. When Michelle Feilden came across it in Foxley Wood (TG0523) during an NWT Fungus Workshop there was no such problem and several fruiting bodies were seen *in situ,* and again the next year. What is remarkable is that it should have been overlooked for so long in this well-studied site.

Although not new to Norfolk, it was 60 years since the much more slender club fungus, *Typhula phacorrhiza* (see photo opp. p.33), which appeared in the garden of Simon and Anne Harrap at Edgefield (TG0934) was recorded (by Ted Ellis at Wheatfen (TG3205) in 1943). On both occasions the fungus was under Ash. Two other rare species of *Typhula* were added to the Norfolk list at the BMS Autumn Foray in 2003 (see below): *T. spathulata* by Bruce Ing at Felbrigg Hall and *T. sphaeroidea* by Carol Hobart in Swanton Novers Great Wood. The latter species is a North American fungus only recorded once previously in Britain (from Northern Ireland) and considered to require further investigation before it is accepted on to the British list. A similar situation exists for *T. sclerotioides* recorded in 2004 by Trevor Dove, both at Barton Leys Wood (TF7005) and at Strumpshaw (TG3306). This is an alpine species considered unlikely to occur in Britain (Legon & Henrici 2005).

HYDNOID FUNGI

In a small group of fungi, the hydnoid fungi, the surface area of the spore-

producing tissue is increased not by gills or tubes but by fleshy teeth which hang down from the underside of the cap. Most are rare and are Biodiversity Action Plan species. There are three reliable Norfolk records for both the Zoned Tooth *Hydnellum concrescens* and the Velvet Tooth *H. spongiosipes.* What was unexpected, however, was the appearance of a fine 'head' of Bearded Tooth *Hericeum erinaceus* in October 2006 at Trowse Wood near Norwich (see photo opp. p.81). The attention of the mycological community was drawn to this prominent fungus by Stephen Livermore who spotted it on the cut end of a Beech tree *Fagus silvatica* which had been felled several years previously but fortuitously left lying. This striking white fungus is fairly frequently seen in the New Forest and in the Home Counties but records for further north are scarce. It was recorded on the Suffolk coast in 1990 and is apparently spreading.

NEW MICROFUNGI

Well over half of all fungus species recorded from Britain are ascomycetes (Ascomycota), distinguished by producing their spores in tubes (asci). Although a few, including morels and the larger cup fungi, are large enough to catch the eye of the wandering naturalist, most are relatively insignificant. Most ascomycetes occur on dead plant material.

One of the many groups in which the late Reg Evans specialised were the 'pyrenomycetes', a polyphyletic assemblage of ascomycetes in which the asci are clustered in flask-like structures embedded in a firm stroma. Most of his interesting finds were made before 2000 but in that year he recorded *Diaporthe pithya* from Foxley Wood, the second British record and in 2002 he was able to confirm the identification of *Pleuroceras pseudoplatani* found on a living Sycamore *Acer pseudoplatanus* leaf by Rex Hancy at Thorpe End Woods in Norwich. This had previously been found only in Berkshire and Lancashire.

Peter Lambley's discovery of *Chaenothecopsis retinens*, a minute parasite of lichens, at Thursford Wood in 2002 was particularly interesting as it does not appear to have been recorded anywhere in the world since it was described as a separate species from Jersey in 1866.

Another 'unusual' substrate for fungi is bird pellets. Trevor Dove found the discomycete *Cheilymenia cadaverina* on a Tawny Owl pellet at Strumpshaw Fen in 2007. The only other record for Britain is from Derbyshire in 1959 when it was found on a Kestrel pellet.

When husband and wife team Ted Batten and Sheila Francis visited Norfolk from their Suffolk home they could be relied on to add to the Norfolk list. At Holme Dunes in 2001 Sheila found three new species on Marram *Ammophila arenaria*, namely *Gorgoniceps micrometra, Metasphaeria graminum* and *Tubeufia trichella*. Ted added *Orbilia septispora*, also from this host, making it the third UK record (all by Ted!). On the same foray he found *Ciliolarina pinicola* on the bark of a fallen twig of Corsican Pine *Pinus nigra* in the dunes. This discomycete fungus was known from Germany, Sweden and from Spain but had not previously been recorded from this country. At the 2002 BMS foray the couple added a further three fungi (*Ascochyta psammae*, *Rutstroemia maritima* and *Thyrostromella myriana*), all on Marram and in each case only the second or third record for Britain.

At the 2003 BMS Foray (see below) Ted added the discomycete *Unguiculariopsis ilicinicola*, from a Holly *Ilex aquifolium* twig at Gresham's School, Holt to the Norfolk list. It had previously been recorded only three times from Britain. Sadly, Ted Batten died in 2006.

UNUSUAL HOSTS

Parasitic fungi vary in their host specificity from the very catholic Honey Fungus *Armillaria mellea* to the absolutely specific Birch Polypore *Piptoporus betulinus*. Recorders often specify the host only if it is unusual and this can lead to over-reporting of 'unusual' hosts in databases.

Richard Shotbolt made what appears to be the first British record for *Sphaerotheca pannosa* (a rose mildew) on Cherry Laurel *Prunus laurocerasus* at Holt Hall (TG0739) in 2002. In southern Europe it is much commoner and a nuisance on nursery stock. In 2000 Tony Leech found and photographed *Inonotus dryadeus* Oak Polypore on Beech *Fagus sylvatica* at Gresham's School, Holt (TG0839), a host reported as 'unverified' in Legon & Henrici (2005) and not mentioned by Ryvarden & Gilbertson (1993). David Boulton also photographed this fungus on Beech at Heydon Hall (TG1127) in 2003. In 2007, *Ganoderma applanatum*, which is almost, but not quite, restricted to deciduous hosts, was found on a fallen Scots Pine *Pinus sylvatica* trunk at Ashwellthorpe Lower Wood (TM1948).

NIPPLE-SHAPED GALLS ON *Ganoderma applanatum*

Although a number of fungi cause galls on vascular plants, relatively few fungi are hosts to gall-causers. The prominent nipple-shaped gall on the underside (hymenium) of Artist's Bracket *Ganoderma applanatum* is caused

by the flat-footed fly, *Agathomyia wankowiczii* and was first recorded in Britain in 1991 having spread from continental Europe (see photo between pp.32 and 33). It was first recorded in Norfolk by Alec Bull who found it at Bressingham (TM0780) in early 2002 and noted that there was evidence of the gall on hymenial layers which had been formed three years previously (Bull, 2002). A similar situation applied to a specimen found later that year at Ashwellthorpe Lower Wood (TM1498) suggesting that the fly was in Norfolk as early as 1999. The gall was subsequently found at Sculthorpe Moor (TF9030) in 2004 and appears to be increasing in the County.

SLIME MOULDS

Slime moulds (myxomycetes) do not belong in the kingdom Fungi and are best considered as a phylum in the kingdom Protozoa. Nevertheless, as 'honorary fungi' their distribution is appropriately recorded with the fungi and historically has been studied by mycologists. In the final quarter of the twentieth century myxomycetes were assiduously recorded by Lil Evans but in the last few years, mainly as a result of several visits to the county by Bruce Ing, the national expert on the group, 22 additions have been made to the County list. Many of these have 'appeared' on samples of bark taken from living trees and kept in a moist chamber. New species of note include *Comatricha ellae* and *Paradiacheopsis microcarpa* both only recorded previously in Britain (by Bruce Ing) at Glamis Castle.

BRITISH MYCOLOGICAL SOCIETY SPRING FORAY 2002

British Mycological Society forays bring together mycologists from across the country and in 2002 member spent a week based at the Field Study Centre at Wells. A remarkable 363 taxa of true fungi were recorded by participants of which 36 had not previously been recorded in Norfolk. Not surprisingly, at this time of year there are relatively few large fungi and only 21 species of agarics were recorded with just two of these new to Norfolk: *Coprinopsis jonesii* at Dersingham Bog and *Resupinatus trichotis* at Holkham Park (seen later in the same year by Jonathan Revett at Sculthorpe Moor (TF9030)). The corticioid fungus *Vuillemenia macrospora*, found by Martyn Ainsworth on a dead Tamarisk *Tamarix gallica* branch at Brancaster was a first record for England, all four previous records having come from Scotland.

Of the smaller fungi, three species had not previously been recorded in Britain: *Belonopsis retincola*, a discomycete found on *Phragmites* by Henry Beker at Wells; *Mollisia rosae* found on *Rosa* sp. at both Holkham Meols (by L. Davy) and Holkham Park (by Martyn Ainsworth) and *Ascocodinaea polyporicola*

on *Trichaptum abietinum* at Dersingham Bog by Alick Henrici.

BRITISH MYCOLOGICAL SOCIETY AUTUMN FORAY 2003

Some fifty mycologists spent all or part of the last week of October 2003 based at Gresham's School, Holt. Sites visited included Blickling Hall, Kelling Heath Holiday Park, Swanton Novers Great Wood, Holkham Meols and Felbrigg Hall. Despite it being an exceptionally dry autumn, 644 taxa of true fungi were recorded during the week. Of these, 78 species were new to the county, including 34 agarics. The percentage of records new to the county was similar for the two BMS forays: 9.9% in spring 2002 and 12.1% in autumn 2003.

Three agarics new to Britain were collected during the week, two of them species of *Russula* (brittlegills). This fact was probably not unrelated to the presence of Marcus Floriani, the guest tutor from Italy and an expert on the genus, who was able to confirm the identifications. One of them, *R. ruberrima* (see photo opp. p.33), found at Kelling Heath Holiday Park, made headlines in the Eastern Daily Press newspaper (6 Nov 2003). The second, *R. versatilis*, was also found at Kelling Heath Holiday Park and also by Patrick Leonard! *Russula* species are large and often strongly coloured but their variability and large numbers (now 140 on the British list) makes them difficult to identify. During the week, and despite the very dry preceding months, 22 species of *Russula* were recorded, including four new to the county (*R. anatina* and *R. torulosa* in addition to the above).

The third new British agaric was *Galerina terrestris*, a small brown toadstool collected by Irene Ridge at Holkham Meols. Irene, who nobly specialises in 'small brown toadstools' also found the third British specimen of *Hypholoma xanthocephalum* at Felbrigg, an identification confirmed by Alick Henrici. This species is on the provisional Red Data List. Two more 'third for Britain' agarics were collected during the week: *Coprinopsis pachyderma*, by Jacqui Darby in a mixed plantation at Kelling Heath Holiday Park and confirmed by *Coprinus* expert Derek Schafer, and *Psathyrella obtusata* var. *aberrans*, claimed by its finder, Richard Shotbolt, again at Felbrigg, to be 'quite distinct from the type variety'.

One of the most delightful finds of the week, made by Bruce Ing at Swanton Novers Woods, was the Holly Parachute *Marasmius hudsonii*. This delicate pinkish agaric has a cap barely 5mm in diameter beset with sparse, long, purple-brown bristles and is found only on fallen leaves of Holly *Ilex aquifolium*. It is nowhere common but has a predominantly northern and

western distribution in Britain. Curiously, a second Norfolk record was reported in 2006, by Colin Jacobs.

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Appendix 1: FUNGI NEW TO NORFOLK SINCE 2000

In some cases the Grid Reference refers to the site in general rather than specifically the 1 x 1km square in which the fungus was recorded. An asterisk against the date (2002*, 2003*) indicates that the fungus was collected during a British Mycological Society Foray in that year. The full names of recorders are listed in Appendix 2.

Species	Place	Grid	Year	Recd.
ASCOMYCOTA (Kingdom Fungi)				
Actidium hysterioides Fr.	Dersingham Bog	TF6628	2002*	BMS
Anthostomella phaeosticta (Berk.) Sacc.	Holkham Meols	TF8845	2002*	SMF
Arachnopeziza aurelia (Pers.) Fuckel	Emily's Wood	TL7989	2001	MP
Ascobolus albidus P. Crouan & H. Crouan	Holme Dunes	TF7144	2001	REE
Ascobolus ciliatus Berk.	Swanton Novers [4]	TG0032	2002*	PEGW
Ascoclyta psammae Oudem.	Holkham Meols	TF8845	2002*	SMF
Ascocodinaea polyporicola Samuels, Cand. & Magni	Dersingham Bog	TF6628	2002*	BMS
Ascocoryne albidum (Berk.) anon. ined.	Felbrigg Hall	TG1939	2003*	DG
Ascotremella faginea (Peck) Seaver	Emily's Wood	TL7989	2001	MP
Belonium psammicola (Rostr.) Nannf.	Holkham Meols	TF8845	2002*	EB
Belonopsis retincola (Rabenh.) Le Gal & F. Mangenot	Abraham's Bosom	TF9146	2002*	HJB
Beverwykella pulmonaria (Beverw.) Tubaki	Holt	TG0839	2003*	AH
Bisporella scolochloae (De Not.) Spooner	Holkham Meols	TF8845	2002*	EB
Camposporium cambrense S. Hughes	Holkham Meols	TF8845	2002*	AH
Candelabrum spinulosum Beverw.	Holkham Meols	TF8845	2002*	AH
Caudospora taleola (Fr.) Starbäck	Kelling Heath [2]	TG1041	2003*	MP
Cephalotheca sulfurea Fuckel	Holkham Park	TF8743	2002*	MAA
Chaenothecopsis retinens (Nyl.) Tibell	Thursford Wood	TF9733	2002	PWL
Cheilymenia cadaverina (Velen.) Svrcek	Strumpshaw	TG3406	2007	TWD
Cheilymenia stercorea (Pers.) Boud.	Buxton Heath	TG1721	2007	ARL
Cheirospora botryospora S. Hughes	Felbrigg Hall	TG1939	2003*	BMS
Chromelosporium carneum (Pers.) Hennebert	Swanton Novers [4]	TG0130	2003*	CH
Ciliolarina pinicola (Henn. & Plöttner) Huhtinen	Holme Dunes	TF7144	2001	EB
Coprotus granuliformis (P. Crouan & H. Crouan) Kimbr.	Welney	TL5395	2003	JJR
Cordyceps forquignonii Quél.	Swanton Novers [4]	TG0032	2001	REE
Corynespora smithii (Berk. & Broome) M.B. Ellis	Swanton Novers [4]	TG0032	2002*	KR
Cristulariella depraedans (Cooke) Höhn.	Swanton Novers [4]	TG0130	2003*	BMS
Crocicreas subhyalinum (Rehm) S.E. Carp.	Felbrigg Hall	TG1939	2003*	MP
Dermea padi (Alb. & Schwein.) Fr.	Swanton Novers [4]	TG0032	2002*	KR

Species	Place	Grid	Year	Recd.
Diaporthe pithya Sacc.	Foxley Wood	TG0523	2000	REE
Diaporthopsis pantherina (Berk.) Wehm.	Dersingham Bog	TF6628	2002*	SMW
Erysiphe berberidis DC.	Holt	TG0839	2003*	RS
Erysiphe biocellata Ehrenb.	Blickling Hall	TG1728	2003*	MP
Erysiphe convolvuli DC.	Ranworth	TG3515	2007	KR
Erysiphe cruciferarum Opiz ex L. Junell	Wells-next-the-Sea	TF9244	2002*	BMS
Erysiphe euonymi-japonici (Vienn.-Bourg.) U. Braun & S. Takam.	Wells-next-the-Sea	TF9244	2002*	BMS
Erysiphe flexuosa (Peck) U. Braun & S. Takam.	Blickling Hall	TG1728	2003*	AWB
Erysiphe ornata var. *ornata* (U. Braun) U. Braun & S. Takam.	Kelling Heath [2]	TG1041	2003*	BI
Erysiphe symphoricarpi (Howe) U. Braun & S. Takam.	Holt	TG0839	2003*	BI
Erysiphe syringae Schwein.	Holt	TG0839	2003*	BI
Erysiphe trifolii var. *intermedia* (U. Braun) U. Braun & S. Takam.	Holt	TG0839	2003*	BI
Erysiphe urticae (Wallr.) S. Blumer	Blickling Hall	TG1728	2003*	RS
Geoglossum fallax E.J. Durand	Bergh Apton	TM3199	2007	AA
Geopora cervina (Velen.) T. Schumach.	Welney	TL5395	2001	JJR
Gliocladium catenulatum J.C. Gilman & E.V. Abbott	Barton Leys Woods	TF7005	2004	TM
Gorgoniceps micrometra (Berk. & Broome) Sacc.	Holme Dunes	TF7144	2001	SMF
Graphium calicioides (Fr.) Cooke & Massee	Felbrigg Hall	TG1939	2003*	BMS
Helicodendron websteri Voglmayr & P.J. Fisher	Gresham's School	TG0839	2003*	AH
Helicoön richonis (Boud.) Linder	Gresham's School	TG0840	2003*	AH
Helvella cupuliformis Dissing & Nannf.	Sculthorpe Moor	TF9030	2002	ARL
Hyaloscypha fuckelii var. *fuckelii* Nannf.	Swanton Novers [4]	TG0035	2002*	HJB
Hyaloscypha quercicola (Velen.) Huhtinen	Gresham's School	TG0839	2003*	AH
Hyaloscypha zalewskii Descals & J. Webster	Blickling Hall	TG1728	2003*	AH
Laetinaevia pustulata Graddon	Holkham Meols	TF9045	2002*	EB
Lophodermium petiolicola Fuckel	Felthorpe Woods	TG1416	2002	REE
Metasphaeria graminum (Sacc.) Sacc.	Holme Dunes	TF7144	2001	SMF
Mollisia amenticola (Sacc.) Rehm	Blickling Hall	TG1728	2003*	MP
Mollisia rosae P. Karst.	Holkham Meols	TF9045	2002*	LD
Monilinia aucupariae (F. Ludw.) Whetzel	Swanton Novers [4]	TG0032	2002*	MAA
Mycosylva clarkii M.C. Tulloch	Shouldham Warren	TF6811	2002	MP
Mytilinidion mytilinellum (Fr.) H. Zogg	Shouldham Warren	TF6811	2002	MP
Ophiostoma ulmi (Buisman) Nannf.	Danby Wood	TG2205	2004	TWD
Orbilia coccinella (Sommerf.) P. Karst.	Holkham Meols	TF8845	2002*	MP
Orbilia septispora Baral	Holme Dunes	TF7144	2001	EB
Pezicula cinnamomea (DC.) Sacc.	Kelling Heath [2]	TG1041	2003*	MP

Species	Place	Grid	Year	Recd.
Peziza granulosa Schumach.	Holt	TG0839	2006	ARL
Peziza pseudoviolacea Donadini	Waterhouse Plant'n	TL9094	2004	ALB
Pezizella parilis (P. Karst.) Dennis	Swanton Novers [4]	TG0130	2003*	MP
Pezizella vulgaris (Fr.) Sacc.	Swanton Novers [4]	TG0130	2003*	MP
Phaeostalagmus cyclosporus (Grove) W. Gams	Holkham Park	TF8743	2002*	MAA
Phomopsis platanoidis (Cooke) Died.	Kelling Heath [2]	TG1041	2003*	MP
Phyllachora dactylidis Delacr.	Blickling Hall	TG1728	2003*	MP
Pleuroceras pseudoplatani (Tubeuf) M. Monod	Thorpe End Woods	TG2811	2002	RCH
Pseudaegerita viridis (Bayl. Ell.) Abdullah & J. Webster	Gresham's School	TG0839	2003*	AH
Pseudombrophila cervaria (W. Phillips) Brumm.	Weney	TL5395	2003	JJR
Pseudotrichia minor Munk	Felbrigg Hall	TG1939	2003*	MP
Psilachnum chrysostigmum (Fr.) Raitv	Swanton Novers [4]	TG0032	2002*	KR
Ramularia aequivoca (Ces.) Sacc.	Felbrigg Hall	TG1939	2003*	BMS
Ramularia ari Fautrey	Holkham Park	TF8743	2002*	KR
Rutstroemia maritima (Roberge ex Desm.) Dennis	Holkham Meols	TF8845	2002*	EB
Scutellinia umbrorum (Fuckel) Lambotte	Ashwellthorpe [1]	TM1498	2001	MJW
Spirosphaera floriformis Beverw.	Gresham's School	TG0839	2003*	AH
Spondylocladiopsis cupulicola M.B. Ellis	Gresham's School	TG0839	2003*	AH
Thyrostromella myriana (Desm.) Höhn.	Holkham Meols	TF8845	2002*	SMF
Tricladium castaneicola B. Sutton	Holkham Meols	TF8845	2002*	AH
Tubeufia trichella (Sacc., E.Bommer & M.Rousseau) Scheuer	Holme Dunes	TF7144	2001	SMF
Venturia macularis (Fr.) E. Müll. & Arx	Foxley Wood	TG0523	2000	REE
Venturia maculiformis (Desm.) G. Winter	Swanton G't Wood	TG0130	2003*	BMS
Venturia rumicis (Desm.) G. Winter	Swanton Novers [4]	TG0032	2002*	SEW
Vibrissea truncorum (Alb. & Schwein.) Fr.	Honingham Fen	TG0911	2001	REE

BASIDIOMYCOTA (Kingdom Fungi)

Agrocybe putaminum (Maire) Singer	Welney	TL5294	2002	JJR
Agrocybe rivulosa Nauta	Gressenhall	TF9716	2006	PL
Antrodia ramentacea (Berk. & Broome) Donk	Holt Country Park	TG0837	2007	KR
Armillaria bulbosa Velen.	Holkham	TF8945	2002	GS
Armillaria gallica Marxm. & Romagn.	Blickling Hall	TG1728	2003*	GGK
Aurantiporus fissilis (Berk. & M.A. Curtis) H. Jahn	G'hall Old Carr	TF9717	2003	ALB
Aureoboletus gentilis (Quél.) Pouzar	Foxley Wood	TG0523	2005	ARL
Bolbitius coprophilus (Peck) Hongo	Honing	TG3328	2005	AA
Boletus radicans Pers.	Wolterton Hall	TG1631	2003	ARL

Species	Place	Grid	Year	Recd.
Ceriporiopsis pannocincta (Romell) Gilb. & Ryvarden	Felbrigg Hall	TG1939	2003*	MAA
Cheimonophyllum candidissimum (Berk. & M.A. Curtis) Singer	Corkmere Bottom	TL8990	2003	ALB
Clavaria zollingeri Lév.	East Walton Com.	TF7316	2001	JW
Clitocybe agrestis Harm.	Welney	TL5395	2001	JJR
Clitocybe subspadicea (J.E. Lange) Bon & Chevassut	Hercules Wood	TG1628	2003*	CH
Clitopilus passeckerianus (Pilát) Singer	Gressenhall	TF9716	2006	PL
Conocybe coprophila (Kühner) Kühner	Leziate Pits	TF6818	2002	JW
Conocybe intrusa (Peck) Singer	Holt	TG0839	2002	ARL
Conocybe mesospora Kühner ex Watling	Kelling Heath [2]	TG1041	2003*	SK
Coprinellus heterosetulosus (Locq. ex Watling) Vilgalys, Hopple & Jacq. Johnson	Welney	TL5395	2001	JJR
Coprinopsis acuminata (Romagn.) Redhead, Vilgalys & Moncalvo	Kelling Heath [2]	TG1041	2003*	PC
Coprinopsis cothurnata (Godey) Redhead, Vilgalys & Moncalvo	Welney	TL5294	2002	JJR
Coprinopsis jonesii (Peck) Redhead, Vilgalys & Moncalvo	Dersingham Bog	TF6628	2002*	BMS
Coprinopsis pachyderma (Bogart) Redhead, Vilgalys & Moncalvo	Kelling Heath [2]	TG1041	2003*	JD
Coprinopsis phaeospora (P. Karst.) P. Karst.	Welney	TL5395	2002	JJR
Coprinopsis semitalis (P.D. Orton) Redhead, Vilgalys & Moncalvo	Lynford Arboretum	TL8294	2002	JJR
Coprinus cordisporus Gibbs	Welney	TL5395	2002	JJR
Coprinus cortinatus J.E. Lange	Emily's Wood	TL7989	2001	MP
Coprinus tuberosus Quél.	Welney	TL5395	2002	JJR
Cortinarius calochrous var. *calochrous* (Pers.) Gray	Ashwellthorpe [1]	TM1498	2001	ARL
Cortinarius cinnamomeoluteus P.D. Orton	Barton Leys Wood	TF7005	2004	ARL
Cortinarius decipiens var. *atrocaeruleus* (M.M. Moser) H. Lindstr.	Holkham Meols	TF8845	2003*	PC
Cortinarius evernius (Fr.) Fr.	Kelling Heath [2]	TG1041	2000	ARL
Cortinarius saturninus (Fr.) Fr.	Foulden Common	TF7600	2001	ALB
Cortinarius uliginosus Berk.	Horsford Wood	TG2017	2000	RS
Cortinarius umbrinolens P.D. Orton	Waterhouse Plant'n	TL9094	2002	ALB
Cortinarius violilamellatus A. Pearson ex P.D. Orton	Buxton Heath	TG1721	2002	AA
Crepidotus cesatii var. *subsphaerosporus* (J.E. Lange) Senn-Irlet	Weney WWT	TL5594	2000	JJR
Cristinia gallica (Pilát) Jülich	Swanton Novers [4]	TG0130	2003*	BI
Cystoderma jasonis (Cooke & Massee) Harm.	Blickling Hall	TG1728	2003*	DJS
Datronia stereoides (Fr.) Ryvarden	East Walton Com.	TF7316	2003	ALB

Species	Place	Grid	Year	Recd.
Dendrothele acerina (Pers.) P.A. Lemke	G'hall Old Carr	TF9717	2003	ALB
Dermoloma pseudocuneifolium Herink ex Bon	Foulden Common	TF7600	2001	ALB
Entoloma ameides (Berk. & Broome) Sacc.	Gresham's School	TG0839	2006	ARL
Entoloma chalybaeum var. *chalybaeum* (Pers.) Noordel.	Gresham's School	TG0839	2007	ARL
Entoloma lividoalbum (Kühner & Romagn.) Kubicka	Felbrigg G't Wood	TG1939	2001	JJR
Entoloma nigroviolaceum (P.D. Orton) Hesler	Foulden Common	TF7600	2001	ALB
Entoloma poliopus var. *parvisporigerum* Noordel	Foulden Common	TF7600	2001	ALB
Entoloma rugosum (Malençon) Bon	Thompson Com.	TL9396	2004	TCEW
Entoloma turci (Bres.) M.M. Moser	Foulden Common	TF7600	2001	ALB
Exidia plana (F.H. Wigg.) Donk	Holkham Park	TF8743	2002*	BMS
Flammulaster granulosus (J.E. Lange) Watling	Blickling Hall	TG1728	2003*	IR
Galerina atkinsoniana A.H. Sm.	Holkham Meols	TF8845	2003*	IR
Galerina calyptrata P.D. Orton	Shouldham Warren	TF6811	2002	MP
Galerina embolus (Fr.) P.D. Orton	Holkham Meols	TF8845	2003*	IR
Galerina stylifera (G.F. Atk.) A.H. Sm. & Singer	Felbrigg Hall	TG1939	2003*	SEW
Galerina terrestris V.L. Wells & Kempton	Holkham Meols	TF8845	2003*	IR
Geastrum campestre Morgan	Holkham Meols	TF8845	2006	PS
Gymnopilus dilepis (Berk. & Broome) Singer	Beeston Common	TG1642	2001	FJLF
Helicogloea lagerheimii Pat.	Kelling Heath [2]	TG1041	2003*	AH
Hericium erinaceus (Bull.) Pers.	Trowse Wood	TG2406	2006	SL
Hohenbuehelia culmicola Bon	Holkham Meols	TF8845	2003*	PAJ
Hohenbuehelia reniformis (G. Mey.) Singer	Emily's Wood	TL7989	2004	TM
Hygrocybe calciphila Arnolds	Bodney Warren	TF8597	2004	ALB
Hygrocybe calyptriformis var. *calyptriformis* (Berk.) Fayod	Felbrigg Hall	TG1939	2004	JSGW
Hygrocybe cantharellus (Schwein.) Murrill	Holt Lowes	TG0837	2007	KR
Hygrocybe flavescens (Kauffman) Singer	Lynford Arboretum	TL8294	2002	JJR
Hygrophorus cossus (Sowerby) Fr.	Emily's Wood	TL7989	2004	AR
Hyphodontia aspera (Fr.) J. Erikss.	Gresham's School	TG0839	2003*	JLT
Hyphodontia pallidula (Bres.) J. Erikss.	Kelling Heath [2]	TG1041	2003*	AH
Hypholoma xanthocephalum P.D. Orton	Felbrigg Hall	TG1939	2003*	IR
Inocybe arenicola (R. Heim) Bon	East Tuddenham	TG0713	2000	ALB
Inocybe bongardii (Weinm.) Quél.	Ashwellthorpe [1]	TM1498	2000	REE
Inocybe hirtella var. bispora Kuyper	Holkham Meols	TF8845	2003*	PC
Inocybe hystrix (Fr.) P. Karst.	Gresham's School	TG0839	2007	ARL
Inocybe inodora Velen.	Holkham Meols	TF8845	2003*	PC
Inocybe lanuginosa var. *ovatocystis* (Boursier & Kühner) Stangl	Wayland Wood	TL9299	2002	REE
Inocybe ochroalba Bruyl.	Holkham Meols	TF8845	2003*	IR

Species	Place	Grid	Year	Recd.
Inocybe posterula (Britzelm.) Sacc.	Holkham Meols	TF8845	2003*	TWD
Laccaria pumila Fayod	Buxton Heath	TG1721	2002	AA
Lactarius lacunarum Romagn. ex Hora	Cawston Heath	TG1624	2000	ARL
Lactarius quieticolor Romagn.	Kelling Heath [2]	TG1041	2003*	DG
Leccinum aerugineum (Fr.) Lannoy & Estadès	Blickling Hall	TG1728	2003*	JD
Leccinum quercinum (Pilát) Pilát & Dermek	Foxley Wood	TG0523	2004	ARL
Leccinum roseofractum Watling	Roman Camp	TG1841	2000	JJR
Lepiota clypeolarioides Rea	Lynford Arboretum	TL8294	2001	RS
Lepiota echinacea J.E. Lange	G'hall Old Carr	TF9717	2001	ALB
Lepiota grangei (Eyre) Kühner	Horsford	TG1817	2007	TWD
Lepista ovispora (J.E. Lange) Gulden	Kelling Heath [2]	TG1041	2003*	SEW
Leucoagaricus americanus (Peck) Vellinga	Downham Market	TF6103	2005	JJR
Leucoagaricus barssii (Zeller) Vellinga	Holkham Meols	TF8845	2000	TWD
Leucoagaricus melanotrichus (Malencon & Bertault) Trimbach	Shouldham Warren	TF6811	2002	PEGW
Leucoagaricus subcretaceus Bon	Norwich	TG2210	2003	TWD
Leucocoprinus birnbaumii (Corda) Singer	Holt Lowes	TG0837	2006	SH
Lyophyllum loricatum (Fr.) Kühner ex Ka lamees	Swanton Novers [4]	TF9429	2003*	EWB
Macrolepiota fuliginosa (Barla) Bon	Stanford Battle Area	TL8796	2004	ALB
Macrolepiota konradii (Huijsman ex P.D. Orton) M.M. Moser	Blickling Hall	TG1728	2003*	GGK
Marasmius anomalus Lasch	Holme Dunes	TF7144	2001	RS
Marasmius bulliardii Quél.	G'hall Old Carr	TF9717	2003	ALB
Marasmius hudsonii (Pers.) Fr.	Swanton Novers [4]	TG0130	2003*	BI
Marasmius setosus (Sowerby) Noordel.	Gresham's School	TG0839	2000	ARL
Melanophyllum eyrei (Massee) Singer	Stanford Wood	TL8494	2000	ALB
Micromphale brassicolens var. *brassicolens* (Romagn.) P.D. Orton	Blickling Hall	TG1728	2003*	JD
Mycena adonis var. *coccinea* (Sowerby) Kühner	Cockley Cley	TF7804	2000	JJR
Mycena flavescens Velen.	Holkham Meols	TF8845	2003*	DJS
Mycena rosella (Fr.) P. Kumm.	Shouldham Warren	TF6811	2002	JE
Mycena septentrionalis Maas Geest.	Holkham Meols	TF8845	2003*	IR
Omphalina subhepatica (Batsch) Murrill	Holkham Dunes	TF9045	2001	JJR
Panaeolus olivaceus F.H. Moller	Felbrigg Hall	TG1939	2003*	SEW
Peniophora pini (Schleich. & DC.) Boidin	Holt Lowes	TG0937	2003	ARL
Peniophora pithya (Pers.) J. Erikss.	Foxley Wood	TG0523	2000	REE
Phanerochaete magnoliae (Berk. & M.A. Curtis) Burds.	Gresham's School	TG0839	2003*	MAA
Phlebia subochracea (Bres.) J. Erikss. & Ryvarden	Gresham's School	TG0839	2003*	AH
Pholiota lubrica (Pers.) Singer	G'hall Old Carr	TF9717	2003	ALB

Species	Place	Grid	Year	Recd.
Phylloporus pelletieri (Lév.) Quél.	Holt Hall	TG0739	2002	TM
Pluteus atromarginatus (Singer) Kühner	Two Mile Bottom	TL8488	2002	PB
Pluteus hispidulus (Fr.) Gillet	Thompson Com.	TL9396	2004	SEW
Pluteus luctuosus Boud.	Danby Wood	TG2205	2004	TM
Polyporus melanopus (Pers.) Fr.	Holt Lowes	TG0937	2001	ARL
Postia wakefieldiae (Kotl. & Pouzar) Pegler & E.M. Saunders	Swanton Novers [4]	TG0130	2003*	TWD
Psathyrella artemisiae var. *artemisiae* (Pass.) Konrad & Maubl.	Blickling Hall	TG1728	2003*	IR
Psathyrella obtusata var. *aberrans* Kits van Wav.	Felbrigg Hall	TG1939	2003*	RS
Psathyrella tephrophylla (Romagn.) M.M. Moser ex Bon	Foulden Common	TF7600	2004	ALB
Psilocybe pratensis P.D. Orton	Holkham Meols	TF8845	2003*	TFH
Psilocybe strictipes Singer & A.H. Sm.	Shouldham Warren	TF6811	2002	AR
Ramariopsis pulchella (Boud.) Corner	Stanford Battle Area	TL8796	2004	ALB
Resupinatus trichotis (Pers.) Singer	Holkham Park	TF8743	2002*	ATB
Russula anatina Romagn.	Swanton G't Wood	TG0130	2003*	SK
Russula anthracina Romagn.	Holt Country Park	TG0838	2007	ARL
Russula faginea Romagn. ex Adamcík	Felthorpe Woods	TG1416	2001	REE
Russula fragilis var. *knauthii* (Singer) Kuyper & Vuure	Buxton Heath	TG1721	2002	AA
Russula risigallina (Batsch) Sacc.	Holt Country Park	TG0837	2007	ARL
Russula romellii Maire	Felthorpe Woods	TG1416	2004	RS
Russula ruberrima Romagn.	Kelling Heath [2]	TG1041	2003*	PL
Russula rubra (Lam.) Fr.	Cranworth	TF9804	2002	ALB
Russula torulosa Bres.	Holkham Meols	TF8845	2003*	GGK
Russula turci Bres.	Lynford Arboretum	TL8294	2004	RS
Russula versatilis Romagn.	Kelling Heath [2]	TG1041	2003*	PL
Sistotrema sernanderi (Litsch.) Donk	Blickling Hall	TG1728	2003*	SEE
Terana caerulea (Lam.) Kuntze	G'hall Old Carr	TF9717	2003	ALB
Trechispora candidissima (Schwein.) Bondar tsev & Singer	Quarle's Wood	TF8839	2002*	MP
Trechispora stevensonii (Berk. & Broome) K.H. Larss.	Ringstead Downs	TF6840	2002*	HJB
Tremella globispora D.A. Reid	Swanton Novers [4]	TG0032	2002*	ACL
Tremella versicolor Berk. & Broome	Danby Wood	TG2205	2004	RS
Tricholoma viridifucatum Bon	Sheringham Park	TG1341	2007	ARL
Tuberculina sbrozzii Cavara & Sacc.	Wells-next-the-Sea	TF9244	2002*	BMS
Typhula spathulata (Peck) Berthier	Felbrigg Hall	TG1939	2003*	BI
Typhula sphaeroidea Remsberg	Swanton Novers [4]	TG0130	2003*	CH
Vuilleminia macrospora (Bres.) Hjortstam	Brancaster Golf	TF 7745	2002*	MAA

Species	Place	Grid	Year	Recd.
ZYGOMYCOTA (Kingdom Fungi)				
Pilobolus crystallinus var. *kleinii* (Tiegh.) R.Y. Zheng & G.Q. Chen	Roydon Common	TF6922	2007	ARL
PLASMODIOPHOROMYCOTA (Kingdom Protozoa)				
Sorosphaera veronicae Schröeter	Tibenham		2001	RM
MYXOMYCOTA (Kingdom Protozoa)				
Comatricha ellae Härk.	Felbrigg Hall	TG1939	2003*	BI
Didymium ilicinum Ing	Gresham's School	TG0839	2003*	DG
Echinostelium colliculosum K.D. Whitney & H.W. Keller	Holkham Meols	TF8845	2003*	BI
Echinostelium corynophorum K.D. Whitney	Holkham Meols	TF8845	2003*	BI
Echinostelium fragile Nann.-Bremek.	Holkham Meols	TF8845	2003*	BI
Licea clarkii Ing	Holkham Meols	TF8845	2003*	BI
Licea denudescens H.W. Keller & T.E. Brooks	Gresham's School	TG0839	2003*	BI
Licea kleistobolus G.W. Martin	Holkham Meols	TF8845	2003*	BI
Licea longa Flatau	Holkham Meols	TF8845	2003*	BI
Licea marginata Nann.-Bremek.	Gresham's School	TG0839	2003*	BI
Licea microscopica D.W. Mitch.	Holkham Meols	TF8845	2003*	BI
Licea operculata (Wingate) G.W. Martin	Holkham Meols	TF8845	2003*	BI
Licea sambucina D.W. Mitch.	Sheringham Park	TG1341	2003*	BI
Licea scyphoides T.E. Brooks & H.W. Keller	Holkham Meols	TF8845	2003*	BI
Macbrideola macrospora (Nann.-Bremek.) Ing	Sheringham Park	TG1341	2003*	BI
Oligonema schweinitzii (Berk.) G.W. Martin	Gresham's School	TG0839	2003*	AH
Paradiacheopsis cribrata Nann.-Bremek.	Holkham Meols	TF8845	2003*	BI
Paradiacheopsis microcarpa (Meyl.) D.W. Mitch. ex Ing	Felbrigg Hall	TG1939	2003*	BI
Physarum globuliferum (Bull.) Pers.	Emily's Wood	TL7989	2001	MP
Physarum robustum (Lister) Nann.-Bremek.	Kelling Heath [2]	TG1014	2003*	MP
Pocheina rosea (Cienk.) A.R. Loebl. & Tappan	Holkham Meols	TF8845	2003*	BI
Willkommlangea reticulata (Alb. & Schwein.) Kuntze	Barton Leys Woods	TF7005	2004	TWD

See p. 52 for Appendix 2

Appendix 2: NAMES OF RECORDERS REFERRED TO IN APPENDIX 1

Initials	Name	Initials	Name	Initials	Name
AA	A. Andrews	HJB	H.J.Beker	PS	P.Sterry
ACL	A.C.Leonard	IR	I.Ridge	PWL	P.W.Lambley
AH	A.Henrici	JD	J.Darby	REE	R.E.Evans
ALB	A.L.Bull	JE	J.Emmony	RM	R.Maidstone
AR	A.Robbins	JJR	J.J.Revett	RS	R.Shotbolt
ARL	A.R.Leech	JLT	J.L.Taylor	RWH	R.W.Hancy
ATB	A.T.Braddock	JSGW	J.S.G.Worton	SEE	S.E.Evans
AWB	A.W.Brand	JW	J.Williamson	SEW	S.E.Wells
BI	B.Ing	KR	K.Robinson	SH	S.Harrap
BMS	B.M.Spooner	LD	L.Davy	SK	S.Kemp
CH	C.Hobart	MAA	M.A.Ainsworth	SL	S.Livermore
DG	D.Griffin	MJW	M.J.Woolner	SMF	S.M.Francis
DJS	D.J.Schafer	MP	M.Parslow	SMW	S.M.Weir
EB	E.Batten	PAJ	P.A.Jones	TCEW	T.C.E.Wells
EWB	E.W.Brown	PB	P.Batchelor	TFH	T.F.Hering
FJLF	F.J.L.Farrow	PC	P.Cullington	TM	T.Money
GGK	G.G.Kibby	PEGW	P.E.G.Walker	TWD	T.W.Dove
GS	G.Simpson	PL	P.Leonard		

Twenty years of change at Thorpe St. Andrew - from hospital to business park

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The author recently retired from the NHS having spent the last 20 years working at the Health Authority (latterly Primary Care Trust) offices on the north side of the St Andrew's Hospital estate, on the eastern outskirts of Norwich. When he first went to St Andrew's, the north side of the hospital still provided patient accommodation for the elderly mentally infirm; the grounds, formerly worked by more able-bodied patients, were let out to local farmers, and the main A47 Norwich-Yarmouth road squeezed under the narrow arched bridge linking the north and south sides of the estate.

In the ensuing years, the A47 was diverted to the new southern bypass, the Dussindale housing estate developed to the north of the site, the farmland around the hospital was sold to create the St Andrew's Business Park, and land to the east began to be developed as the Broadland Business Park.

The author habitually took a stroll through the grounds each lunchtime, recording the natural history and observing how the wildlife adapted to its changing environment. A range of walks was available in the early days, but these became more restricted as the commercial development of the site gathered pace.

The site is bounded to the north-west by the Norwich-Cromer railway line and to the south by the main Norwich-Yarmouth road, which cut between the north and south sides of the hospital estate. Four north-south roads subdivided the site: the main drive (from what is now a roundabout on the Yarmouth road), the east drive (from the aforementioned overbridge), Boundary Lane (a rough track which used to run along the valley bottom), and the now much changed Green Lane along higher ground to the east.

The main habitats of those early walks were:

- A conifer plantation bordering the railway line, with a view to arable fields now lost under the Dussindale housing development;
- Fields to the west of the main drive, which were cultivated for silage, adjacent to which was the concrete base of the demolished Hillside

Occupational Therapy Department. This whole area has been developed as the Broadland Business Park;

- A cricket pitch between the main and east drives, edged with steep south facing banks; an area of rough ground where the Sports Centre now is, and an adjoining area of deciduous woodland falling away to Boundary Lane;
- Sloping fields between the east drive and Boundary Lane (now levelled and fast disappearing under the Broadland Business Park);
- The hedgerows, cottage gardens, old orchard and wooded escarpment to the east of Boundary Lane (all ripped out, except for the mature trees on the escarpment, and replaced by a surfaced footpath and cycle way and a reed-fringed conservation pond);
- Arable fields (now built on) rising up to Green Lane and the old hospital cemetery with its mature trees still surviving on the skyline to the east).

Birds (78 species)

From 1987-93 the author kept year's lists of birds seen in or flying over the grounds of the hospital. These totalled 65 species over the seven year period with a maximum annual count of 48 species (see Appendix 1). Thereafter only new birds were noted (11 additional species up to 2005). Then, conscious of the significant habitat changes, year lists were recommenced, with 53 species being recorded in 2006/7, including two new species increasing the 20-year total to 78 species.

It came as something of a surprise to discover that the 2006 list of 50 species was greater than any of the earlier lists compiled from a wider range of habitats, though the abundance of birds and the frequency of their observation were probably much reduced. For instance, Fieldfare used to be regular winter visitors to the old orchard but were only observed on passage in 2006/7.

The species which were not seen in 2006/7 were: Red-legged Partridge and Lapwing (reflecting the loss of ploughed fields); Turtle Dove, Yellowhammer and House Sparrow (reflecting national declines in farmland birds); Garden Warbler, Willow Warbler, Bullfinch (reflecting the loss of the old orchard); Spotted Flycatcher (reflecting national declines); Coal Tit and Treecreeper (reflecting restricted access to woodland within the site).

The new birds in the 21st century were: Pink-footed Goose (it is now not unusual to see large skeins overflying the site reflecting the increased winter population in Norfolk); Egyptian Goose (in the parkland habitat of mature

trees around the old hospital buildings, and latterly on the new lake in the valley bottom); Grey Wagtail (an annual winter visitor to the lake since 2004); Moorhen (in the developing reed fringe of the lake since 2007); Little Owl (a vagrant in 2007).

Perhaps the most iconic bird at St Andrew's is the Skylark, which has been present throughout the 20 years of change and which continued to sing in February 2008 as the bulldozers moved in to commence building on two more tracts of land adjacent to Boundary Lane.

Mammals (7 species)
Rabbit and Grey Squirrel have been regularly observed throughout the period. All other observations are casuals (see Appendix 2). In March 1987, a Field Vole was watched for about a minute, rummaging under leaves and grooming on an area of soft earth near a smouldering bonfire, before it demonstrated its ability to dig down into the earth and disappear into a mole run in about five seconds.

Hedgehogs have been seen crossing internal roads on a couple of occasions. Mole was once seen on the bank of the old cemetery; Foxes were seen in 1997 and 2000.

In August 2006, a Natterer's Bat with its distinctive white underparts, was seen flying around in a shaded, internal quadrangle of the old hospital buildings. It clung to the brick walls a couple of times, before squeezing into a crevice in the brickwork.

Butterflies (22 species)
Prior to the redevelopment of the site, the most important butterfly habitats were: the flower rich ride along the south side of the railway plantation; the rough grassland and bramble scrub bordering the railway near the present footbridge; the remnant flower beds and invasive vegetation of the demolished occupational therapy building; and the hedgerows and cottage gardens of Boundary Lane. These diverse habitats supported up to 20 species in the period 1987-1999 (see Appendix 3).

Most of these habitats were lost with the subsequent redevelopment of the site, and latterly only 15 species were recorded, though these did include two new species: Brown Argus in 2000; and Clouded Yellow in 2004 and 2006.

The species which were lost were: Small Skipper, Large Skipper and Small Copper (reflecting loss of nectar plants); Holly Blue and Speckled Wood

(reflecting restricted access to the wooded areas of the site); and Wall and Small Heath (reflecting national declines).

On a more optimistic note, the provision of a wildflower meadow adjacent to the Archant print works at the top of the main drive led to the sight of over 30 Common Blue butterflies in flight together in the summer of 2006. In the same year a profusion of Painted Lady, Red Admiral and Comma butterflies were seen nectaring on *Buddleja* near the lake; both observations demonstrating that in favourable seasons even the harsh environment of a business park can provide jewels to lift the spirits of its workers.

Dragonflies (16 species)

Prior to the excavation of the lake, the only dragonflies seen on the St Andrew's site were those hawking insects around the buildings or along the woodland margins. Hairy Dragonfly *Brachytron pratense*, Southern Hawker *Aeshna cyanea*, Migrant Hawker *Aeshna mixta* and Brown Hawker *Aeshna grandis* were all seen in this way. In addition Black-tailed Skimmer *Orthetrum cancellatum* and Broad-bodied Chaser *Libellula depressa* were seen in Boundary Lane, while other vagrants such as Common Blue Damselfly *Enallagma cyathigerum* and Common Darter *Sympetrum striolatum* were seen near the railway.

The lake was excavated in 2003-4 and landscaped in 2005, and immediately attracted a host of breeding species in the hot summer of 2006 when the lake was alive with Emperor Dragonflies *Anax imperator*, Black-tailed Skimmers and Common Blue Damselflies. Later in the year Four-spot Chasers *Libellula quadrimaculata*, Banded Demoiselles *Calopteryx splendens* and Emerald Damselflies *Lestes sponsa* were seen, along with Brown, Southern and Migrant Hawkers. Norfolk Hawker *Aeshna isosceles* was present on a single day in each of 2006 and 2007. See Appendix 4 for a full list of species.

Grasshoppers and allied insects (11 species)

More than any other species, the grasshoppers and crickets have demonstrated an ability to adapt to the changing environment of the St Andrew's site (see Appendix 5). In 1987, Field Grasshopper *Chorthippus brunneus* was the most abundant species being present in rough grassy margins everywhere. Meadow Grasshopper *Chorthippus parallelus* was initially known only from the borders of the railway line, but as the cropping regime changed, it spread first of all to the warm micro-climates around the demolished OT building, then across the fields to the main drive. As the years passed it began to be found in the fields sloping down from the east drive to Boundary Lane, where

a transect walk in the late 1990's found it be particularly abundant, with insects springing out of the way every few paces. Finally it was found in the fields to the east of Boundary Lane. All of these habitats have now been swept away and it survives only in small numbers on the steep sloping banks which separate the different building levels.

Common Green Grasshopper *Omocestus viridulus* was only occasionally encountered (first recorded 1992) but never seemed to establish itself in any significant numbers. Lesser Marsh Grasshopper *Chorthippus albomarginatus* was not seen until 1996, after which it began to be found in increasing numbers in the fields to the east of Boundary Lane until their redevelopment.

Following the levelling of the fields between the east drive and Boundary Lane, Slender Groundhopper *Tetrix subulata* was found in a flood pool there in 2002, with small numbers in a damp hollow in later years, again demonstrating the ability of the orthopteran group to respond quickly to new opportunities.

Oak Bush-cricket *Meconema thalassinum* has been recorded indoors on a couple of occasions and Dark Bush-cricket *Pholidoptera griseoaptera* has been recorded throughout the study period from brambles near the railway and in Boundary Lane. Speckled Bush-cricket *Leptophyes punctatissima* was recorded from the orchard in 1995. After the grubbing out of the orchard and the boundary lane hedges, nymphs of this species were found in remarkable numbers in June 2001 at the base of the escarpment which used to surround the orchard (over 100 in a 20m length of nettles). It is believed this represented a predator/prey imbalance as species adapted to the changing environment, because in later years, numbers were much reduced and the nettles appeared to be dominated by the hunting spider *Pisaura mirabilis.*

The final orthopteran invader was Long-winged Conehead *Conocephalus discolor* which was found in rank vegetation around the levelled fields to the east of the old hospital buildings in 2005 and which was present in increased numbers in 2006, despite the strimming of their preferred banks between seasons.

Common Earwig *Forficula auricularia* was first recorded in 1990 being swept from oak trees near the railway, while Short-winged Earwig *Apterydia media* was most unusually recorded indoors in 2004.

Bumblebees (9 species)
Bumblebee recording began in 1993 when all six species of common

bumblebee were recorded (*Bombus lucorum, B. terrestris, B. pratorum, B. hortorum, B. lapidarius, B. pascuorum).* The cuckoo bees *B. vestalis* and *B. sylvestris* were also seen in the early years. At this time the St Andrew's estate provided a rich habitat for bumblebees with diverse foraging opportunities among wild flowers and in cottage gardens, and with a wide range of nesting opportunities. With the exception of *B. lucorum*, all species have continued to be seen since the redevelopment of the site, perhaps aided by the wildflower meadow of the Archant print works, and the flower rich banks bordering the main drive (see Appendix 6).

In year 2000, *B. ruderarius* was seen on the banks around the cricket field, with a voucher specimen confirmed by KC Durrant. The species continued to be seen in small numbers until 2006, but is now believed to be lost from the site because of the intensity of the development.

Other invertebrates (miscellaneous observations)
The Fly Bug *Reduvius personatus* was found indoors on a couple of occasions. Field guides describe this as a predatory bug which feeds on a wide range of insects, including bed bugs. Was this a relict from the earlier history of St Andrew's Hospital?

Hornet *Vespa crabo* was seen in Boundary Lane in 1990 and by the railway footbridge in 1999; while Common Wasps *Vespula vulgaris* regularly fed on ivy flowers on the sheltered banks of the cricket field well into November each year.

Five species of ladybird were recorded; the ubiquitous Two-spot and Seven-spot Ladybirds, *Adalia 2-punctata* and *Coccinella 7-punctata*; the Eleven-spot Ladybird *Coccinella 11-punctata*; the Cream-streaked Ladybird *Harmonia 4-punctata* (May 2004); and from 2006 onwards the Harlequin Ladybird *Harmonia axyridis.*

The spider *Pisaura mirabilis* has already been mentioned. The Zebra Spider *Salticus scenicus* seemed to be a regular denizen of office desk-tops, leaving one to wonder if it lived in the computer equipment. Lastly, the Squid Spider *Tetragnatha extensa* was seen on reeds by the new pond in summer 2007, again demonstrating the ability of invertebrates to quickly colonise new habitats.

Vascular plants (miscellaneous observations)
It is difficult to interpret the flora of the site because of its semi park-like

nature. Cowslip *Primula veris* and Everlasting Pea *Lathyrus latifolius* are prominent on the steep banks of the main drive but are of uncertain origin. Bee Orchid *Ophrys apifera* was plentiful on the site of the Sports Centre before it was built, and still survives along the northern edge of the tennis courts, where one year the strimmers reassuringly left it untouched in small islands of uncut grass. Bird's-foot Trefoil *Lotus corniculatus* can also be found here. Bulbous Buttercup *Ranunculus bulbosus* and Ox-eye Daisy *Leucanthemum vulgare* are plentiful on the grassy banks surrounding the cricket field.

One of the most interesting areas to study, before it was lost to development, was the rough margins of the railway line and the nearby demolished OT building. Here were Perforate St John's Wort *Hypericum perforatum*, Great Mullein *Verbascum thaspus*, Hare's-foot Clover *Trifolium arvense*, Hop Trefoil *Trifolium campestre*, Hoary Plantain *Plantago media*, Nodding Thistle *Carduus nutans* and Bladder Campion *Silene vulgaris*. Slowly, the open habitat of the OT buildings was engulfed by brambles and *Buddleja*, and the micro habitats which had so suited the orthoptera and smaller butterfly species were lost.

Hart's-tongue Fern *Phyllites scolopendrium* is present on the low wall around the east side of the main hospital buildings, where a single plant of Black Spleenwort *Asplenium adiantum-nigrum* also hangs on precariously. Black Spleenwort was also present on an old veranda near Thorpe End house (TG281088), before its demolition. Seven plants were noted in 1988 increasing to twenty in 1989, but only a few remained in 1992. Black Spleenwort and Wall Rue *Asplenium ruta-muraria* were also present on a retaining wall at the southern end of the overbridge across the old A47. A selected list of vascular plant species is given in Appendix 7

Discussion

For most of the 20-year period the author was alone on his lunchtime walks, exploring woodlands, field margins, country lanes and waste ground. With the development of the Broadland and St Andrew's Business Parks, a network of footpaths and cycle ways has been created which are regularly used by an increasing number of workers for lunchtime recreation, or to give access to the nearby supermarket.

Intense dragonfly activity over the conservation pond during the hot June and July of 2006 demonstrated the ability of charismatic species, such as Emperor Dragonfly and Black-tailed Skimmer, to attract the attention of

passers by and absorb them for a moment into the natural world. The wildlife future for this site must rest with its recreational value and associated health benefits for the local workforce.

Although most of the former habitats are lost, there remain areas of deciduous and coniferous woodland; there remain steep embankments defining the different levels of the site; there is the wildflower meadow and the conservation pond with its surrounding wooded escarpment. There is opportunity to create 'urban set-aside' by allowing these areas to remain semi-natural, and by avoiding the desires of excessive tidiness. Too many of the 'waste' areas within the site are currently strimmed to ground level. The invertebrate fauna needs to be encouraged as the basis of the food chain, butterflies and bumblebees need nectar and forage plants. The area could be part of a landscape corridor providing a green link from the nearby marshes along the River Yare, inland to the gardens of Thorpe St Andrew and the Dussindale estate.

If the balance is correct, then the early morning workers at St Andrew's can continue to be inspired by the ringing song of the Mistle Thrush in spring; lunchtime walkers can be entranced by the dragonflies in summer; the plaintive song of the Robin can console them in autumn; and the clamour of wild geese can lift their spirits in winter, carrying them away in their imaginations to wild and lonely places.

Appendix 1: BIRDS

Nomenclature as in the 2006 Norfolk Bird & Mammal Report.

Regular: Likely to be seen many times each year.
Occasional: Likely to be seen several times each year.
Irregular: Species with only a few records over the 20 year period.

Species	Year lists 1987-93							New	List	Status
	87	88	89	90	91	92	93	94-05	06-07	
Mute Swan	x								x	Flying over and at pond
Whooper Swan								x		Irregular flying over
Pink-footed Goose								x	x	Occasionally flying over
Greylag Goose								x		Irregular flying over
Egyptian Goose								x	x	Occasional
Mallard								x	x	Increasingly regular
Red-legged Partridge	x	x	x	x	x					Formerly occasional

Species	Year lists 1987-93							New	List	Status
	87	88	89	90	91	92	93	94-05	06-07	
Grey Partridge								x		One record
Pheasant	x	x	x	x	x	x	x		x	Occasional
Cormorant		x			x				x	Irregular flying over
Grey Heron				x			x		x	Irregular flying over
Marsh Harrier								x		One record
Sparrowhawk			x	x	x	x	x		x	Regular
Kestrel	x	x	x	x	x	x	x		x	Regular
Moorhen									x	Occasional on pond
Oystercatcher								x	x	Irregular flying over
Lapwing	x	x	x		x	x				Formerly occasional
Curlew		x								Irregular flying over
Black-headed Gull	x	x	x	x	x	x	x		x	Regular
Common Gull	x	x		x	x				x	Occasional
Lesser Black-backed Gull				x						Irregular
Herring Gull				x					x	Irregular
Feral Pigeon	x	x	x	x	x	x	x		x	Regular
Stock Dove	x	x	x	x	x	x			x	Regular
Woodpigeon	x	x	x	x	x	x	x		x	Regular
Collared Dove	x	x	x	x	x				x	Regular
Turtle Dove	x	x	x	x	x	x	x			Formerly occasional
Cuckoo		x					x			Irregular flying over
Barn Owl								x		One record
Little Owl									x	One record
Swift	x	x	x	x		x	x		x	Regular
Green Woodpecker	x		x			x	x		x	Increasingly regular
Great Spotted Wood pecker				x		x	x		x	Increasingly regular
Lesser Spotted Wood pecker					x					One record
Skylark	x	x	x	x	x	x	x		x	Regular
Swallow	x	x		x		x	x		x	Occasional
House Martin	x	x	x	x	x	x	x		x	Formerly bred
Meadow Pipit			x		x	x	x		x	Occasional
Grey Wagtail								x	x	Occasional at pond
Pied Wagtail	x	x	x	x	x	x	x		x	Regular
Wren	x	x	x	x	x	x	x		x	Regular
Dunnock	x	x	x	x	x	x			x	Regular
Robin	x	x	x	x	x	x			x	Regular

Species	Year lists 1987-93							New	List	Status
	87	88	89	90	91	92	93	94-05	06-07	
Blackbird	x	x	x	x	x	x	x		x	Regular
Fieldfare	x	x	x	x	x	x	x		x	Regular
Song Thrush	x	x	x	x	x	x			x	Regular
Redwing	x	x	x						x	Occasional
Mistle Thrush	x	x	x	x	x	x	x		x	Regular
Sedge Warbler							x			One record
Blackcap	x	x	x	x	x		x		x	Formerly in orchard
Garden Warbler	x	x	x			x	x			Formerly in orchard
Lesser Whitethroat			x			x	x		x	Occasional
Whitethroat			x	x	x	x	x		x	Occasional
Chiffchaff	x	x	x	x	x	x	x		x	Formerly regular
Willow Warbler	x	x	x	x	x	x	x			Formerly regular
Goldcrest	x	x	x		x		x		x	Occasional
Spotted Flycatcher	x	x								Formerly in cemetery
Long-tailed Tit	x	x	x	x			x		x	Regular
Blue Tit	x	x	x	x	x	x	x		x	Regular
Great Tit	x	x	x	x	x	x	x		x	Regular
Coal Tit	x	x	x	x	x					Formerly occasional
Nuthatch								x		Irregular
Treecreeper	x	x			x	x				Irregular
Jay	x	x	x	x	x	x	x		x	Regular
Magpie	x	x			x				x	Increasingly regular
Jackdaw					x		x		x	Irregular
Rook	x	x	x	x	x	x			x	Regular
Carrion Crow		x							x	Irregular
Starling	x	x	x	x	x	x			x	Regular
House Sparrow	x	x	x	x	x	x	x			Formerly regular
Chaffinch				x	x	x			x	Increasingly regular
Brambling			x							Irregular
Greenfinch	x		x	x	x	x			x	Increasingly regular
Goldfinch	x			x	x	x	x		x	Increasingly regular
Linnet	x	x		x	x		x		x	Occasional
Redpoll	x									One record
Bullfinch	x	x	x							Formerly occasional
Yellowhammer	x	x		x		x	x			Formerly occasional
YEARLY TOTALS	48	47	43	44	44	40	38		54	
OVERALL TOTAL	65 species in seven years							11 new	2 new	78 species in all

Appendix 2: MAMMALS

Hedgehog	*Erinaceus europaeus*
Mole	*Talpa europaea*
Natterer's Bat	*Myotis nattereri*
Rabbit	*Oryctolagus cuniculus*
Grey Squirrel	*Sciurus carolinensis*
Field Vole	*Microtus agrestis*
Red Fox	*Vulpes vulpes*

Appendix 3: BUTTERFLIES

	Species	1987-1999	2000-2007
Small Skipper	*Thymelicus sylvestris*	x	
Large Skipper	*Ochlodes sylvanus*	x	
Clouded Yellow	*Colias croceus*		x
Brimstone	*Gonepteryx rhamni*	x	x
Large White	*Pieris brassicae*	x	x
Small White	*Pieris rapae*	x	x
Green-veined White	*Pieris napi*	x	x
OrangeTip	*Anthocharis cardamines*	x	x
Small Copper	*Lycaena phlaeas*	x	
Brown Argus	*Plebeius agestis*		x
Common Blue	*Polyommatus icarus*	x	x
Holly Blue	*Celastrina argiolus*	x	
Red Admiral	*Vanessa atalanta*	x	x
Painted Lady	*Vanessa cardui*	x	x
Small Tortoiseshell	*Aglais urticae*	x	x
Peacock	*Inachis io*	x	x
Comma	*Polygonia c-album*	x	x
Speckled Wood	*Pararge aegeria*	x	
Wall Brown	*Lasiommata megera*	x	
Gatekeeper	*Pyronia tithonus*	x	x
Meadow Brown	*Maniola jurtina*	x	x
Small Heath	*Coenonympha pamphilus*	x	
TOTALS		**20**	**15**

Appendix 4: DRAGONFLIES

Species		1987-1999	2000-2007
Banded Demoiselle	*Calopteryx splendens*		x
Emerald Damselfly	*Lestes sponsa*		x
Large Red Damselfly	*Pyrrhosoma nymphula*		x
Blue-tailed Damselfly	*Ischnura elegans*		x
Common Blue Damselfly	*Enallagma cyathigerum*	x	x
Azure Damselfly	*Coenagrion puella*		x
Hairy dragonfly	*Brachytron pratense*	x	
Brown Hawker	*Aeshna grandis*	x	x
Southern Hawker	*Aeshna cyanea*	x	x
Migrant Hawker	*Aeshna mixta*	x	x
Norfolk Hawker	*Aeshna isosceles*		x
Emperor Dragonfly	*Anax imperator*		x
Broad-bodied Chaser	*Libellula depressa*	x	x
Four-spot Chaser	*Libellula quadrimaculata*		x
Black-tailed Skimmer	*Orthetrum cancellatum*	x	x
Common Darter	*Sympetrum striolatum*	x	x
TOTALS		**8**	**15**

Appendix 5: GRASSHOPPERS and allied insects

Species		1987-1999	2000-2007
Oak Bush-cricket	*Meconema thalassinum*	x	
Dark Bush-cricket	*Pholidoptera griseoaptera*	x	x
Long-winged Conehead	*Conocephalus discolor*		x
Speckled Bush-cricket	*Leptophyes punctatissima*	x	x
Slender Groundhopper	*Tetrix subulata*		x
Common Green Grasshopper	*Omocestus viridulus*	x	
Field Grasshopper	*Chorthippus brunneus*	x	x
Meadow Grasshopper	*Chorthippus parallelus*	x	x
Lesser Marsh Grasshopper	*Chorthippus albomarginatus*	x	x

Species		1987-1999	2000-2007
Short-winged Earwig	*Apterygida media*		x
Common Earwig	*Forficula auricularia*	x	x
TOTALS		**8**	**9**

Appendix 6: BUMBLEBEES

Nomenclature as Benton 2006 - *Bumblebees*, New Naturalists Series No 98.

Species		1987-1999	2000-2007
White-tailed Bumblebee	*Bombus lucorum*	x	
Buff-tailed Bumblebee	*Bombus terrestris*	x	x
Early-nesting Bumblebee	*Bombus pratorum*	x	x
Garden Bumblebee	*Bombus hortorum*	x	x
Red-tailed Bumblebee	*Bombus lapidarius*	x	x
Red-shanked Carder Bumblebee	*Bombus ruderarius*		x
Common Carder Bumblebee	*Bombus pascuorum*	x	x
A cuckoo of *B. terrestris*	*Bombus vestalis*	x	x
A cuckoo of *B. pratorum*	*Bombus sylvestris*	x	x
TOTALS		**8**	**8**

Appendix 7: VASCULAR PLANTS (selected records)

Nomenclature as Becket & Bull 1999 - *A Flora of Norfolk*

Species		Location
Bracken	*Pteridium aquilinum*	Boundary Lane
Hart's-tongue Fern	*Phyllitis scolopendrium*	Wall east of hospital building
Black Spleenwort	*Asplenium adiantum-nigrum*	Wall south of hospital buildings
Wall Rue	*Asplenium ruta-muraria*	Wall south of overbridge
Old Man's Beard	*Clematis vitalba*	Railway bank
Bulbous Buttercup	*Ranunculus bulbosus*	Cricket field

Species		Location
Lesser Spearwort	*Ranunculus flammula*	Introduced beside the pond
Opium Poppy	*Papaver somniferum*	Hillside OT
Common Poppy	*Papaver rhoeas*	Main drive
Common Fumitory	*Fumaria officinalis*	Field margins
Beech	*Fagus sylvatica*	South of hospital buildings
Pedunculate Oak	*Quercus robur*	Boundary Lane
Silver Birch	*Betula pendula*	North of hospital buildings
Fat Hen	*Chenopodium album*	Field margins
Bladder Campion	*Silene vulgaris*	Main drive
White Campion	*Silene latifolia*	Main drive
Red Campion	*Silene dioica*	Main drive
Perforate St John's Wort	*Hypericum perforatum*	Railway bank
Hybrid Lime	*Tilia x europaea*	South of hospital buildings
Sweet Violet	*Viola odorata*	Boundary Lane
Field Pansy	*Viola arvensis*	Field margins
White Bryony	*Bryonia dioica*	Railway bank
Cowslip	*Primula veris*	Main drive
Meadow Saxifrage	*Saxifraga granulata*	Main drive
Creeping Cinqefoil	*Potentilla reptans*	Road verges
Wild Strawberry	*Fragaria vesca*	Main drive
Wood Avens	*Geum urbanum*	Boundary Lane
Agrimony	*Agrimonia eupatoria*	Main drive
Dog Rose	*Rosa canina*	Boundary Lane
Common Bird'sfoot Trefoil	*Lotus corniculatus*	East Drive
Tufted Vetch	*Vicia cracca*	Main drive
Hairy Tare	*Vicia hirsuta*	Railway bank
Common Vetch	*Vicia sativa*	Main drive
Broad-lved Everlasting Pea	*Lathyrus latifolius*	Main drive
Blach Medick	*Medicago lupulina*	Railway bank
Lucerne	*Medicago sativa*	Main drive
Hop trefoil	*Trifolium campestre*	Main drive
Hare's foot Clover	*Trifolium arvense*	Railway bank
Purple Loosestrife	*Lythrum salicaria*	Introduced beside the pond

Species		Location
Horse Chestnut	*Aesculus hippocastanum*	North of hospital buildings
Cut-leaved Cranesbill	*Geranium dissectum*	Boundary Lane
Ivy	*Hedera helix*	Cricket pavilion
Field Bindweed	*Convolvulus arvensis*	Main drive
Viper's Bugloss	*Echium vulgare*	Introduced in wildflower mixes
Self Heal	*Prunella vulgaris*	Main drive
Wild Clary	*Salvia verbenaca*	Railway bank
Hoary Plantain	*Plantago media*	Hillside OT
Butterfly Bush	*Buddleja davidii*	Waste ground near pond
Great Mullein	*Verbascum thapsus*	Hillside OT
Water Figwort	*Scrophularia auriculata*	Introduced beside the pond
Thyme-leaved Speedwell	*Veronica serpyllifolia*	Cemetery
Heath Speedwell	*Veronica officinalis*	Cemetery
Germander Speedwell	*Veronica chamaedrys*	Cemetery
Common Field Speedwell	*Veronica persica*	Cemetery
Slender Speedwell	*Veronica filiformis*	Cricket field
Harebell	*Campanula rotundifolia*	Cemetery
Common Cornsalad	*Valerianella locusta*	Main drive
Musk Thistle	*Carduus nutans*	Railway bank
Creeping Thistle	*Carduus arvense*	Waste ground
Greater Knapweed	*Centauria scabiosa*	Introduced in wildflower mixes
Cornflower	*Centaurea cyanus*	Main drive
Common Knapweed	*Centaurea nigra*	Main drive
Feverfew	*Tanacetum parthenium*	Hillside OT
Ox-eye Daisy	*Leucanthemum vulgare*	Main drive
Tansy	*Tanacetum vulgare*	Main drive
Bee Orchid	*Ophrys apifera*	North of Sports Centre

Swanton Novers Wood NNR, Norfolk, and its Coleoptera: Supplement No.2

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INTRODUCTION

The purpose of this paper is to further supplement that by Sage (2006) and also the first supplement (Sage 2007), in which an additional 37 species of beetle were added to the reserve list, bringing the total to 537. The present paper adds a further 30 species, thus raising the current total to 568 species. Given that the rate of discovery of species new to the list is slowing down it is anticipated that further supplements will appear at irregular intervals as and when sufficient data is available. Additional photographs will be found opposite p.80.

The ride and compartment numbers referred to in the text can be found in Figure 1 in Sage (2006). The detailed Summer Warden's report for 2007 (Baker 2008) can be consulted at the Natural England office at Wolferton.

Precipitation

The annual rainfall in the wood for the period September 2006 to August 2007 was 978.5mm (an average of 81.5mm per month) compared with 698.5mm (an average of 58.2mm per month) for the same period in 2005-2006. This represents an increase for 2006/2007 of 280mm (40%). The average annual rainfall for the 5 years 2001/2002 to 2005/2006 was 740mm, so the 2006/2007 rainfall was 238.5mm (32%) above that 5 year average. The summer rainfall at the Great Wood was also exceptional with 529.5mm falling in the period April to August. This was 245.3mm (86.3%) above the five-year average for the period 2002/2006 (Baker *op.cit.*).

Woodland Management

The long continuous history of coppicing at Swanton Novers has made a positive contribution to the diversity of fauna and flora in these woods. Coppicing has been a significant feature in the history of Swanton Novers Woods for at least 500 years, and probably for much longer than that. In more recent centuries almost the entire area of Great Wood was managed as coppice with standards, including several compartments where it was oak

(both *Quercus patraea* and *Quercus robur*) that was coppiced rather than Small-leaved Lime *Tilia cordata* (as in the south of the wood). Since the 1970s coppicing has been carried out , with varying rates of regularity, on Compartments 10 (part), 14, 15, 16 (part), 17, 18 (part), 19 and 20 (in the Great Wood), and Compartments 1 and 2 in Little Wood. This process will continue and for the foreseeable future it is envisaged that oak and Alder *Alnus glutinosa* coppicing should be conducted on a 25-30 year rotation, and Hazel *Corylus avellana* and Small-leaved Lime on an 8-10 year rotation. The coppiced woodland in Swanton Novers is very diverse and supports exceptional examples of some unusual woodland types (Peterken 1970; Sage 2006).

Woodland structure

It had been apparent for some time that in order to properly understand the history and structure of these woods, it would be necessary to ascertain the age of the trees. In pursuance of this objective John White, formerly Research Dendrologist with the Forestry Commission, made two visits to the site in late March and April 2007 with the primary purpose of ageing a sample of the larger trees. The planting year was calculated from 2006 because 2007 growth was not yet complete. A total of 19 oak trees, two Ash and three Scots Pines in the Great Wood were measured and their ages calculated. Although the work was concentrated on the Great Wood, a sample of three oak trees in Little Wood were also checked. In the former, three of the oaks examined qualified as 'Champion Oaks' and were aged respectively 159 years (Compartment 5, planted 1847), 156 years (Compartment 7, planted 1850) and 150 years (Compartment 12, planted 1856). The latter tree was found to be 26 metres in height. A 'Champion Oak' is one that is growing as well as any oak can in near ideal conditions. It will have average ring width in a 70-80 year formative period of 5mm and then average annual basal area increments of 109.2-124.9 cm^2 during its mature state. Thirteen of the remaining oak trees ranged from 117-206 years old. An isolated slow-growing oak in compartment 14 was estimated to be 216 years old (planted/originated 1789). Two old pollarded boundary oaks adjacent to Compartment 17 were aged 332 (originated 1674) and 411 (originated 1595) years respectively. The data suggest that there was considerable felling of trees about 1630+, and these were replaced by the small number of ancient survivors that are present today. The majority of the smaller extant oak trees date back to 1830-1850, and there are so many of them that extensive clearances must have taken place.

A standard Ash *Fraxinus excelsior* in Compartment 14 was estimated to be

170 years old (planted 1836). The most outstanding Ash, however, is an old coppice/pollard on the boundary bank at the west end of Ride 64. This was estimated to be 530 years old (originated 1476), and was probably last cut about 1850.

Although not native to the site, Scots Pine *Pinus sylvestris* are a noticeable feature of the Great Wood, and were no doubt planted for amenity purposes. A tree in Compartment 7 was estimated to be 76 years old (planted 1930). An old pine in Ride 63 was aged at 134 years (planted 1872). A dominant heavy-branched example in Compartment 8 was estimated to be 176 years old (originated 1830).

Mention must be made of a multi-stemmed Small-leaved Lime boundary pollard adjacent to the southern edge of Compartment 17. This is now a very tall tree, but there is no method available for estimating its age. There is a fine stand of tall Small-leaved Lime trees in Ride 43, and it is considered that these may have a common origin dating back 6000+ years. Pollen analysis research by Birks (1989) led to the development of isochrome contour maps, and these showed that lime was present in southern England 7500 years ago, and gradually spread into central England and parts of Wales. Small-leaved Lime was a dominant species in the primeval woodlands of the English lowlands for over 2000 years.

Also of particular interest was a discrete stand of young Aspen *Populus tremula* near the junction of Rides 66 and 67, and extending into Compartment 17. It is considered likely that this is a single clone whose origin could date back to the immediate post-glacial (*ca.*9000 years ago), but might perhaps be later. The finest example of this phenomenon in the country is at St Pierre Hotel golf course near Chepstow, Monmouthshire, which has about 1000 stems and covers approximately one hectare. The possibility that Aspen was originally planted in the Great Wood rather then arriving naturally by post-glacial immigration can almost certainly be discounted. Its ability to colonise large areas by suckering did not make it a popular species with tree planters. As the last Ice Age came to an end the treeline moved northwards from the warm climate of the south. Pollen analyses from earth core samples have shown that the earliest arrivals in this country were the pioneer species Aspen, birch *Betula* sp. and sallow *Salix* sp. all noted for their colonising abilities. These were followed later by oak, Alder and lime, all of which had established themselves widely across Britain by about 4000BC.

Unfortunately, during the course of coppicing operations in Compartment 19

during January 2008, the stand of well-developed Aspen near the junctions of Rides 66 and 67 mentioned above, was cut almost to ground level. Although regeneration will take place it will take many years for really mature trees to develop.

Ponds

The wet weather continued throughout the winter of 2006/2007 resulting in a very high water-table in the woods which caused the ponds to overflow (Baker 2008). The pond in Compartment 4 was checked and found to have a pH of 7.0 compared to a pH of 5.5 in 1997 for the main pond in Little Wood, and the north and south ponds in Great Wood (Sage 2006).

BIODIVERSITY

Flora

Five species were added to the list of vascular plants during 2007. These were Rough Hawkbit *Leontodon hispidus,* a single plant of which was found in Ride 60 in June; Turkish Hazel *Corylus colurna* which was discovered in Ride 57 in July, and which had presumably been deliberately planted at some time in the past; Pendulous Sedge *Carex pendula* in Ride 32 (Little Wood) and Ride 61 in April; Common Spike Rush *Eleocharis palustris* in Rides 32 and 61 in June; and Common Bistort *Persicaria bistorta* in Ride 57 in June. These additions increase the list of vascular plants from 327 to 332 species. There were some possible further additions which require further checking in 2008. The Broad-leaved Helleborine *Epipactis helleborine* had not been seen actually within the reserve in recent years (Sage 2006), but in 2007 two plants were found in Ride 35. These may have originated from the colony along the clay pit area of Brick Kiln Lane. However, this orchid can apparently lie dormant for considerable periods before reappearing, so this may actually not be a spread, but a separate longer term site. The Lily of the Valley *Convallaria majalis* continues to show an overall decline in sample plots, most likely due to maturing Rowan *Sorbus aucuparia* saplings creating unfavourable conditions in these plots. The May Lily *Maianthemum bifolium* is now showing signs of a serious decline (Baker *op.cit.*). The causes for this are not currently known, but various theories have been suggested, including: changes in light intensity at ground level in the population area, changes in air circulation/humidity, lack of genetic material (if the plant represents a single clone).

The warden, Robert Baker, carried out a number of plant community surveys in the wider rides during April, June and August. This work identified the

most floristically diverse rides and, combining the the spring and summer surveys, shows the eight most diverse rides (Table 1).

Table 1 Rides with the greatest floristic diversity

Ride	Type	No. of species
68	Dry and sunny	42
69	Mainly dry with small flush areas	40
32	Dry - wet	40
57	Wet - very wet	39
66/65	Mainly dry with small flush areas	37
67	Mainly dry with small flush areas	36
61	Fairly dry but flush area present	32

Mammals

Two species were added to the list in June 2007 increasing the total from 22 to 24. The two species were the Barbastelle *Barbastella barbastellus* and Serotine *Eptesicus serotinus*. Both these bats were recorded in the Great Wood and Barbastelle Bats were also recorded in Barney Wood and Little Wood. Judging from the number of bat passes recorded on standarised transects, it seems likely that the NNR supports good populations of both species (Baker *op.cit.*). A recent paper (Hill & Greenaway 2008) discusses research on the conservation of bats in British woodlands , and in particular oakwoods with good cover in both canopy and understorey layers. The most striking feature of the results was the clear association between a well-developed understorey and the number and diversity of bat species.

Birds

Neither the Common Buzzard or European Honey Buzzard bred within the reserve in 2007, and it was a poor breeding season for most passerines. In late May three churring male European Nightjars were found in a clear-felled area just outside the reserve boundary, and there was evidence that at least one brood had been reared (Baker *op.cit.*). Nightjars were seen in the Great Wood and are an addition to the reserve list increasing the total to 72 species. A Common Grasshopper Warbler singing in Compartment 20 in the Great Wood on 3 May unfortunately did not stay, but is also an addition to the list and brings the total to 73 species. Only one pair of Common Redstarts had a territory in 2006 (Sage 2006), but in 2007 there was a welcome increase with

3 pairs in the Great Wood. The Common Nightingale last bred for certain in 2002. In 2007 a singing male took up a territory in Little Wood in April, breeding was not proved but was strongly suspected (Baker *op.cit.*).

Moths (Lepidoptera)

In 2006 two species of macro-moths were added to the reserve list, bringing the total for this group to 403 species (Sage 2006). Two further species were added during 2007 bringing the total to 405. These were the Yellow Belle *Aspitates ochrearia* and the Purple Marbled *Eublemma ostringa*. The Pale Pinion *Lithopane hepatica* which was first recorded in the Great Wood in 2006 was seen again on 23 April 2007, thus raising the possibility that it may be in the process of colonising the wood (Baker *op.cit.*). This is, however, a species which exhibits strong 'boom and bust' patterns, appearing in small numbers in some years in the county and then 'disappearing' for several before reappearing again. This is more likely the case than a recent colonisation.

Butterflies (Lepidoptera)

Transects were carried out in Great and Little Woods on 17 dates and a total of 2326 butterflies of 23 species were recorded. On 19 April a Camberwell Beauty *Nymphalis antioppa* was seen in Ride 57 (Baker *op.cit.*). This is a new species for the reserve list bringing the total to 30. On the debit side, the Dingy Skipper *Erynnis tages* was not recorded in 2007 and is presumed lost from the reserve. The same applies to the Dark Green Fritillary *Measoacidalia aglaja* which, after the 2006 records it was hoped would be regained as a breeding species, but no such evidence was found in 2007 (Baker *op.cit.*).

Beetles (Coleoptera)

The total number of species recorded in Great and Little Woods up to the end of December 2006 was 537 (Sage 2006). During 2007 a further 30 species were recorded which brings the total to 568. These additions are listed in the Appendix where, for ease of reference, both families and species are listed in alphabetical order. The number of families represented is increased from 55 to 56 by the addition of the Silvanidae.

The species list in Sage (2006) included 35 considered rare or scarce, using Hyman & Parsons (1992 & 1994) as the reference point. A further eight species were added in Sage (2007) to bring the total to 43. During 2007 another 5 species were added bringing the total to 48. These additional species are shown below:

RDB3 (Rare)

Oedemera virescens

Nationally Notable (Scarce) Category B

Magdalis cerasi

Rhizophagus nitidulus

Stenocarus ruficornis

Nationally Notable (Scarce)

Omalium allardii

Table 2 summarises the overall situation if the figures in this paper are combined with those in Sage (2007).

Table 2 Totals of rare or scarce species of Coleoptera recorded

Category	No.of species
RDB1 (Endangered)	1
RDB2 (Rare)	1
RDB3 (Vulnerable)	2
RDBK (Insufficiently Known)	1
Nationally Notable (Scarce) Category A	5
Nationally Notable (Scarce) Category B	36
Nationally Notable (Scarce)	2
TOTAL	48

One species new to Norfolk was recorded in 2007, *Melanotus castanipes* which was taken in an underground trap at the base of an oak tree in Ride 58 on 11 June (see below), an unexpected situation. However, this species is closely allied to *Melanotus villosus* and separating the two is not easy. It is only quite recently (Mendel 2004) that *M.castanipes* has finally been admitted to the British List. Whilst this may be the first confirmed record for Norfolk there is little doubt that others remain undetected amongst collections of *M.villosus*.

Also of interest is *Philonthus mannerheimi* also taken in an underground trap at the base of an oak tree, this time in Ride 48 on 11 June. The only previous Norfolk records are in Edwards (1893) who found it at Kirby Beedon in 1876, and in a list of the beetles of Wheatfen drawn up by the late Ted Ellis. Unfortunately the collectors name is not given in this list and neither is the date. Particular interest attaches to *Oedemera virescens* which was obtained

by sweeping vegetation in Ride 61 on 13 June. This rare species was first found in Norfolk (and new to Britain) in Foxley Wood in 1884, where it was also taken on a few more occasions up to 1906. There have been no further Norfolk records until I found one at Castle Acre on 6 May 2000.This species is closely related to *Oedemera lurida* and females of the two species can be difficult to determine. The Great Wood specimen is a female and in terms of size, colour, and one or two other characteristics, does appear referable to *O.virescens*. It is hoped that future searches in the wood will result in the capture of some male specimens.

The litter heap in Ride 61 (see Sage 2007) which provided 26 of the 37 new species recorded in 2006, continued to be productive and the present paper adds a further seven new species:

Ptilidae

Ptenidium nitidum

Staphylinidae

Bryaxis puncticollis
Geostiba circellaris
Mocyta amplicollis
Oxypoda opaca
Philonthus varians
Sepedophilus marshami

Six of the new species were obtained from moss. On 21 February moss close to the Compartment 4 pond yielded *Atomaria atricapilla*, *Mocyta fungi*, *Stenocarus ruficornis*, and *Tychus niger*. Moss in Ride 58 on 27 June provided *Othius subuliformis* and *Tachyporus atriceps*. The most unexpected of these species is *Stenocarus ruficornis* which is normally associated with poppies *Papaver* species; no species of the family Papaveraceae have so far been recorded in Great or Little Woods.

An unidentified fungus on a dead oak tree in Compartment 8 provided *Oxypoda alternans* on 11 July. Two of the new species were found under the bark of oak trees - *Rhizophagus nitidulus* and *Silvanus unidentatus*, both in ride 48 on 11 June. The weevil *Magdalis cerasi* was found on the foliage of an oak in Compartment 4 on 13 June. Another weevil, *Amalorrhynchus melanarius*, was located on its foodplant Watercress *Rorippa nasturtium-aquaticum* in Ride 61 on 13 June. The only ground beetles new to the list were *Agonum obscurum* taken in a pitfall trap in Compartment 20 on 11 April, *Amara eurynota* found in the heather area in Ride 61 on 13 June, and *Amara fuliginosum* in a pitfall trap at the west (wet) end of Ride 61 on 27 September. According to Luff (1998) the latter species occurs at the margins of freshwater in bogs, and especially in the north and west, in open grassland

and moors with high rainfall.

The pitfall traps in compartment 20 were also responsible for the addition of *Alophus triguttatus* and *Barynotus obscurus* on 11 June, and *Drusilla canaliculata* on 17 April. A pitfall trap in Ride 61 on 27 September added *Psylloides chrysocephala* and *Quedius molochinus,* as well as the *Amara* species mentioned above.

A new technique used for the first time in 2007 involved the use of underground beetle traps. The use of such traps was pioneered by Owen (1995) who describes their construction and deployment. They are designed to trap the hypogean (i.e. living underground) fauna which occur at the roots of old trees. Ideally these traps should be sunk at depths of about 18-25 centimetres as close as possible to the trunks of old trees, particularly those which have standing dead wood. They need to be baited and a mixture of sherry and malt vinegar has been found to be effective. Four traps were deployed in the Great Wood, and 12 species were obtained during May and June:

Barypeithes araneiformes	*Pterostichus madidus*
Glisrochilus hortensis	*Pterostichus niger*
*Melanotus castanipes**	*Quedius curtipennis*
Omalium allardii	*Silpha atrata*
Othius punctulatus	*Tachinus humeralis*
Philonthus mannerheimi	*Tachinus signatus*

*new to Norfolk

Unfortunately none of these species have any close association with the root systems of old trees and had obviously been attracted down from the ground surface. The reason why no hypogean species were taken was probably due to the fact that the traps were not far enough down, It proved unexpectedly difficult to sink holes as deep as was desired, but it is hoped to overcome this problem in 2008. Also, the traps have been redesigned and it is hoped that better results will be achieved.

Saproxylic beetles

In Sage (2006) a total of 72 qualifying saproxylic species were listed, and a further eight were added by Sage (2007) to give a total of 80 species in this category, with a Saproxylic Quality Index (SQI) of 416.2. A further two species were added in 2007 which brings the total to 82 and, because both are low-scoring species, the SQI is marginally decreased from 416.2 to 415.8. The two additions are:

Species	Ecology
Magdalis cerasi	Develops in dead boughs and branches, especially of Rosaceae, although also found on oak
Rhizophagus nitidulus	Under sappy bark of freshly dead wood of various broad-leaved trees

In Sage (2006) I listed eight saproxylic species that were known to be primarily associated with ancient woodland and ancient wood-pasture, and *Rhizophagus nitidulus* should also be included here.

Index of Ecological Continuity

This concept was discussed in detail by Sage (*op.cit.*) who showed that Swanton Novers Wood qualified as a site of *National Importance*. None of the species added to the site list during 2007 qualify for inclusion in this category.

SUMMARY

During 2007 a further 31 species were added to the list of Coleoptera, as were two species of macro-moths, one species of butterfly, four plant species, two mammals and two birds. The Saproxylic Quality Index was slightly revised from 416.2 to 415.8. Table 3 updates the figures given on page 37 of Sage (2006).

The figure of 30 species of butterfly given above does not include the Purple Emperor *Apatura iris*, but the historical evidence for the earlier occurrence of this species in the Great Wood is discussed by Sage (2006).

The total number of RDB and Nationally Notable (Scarce) species of beetles is now 48 as a result of the five additional species found in 2007. The number of saproxylic species is increased from 80 to 82, and saproxylic species known to be primarily associated with ancient woodland and ancient wood-pasture is increased from eight to nine.

The work on tree ageing carried out by John White has given an insight into the structure and development of the wood over time, and the plant community surveys by Robert Baker have served to identify the most species-rich rides

ACKNOWLEDGEMENTS

I am indebted to Martin Collier and Ash Murray (Natural England) for reading and commenting on this paper in draft, and the latter for much

Table 3 Total species recorded from Swanton Novers Woods NNR

Group	Number of species
Vascular plants	332 [a]
AWVPs	21
Bryophytes	76
Lichens	35
Fungi	753
Butterflies	30 [b]
Moths	548
Dragonflies	19
Beetles	568
Birds	73
Mammals	24
Reptiles and amphibians	8

[a] Excludes microspecies of bramble.

[b] The Dingy Skipper and Dark Green Fritillary may now be extinct in the wood.

assistance in various other ways. Assistance with specimen identification was kindly given by Martin Collier and Dr R.Colin Welch. I am grateful to John White for making several visits to the wood and for much discussion on the subject of tree-ageing, and also for identifying Turkish Hazel. I also have to thank Mrs Gillian Beckett for several discussions on botanical aspects and, last but by
no means least, Robert Baker for keeping me abreast of his researches.

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Appendix 1: ADDITIONAL SPECIES OF COLEOPTERA RECORDED IN SWANTON NOVERS WOOD DURING 2007

CARABIDAE
Amara eurynota (Panzer)
Agonum obscurum (Herbst)

CHRYSOMELIDAE
Psylloides chrysocephala (L.)

CRYPTOPHAGIDAE
Atomaria atricapilla Stephens

CURCULIONIDAE
Alophus triguttatus (Fabricius)
Amalorrhynchus melanarius (Stephens)
Barynotus obscurus (Fabricius)
Magdalis cerasi (L.) Not.B
Stenocarus ruficornis (Stephens) Not.B

ELATERIDAE
Melanotus castanipes (Paykull)

MONOTOMIDAE
Rhizophagus nitidulus (Fabricius) Not.B

OEDEMERIDAE
Oedemera virescens (L.) RDB3

PTILIDAE
Ptenidium nitidum (Heer)

SILVANIDAE
Silvanus unidentatus (Olivier)

STAPHYLINIDAE
Drusilla canaliculata (Fabricius)
Geostiba circellaris (Gravenhorst)
Mocyta amplicollis (Mulsant & Rey)
Mocyta fungi (Gravenhorst)
Omalium allardii Fairmaire & Brisout Not.B
Othius subuliformis Stephens
Oxypoda alternans (Gravenhorst)
Oxypoda opaca (Gravenhorst)
Philonthus mannerheimi Fauvel
Philonthus varians (Paykull)
Quedius molochinus (Gravenhorst)
Sepedophilus marshami (Stephens)
Tachyporus atriceps Stephens

Pselaphinae
Bryaxis puncticollis (Denny)
Tychus niger (Paykull)

Total 30

ERRATUM

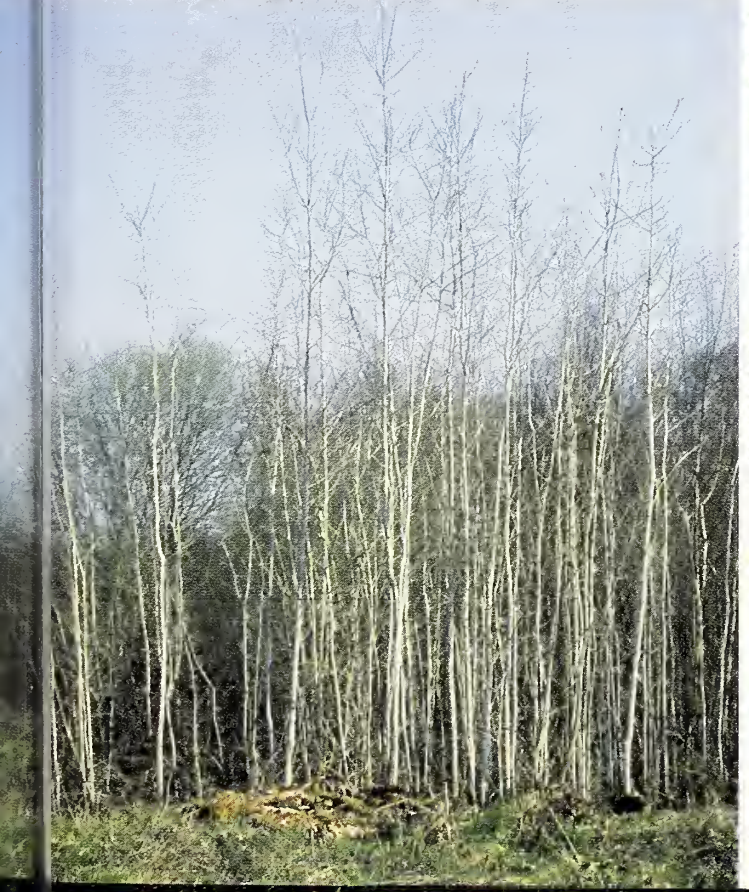
We regret that the following Appendix was inadvertantly omitted from SAGE, B. 2007. Swanton Novers Wood NNR, Norfolk and its Coleoptera: Supplement 1.

Appendix 3 (from 2007 paper): SAPROXYLIC SPECIES USED TO CALCULATE CONTINUITY GRADE, IEC AND RIEC SCORES

Species	Score	IEC	RIEC
Agrilus pannonicus (Pill. & Mitt.)	2	2	0
Ampedus quercicola (du Bysson)	1	3	3
Bitoma crenata (Fab.)	3	1	1
Conopalpus testaceus (Olivier)	3	1	1
Cryptophagus micaceus Rey	1	3	3
Eledona agricola (Herbst)	3	1	1
Enicmus rugosus (Herbst)	2	2	2
Ernoporus caucasicus Lindemann	1	3	2
Hallomenus binotatus (Quensel)	3	1	1
Melandrya caraboides (L.)	3	1	1
Melasis bupestroides (L.)	3	1	1
Mycetophagus piceus (Fab.)	3	1	2
Pediacus dermestoides (Fab.)	3	1	1
Phloiophilus edwardsii Stephens	3	1	1
Phymatodes testaceus (L.)	3	1	1
Platycis minuta (Fab.)	3	1	1
Prionychus ater (Fab.)	3	1	1
Quedius maurus (Sahlberg)	3	1	1
Quedius scitus (Grav.)	3	1	2
Sinodendron cylindricum (L.)	3	1	0
Stenagostus rhombeus (Olivier)	3	1	1
Triplax russica (L.)	3	1	1
TOTAL		**30**	**28**

Great Wood, Swanton Novers NNR.

Top: Bluebells by Compartment 20. **Right.** Boundary Oak (ca.1595) in Compartment 17SW. **Below:** One thousand year-old Aspen clone in Ride 66. *Photos:* Bryan Sage.



Sorosphaera veronicae, a fungus-caused gall on Germander Speedwell *Veronica chamaedrys*. *Photo*: Robert Maidstone.

Tree Bumblebee *Bombus hypnorum.* Recorded for the first time in Norfolk. *Photo*: Tony Irwin.

Barbut's Cuckoo Bee *Bombus barbutellus.* A cuckoo of *B. hortorum.* Female. *Photo:* Nick Owens.

Heath Bumblebee *Bombus jonellus.* Worker. *Photo:* Nick Owens.

Garden Bumblebee *Bombus hortorum.* Worker. *Photo:* Nick Owens.

Large Garden Bumblebee *Bombus ruderarius.* Male. *Photo:* Nick Owens.

Top: Specimen of American Barrelfish *Hyperoglyphe perciformis* in Norwich Castle Museum. *Photo*: Tony Irwin.

Below, clockwise from top left: Bog Beacon *Mitrula paludosa,* Edgefield Heath. *Conocybe intrusa,* Gresham's School. *Russula pungens* (formerly *R. rubra*), Cranworth. *Photos:* Tony Leech. Bearded Tooth *Hericium erinaceus*, Trowse Wood. *Photo:* Stephen Livermore.

American Barrelfish *Hyperoglyphe perciformis* (Mitchill, 1818) (Pisces, Centrolophidae) new to the North Sea

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Castle Museum Study Centre, Shirehall, Norwich NR1 3JQ

An old specimen previously identified as Blackfish, *Centrolophus pompilus* has been re-identified as American Barrelfish, *Hyperoglyphe perciformis*. The specimen, found at Sea Palling in 1898, represents the first and so far only record of *Hyperoglyphe* from the North Sea.

In March 1898, an odd fish was found on Sea Palling beach. The eminent Norfolk naturalist Thomas Southwell examined and recorded it as the first Norfolk specimen of the Blackfish, *Centrolophus pompilus* (Southwell, 1899). In 1900 the specimen (having been stuffed) was presented to Norwich Museum by the Rev. A. Garway Atkins of Palling Rectory. It was duly accessioned with the number 46.00.

In his interleaved copy of Lubbock's *Fauna of Norfolk* (currently housed in Norwich Museum library), Southwell made a note:

> Black Fish (Centrolophus pompilus) *One found on the beach at Sea Palling thrown up by the breakers, but still alive, about 27 March 1898 after very severe N E gales. The first Norf. specimen.*

In his account in the *Transactions*, Southwell (1899) states:

> *A living specimen was cast up on the beach at Sea Palling, after the severe N.E. gales, about 27 March, 1898; seen by me shortly after.*

In 2005, the specimen was being prepared for display in an exhibition at the Time and Tide Museum in Great Yarmouth. Many of the fish specimens for the exhibition had damaged fins, which we were repairing. It was while we were looking at reference works to establish the correct shape of the fins that we noticed that the specimen was not a Blackfish, but was a related species – *Hyperoglyphe perciformis* (Mitchill, 1818).

Detailed diagnoses are given in Wheeler (1969) and Haedrich (1986), but the most obvious difference between the species is the series of spines in front of

the dorsal fin. In *Centrolophus* these are graduated and less distinct from the dorsal fin rays. In *Hyperoglyphe* they are all relatively short and stouter than the dorsal fin rays.

Known as the Barrelfish, and sometimes called the Driftfish in the USA, both the English names of *Hyperoglyphe* refer to the habit of juveniles swimming under and around floating objects, as a result of which they can drift far from their breeding areas in the Western Atlantic. Most records from the British Isles are from Ireland and SW England. The species has also been recorded from Iceland, Norway, Portugal and the Western Mediterranean, but has not been recorded previously from the North Sea.

The present specimen (see photo opp. p.81) has a total length of 310 mm (estimated, as the tips of the caudal fin are missing); fork length 296 mm; standard length 255 mm; head length 75 mm; maximum body depth 92 mm. The specimen does not appear to be over- or under-stuffed, and these measurements are likely to approximate those of the live fish. The dorsal fin comprises 7 spines and 21 rays; the anal fin 3 spines and 17 rays; the pectoral fin 21 rays. The lateral line scales number 91.

Why Southwell misidentified the fish is not certain. The pictures of *Centrolophus* in Yarrell's *History of British Fishes* (1836 or 1859) and Buckland's *Familiar History of British Fishes* (1873) are not particularly good, but should not have caused confusion with *Hyperoglyphe*. In Day's *Fishes of Great Britain and Ireland* (1880-84), both species are well illustrated and the description leaves no room for doubt. Perhaps Southwell did not have access to Day, or perhaps he was relying on his memory of the fish seen for only a brief time. Coincidentally the first Irish specimen (caught in 1870) was also misidentified as *Centrolophus*, but the mistake was realised in 1903 (Quigley, 1986).

The first record of *Centrolophus pompilus* in Norfolk is of a specimen from Happisburgh in 1923, recorded by Patterson (1924). Patterson did have access to Day and was also sent the specimen from which he removed some parasites, so there is little doubt that in this case the identification was correct.

Acknowledgement

We thank Dr Jim Ellis of CEFAS Lowestoft Laboratory for confirming that there are no other records of *Hyperoglyphe* from the North Sea.

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Marstoniopsis insubrica (Küster) Taylor's Spire Shell

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ALIEN-INDIGENOUS: NON-NATIVE-NATIVE

When is a species accepted as part of the U.K. fauna? Does the species have a fossil record from the U.K.? Does the species appear to have been integral to the U.K. fauna then appears to have been lost? If a species can be seen to be a true alien then after what period of time is it accepted as a native species? Are recent records more a reflection on the expertise of the field naturalist in discovering specimens or are they a reflection of real ecological invasion? These questions and answers are illustrated by a study of *Marstoniopsis insubrica.*

NOMENCLATURE

The last list of the non-marine mollusca of the U.K. was produced by Kerney (1976)). Since 1976 there have been many changes and this has led to a new update of all previous lists (Anderson 2005). The traditional usage of *Marstoniopsis scholtzi* has now been substituted by a south alpine taxon *Marstoniopsis insubrica* (Küster) based on the studies by Falniowski & Wilke (2001) who found no significant morphological or genetic differences. The name *insubrica* is substituted on date priority.

Marstoniopsis scholtzi (Schmidt)
Hydrobia scholtzi (Schmidt)
Bithynella scholtzi (Schmidt)
Paludestrina scholtzi (Schmidt)
Paladilhiopsis steini Martens
Paludestrina taylori Smith
Amnicola taylori (Smith)

STATUS

Taylor's Spire Shell is categorised as a Red Data Book 3 Rare species (Bratton 1991).

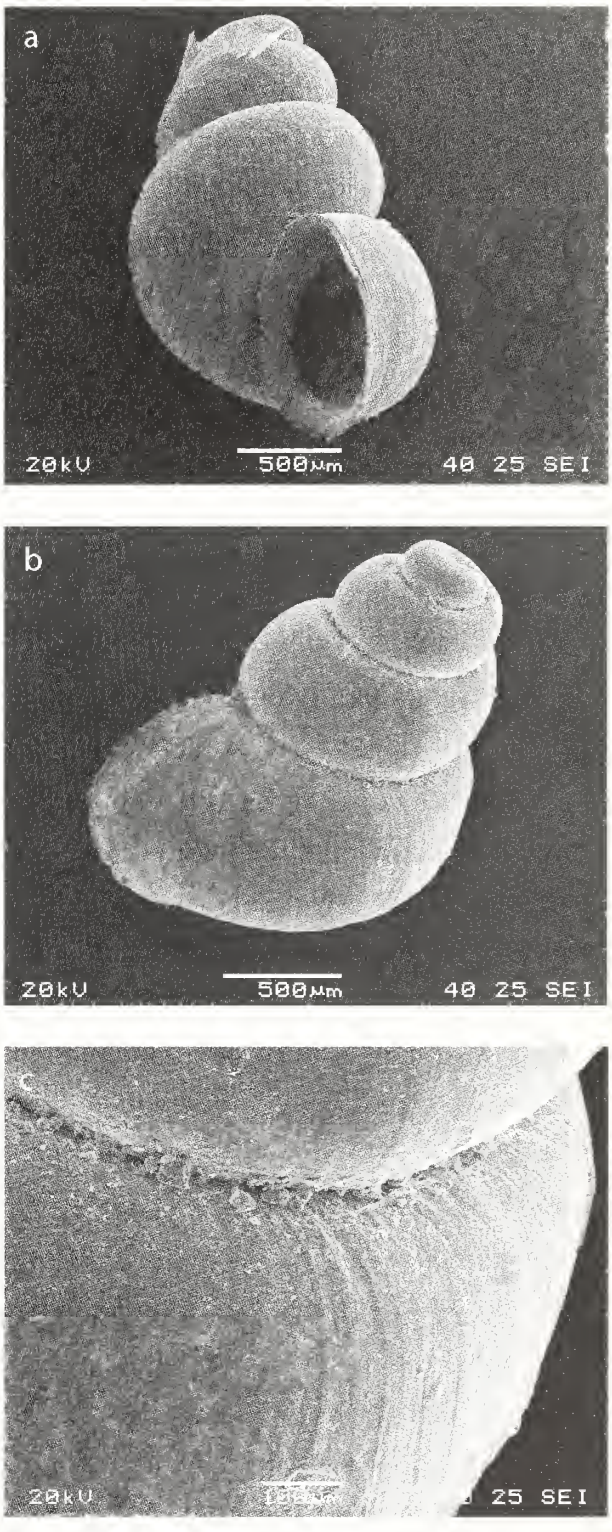
DESCRIPTION

Taylor's Spire Shell is a small pale horn-coloured snail but some of this colouration may be obscured and darkened by encrustations. When clean the shell is semitransparent and slightly glossy. There are four to five whorls with a blunt truncated apex. The whorls are very tumid and meet at deep sutures each placed well below the periphery of the older whorl. The shell surface shows closely set growth lines which appear as very low ridges separated by very shallow grooves. There is a distinct umbilicus. The size is 2.5 x 2.0 mm with the body whorl equalling 66-70% of the total height.

The aperture is rounded and oval in shape. The peristome is thin, smoothly curved and not out-turned except slightly near the umbilicus.

The sexes are separate and egg capsules are laid singly on the surface of marginal aquatic plants.

The capsules contain a single egg which develops to a small snail in about six weeks.



Figures 1 a-c Scanning electron microscope photographs of Taylor's Spire Shell *Marstoniopsis insubrica* from the River Little Ouse, Norfolk.

(School of Environmental Sciences, University of East Anglia).

ECOLOGY

Marstoniopsis insubrica inhabits lakes, canals and rivers, especially those rich in organic matter to depths of 2-3m. The snails occur on weeds, especially *Glyceria*, and on filamentous algae.

Taylor's Spire Shell feeds on diatoms, detritus and decaying plant material.

CURRENT DISTRIBUTION

Marstoniopsis insubrica was first recorded in the UK in canals near Manchester in 1900 (Jackson & Taylor, 1904) and in timber seasoning ponds by a canal at Grangemouth on the Firth of Forth (Waterston 1934). Since the 1950s it is no longer found at Grangemouth. At Agecroft in north-west Manchester Dussart (1977) recorded abundant numbers of *Marstoniopsis insubrica* in the location originally found by Taylor in 1900. It has been recorded from two sites in East Anglia in lowland rivers, the Great Ouse in Norfolk (Preece and Wilmot 1979) and the Deben in Suffolk (Killeen 1992). The collections from the East Anglian locations have all been of small numbers of fresh dead shells. Until the current survey no live snails have been recorded in East Anglia.

ORIGIN

Originally the snail was thought to have arrived from North America where it resembled *Amnicola,* a genus restricted to that continent. It is now described as a species of *Marstoniopsis* with a wide European distribution and it is treated as a native species at the extreme margin of its western European range; north Europe from France and Britain eastwards to north Germany, Poland and southern Scandinavia.

The occurrence of *Marstoniopsis insubrica* in artificial habitats in Britain has led to the suggestion that it must be a European Continental introduction following the Industrial Revolution. The East Anglian river locations may have wider implications for the species.

Marstoniopsis insubrica is known from both the Cromerian and Ipswichian Interglacials (Kerney 1977). Taylor's Spire Shell is unrecorded from the Hoxnian Interglacial. Its absence in the Post-glacial period suggests that it did not survive the invading ice and subsequently failed to recolonize in warmer times. Kennard (1919) recorded *Marstoniopsis* in his manuscript notebooks as a fossil of post-Roman age from deposits of the River Thames from the side of County Hall, Waterloo.

NORFOLK RECORDS

Live specimens of *Marstoniopsis insubrica* were collected only from sites in the River Little Ouse above the junction with the River Great Ouse (Table 1). The snails were collected in depths ranging from 50+cm to 2m in fine silty deposits near the river banks. The majority of the shells examined were found to be dead and the number of living snails noted was small. This

contrasts with the observations of Dussart (1977) in one of the Manchester canals where they were abundant.

The collections were made in water immediately beyond the marginal vegetation dominated by *Glyceria maxima, Sparganium erectum, Nuphar lutea* and *Phragmites australis*. At the Brandon Bank location the mud surface at 50+cm was covered by a mat of green filamentous alga *Cladophora glomerata* covered with epiphytes. Whilst the algae housed many other small snails and mussels, Taylor's Spire Shell was not discovered amongst the threads.

Preece and Wilmot (1977) collected recently dead shells from the middle of the Great Ouse at Hilgay in depths of 2-3m. In the current survey the river was sampled from the banks at three locations from Hilgay to Brandon Creek where there was no evidence of *Marstoniopsis insubrica* in either the mud sediments or the threads of the green filamentous alga *Cladophora*.

Collections made at Fordham in the Cut-off Channel (TL6139399375) and in the River Wissey at Hilgay (TL 6218898818) both proved negative. At these sites the bottom was composed of sandy-gravels with little mud /silts.

CONSERVATION

Kerney (see Bratton 1991) considers that as with all riverine species, acute pollution is a threat. River management work such as dredging and bank reinforcement could also be damaging. In the Rivers Great and Little Ouse problems arising from boat traffic affecting the vegetation and increasing silt suspension are minimal.

SUMMARY

Should we now accept that Taylor's Spire Shell has become established in the U.K. fauna as a native species? The fossil records show it to have been present 600,000+ years ago but it was probably eliminated by the invading ice sheets in the Devensian glacial period. The discovery of fossil specimens in muds in the Thames basin date from post-Roman times. Was the species lost between the post-Roman and the 20th Century or are the lack of records more a reflection on the paucity of experience and classification sources during the intervening years? The 1900 discovery in man-created sites in Lancashire, Cheshire and Stirling point to accidental introductions from Europe as trade developed along the canals etc. The East Anglian river locations discovered over the last thirty years offer a number of possiblities: they predate the Industrial Revolution and represent earlier periods of colonization; they

Table 1. Molluscan assemblages, including *Marstoniopsis insubrica,* in locations on the River Little Ouse, Norfolk. June-August 2008

Species	River Little Ouse Brandon Creek. TL6096691040	River Little Ouse Brandon Bank. TL6213189282
Theodoxus fluviatilis	+	+
Viviparus viviparus	+	+
Valvata piscinalis	+	+
Valvata cristata	+	+
Bithynia tentaculata	+	+
Bithynia leachii	+	+
Potamopyrgus antipodarum	+	+
Marstoniopsis insubrica	+	+
Lymnaea peregra	+	+
Lymnaea stagnalis	+	+
Lymnaea auricularia	+	+
Physa fontinalis	+	+
Planorbis planorbis	+	-
Planobarius corneus	+	-
Planorbis carinatus	+	-
Bathyomphalus contortus	+	+
Anisus vortex	+	-
Gyraulus albus	+	+
Gyraulus crista	+	+
Hippeutis complanatus	+	-
Acroloxus lacustris	+	+
Ferrissia wautieri	+	-
Dreissenia polymorpha	-	+
Sphaerium corneum	+	+
Sphaerium solidum	-	+
Pisidium henslowanum	+	+
Pisidium nitidum	+	+
Pisidium subtruncatum	+	-
Pisidium amnicum	+	-
Pisidium nitidum	+	-
TOTAL	28	21

the Industrial Revolution and represent earlier periods of colonization; they are a product of the Industrial Revolution where rivers for the major routes for commerce or they are of recent colonization.

In the Rivers Great and Little Ouse the Norfolk waters were saline before Dutch engineering works to drain the Fens and the construction of a sluice in 1651. This sluice, however, collapsed in 1740 and the present Denver Sluice was only built in the 1850s. In effect the river in Norfolk has, in recent times, only been freshwater for 150+ years. Shallow barges carried goods to and from Thetford on the Little Ouse until 1824 when the railways developed and killed off the trade. However, much of the Little Ouse would have been saline around Brandon Creek at that time so accidental introductions from the river trade would not have survived.

It can be argued that the current discoveries are no more than a reflection of the development of taxonomic knowledge and the field experience of a small number of scientists, but they fail to answer the question of how long the snail has lived in these rivers? Based on the timing of the construction of the Denver Sluice and the subsequent reduction of the earlier saline levels the evidence points to the earliest colonization having occurred in the early 19th C., although it may be of more recent origin.

Taylor's Spire Shell has been recorded in the U.K. for over a century where it has established itself in a number of locations so by any standards it should be accepted as a native species at the extreme margins of its European range.

ACKOWLEDGEMENTS

The authors would like to thank the Norfolk Biodiversity Partnership for sponsoring this survey as part of a wider review of alien species in Norfolk and Mr Bertrand Lézé of the School of Environmental Sciences UEA. for the SEM photographs.

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Bombus hypnorum (L.) : a bumblebee new to Norfolk

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On 8 June 2008, whilst visiting Norwich (Earlham) Cemetery, I paused beside a footpath TG211086 to observe bumblebees visiting bramble blossom. Amid an assortment of familiar, common species attending the flowers in bright sunshine my eye was soon drawn to a distinctive individual with a ginger thorax and black abdomen fringed with a white tail. This combination, unique to UK bumblebees, indicated that it was *Bombus hypnorum*, first found in Britain in 2001 and a species that had not, as far as I knew, been recorded from Norfolk. The bee soon disappeared, following which I visited Tony Irwin to convey news of the sighting. Images of *B. hypnorum* on the website of the Bees, Wasps and Ants Recording Society (BWARS) were accessed, removing any doubt as to identification, and the Norfolk Wildlife on-line forum was then notified. A distribution map on the BWARS site indicated that the nearest location for *B. hypnorum* was north Suffolk – this referring to a record from Lakenheath Fen, 100m from the Norfolk border, in July 2007 by Tim Strudwick (pers. comm.).

The bee's discovery in Norfolk in 2008 was therefore no great surprise. As already indicated *B. hypnorum* (common name Tree Bumblebee) is very distinctive and easy to identify with confidence in the field if good views are obtained; it can be expected to turn up almost anywhere, favouring woodland and urban areas (Edwards & Jenner 2005). Gardens are visited and it will nest in bird boxes. I believe the individual I saw was a worker in which case it is probable that a queen had arrived in the Cemetery last year. Tony Irwin visited the site a couple of days later and photographed an individual which was visiting brambles (photo between pp.80 and 81). This is a welcome addition to the Norfolk insect fauna and with most of the Norfolk species in severe decline (Richmond 2001), it is both heartening and significant to record an increase in the range of a bumblebee.

Acknowledgements

I thank Tim Strudwick for passing on details of his Suffolk record and Tony Irwin for helpful comments and enabling a photograph to accompany this article.

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Three new galls for Norfolk

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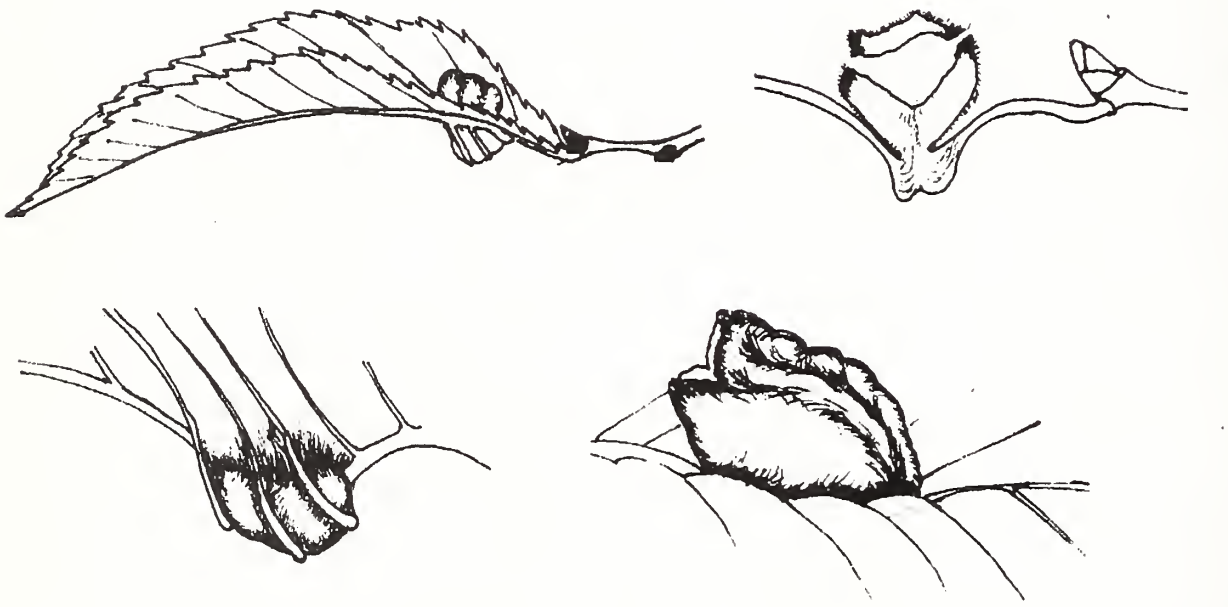
Kaltenbachiella pallida, an aphid gall on Wych Elm

At the annual excursion of the Society with the British Plant Gall Society held at Mannington Hall on 15 August 2004 the group concentrated on searching the trees planted in the arboretum where many galls were found including the aphid gall *Kaltenbachiella pallida* (Haliday) on one of the Wych Elms *Ulmus glabra* (Fig. 1).

Figure 1 *Kaltenbachiella pallida* on a Wych Elm leaf.



Spotted by Ian Farmer of the BPGS on a leaf part way up the tree, the gall was a globular swelling growing from the upper surface of the midrib. Where the gall was attached to the midrib it had distorted the midrib downwards. The upper surface of the gall was covered with short hairs and had developed a large split where the causers, dark green aphids, had already vacated the gall. Two other specimens were subsequently found by other members of the group. All the galls were discovered on heavily shaded leaves 'inside' the canopy rather than on leaves exposed to full light.

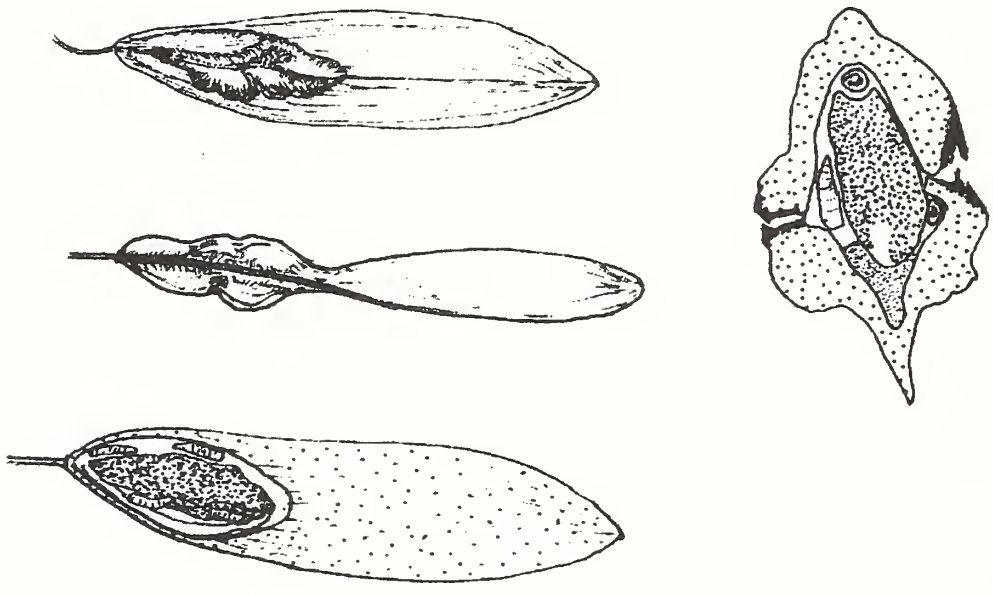
The gall is listed in Redfern et al. (2002) as being rare.

Contarinia marchali, a midge gall on Ash

The weather forecast for the 11 July 2004 promised showers as members

gathered for the Society's meeting at Ringstead Downs. The rain held off until after lunch but while sheltering under some Ash *Fraxinus excelsior* trees I remembered an article in the journal *Cecidology* referring to galls on ash keys so checked some of the rather sparse bunches of keys and discovered some with roughened patches above the seed (Fig.2). Later dissection revealed several pale lemon-yellow maggots, larvae of the midge *Contarinia marchali*.

Figure 2 *Contarinia marchali* on an Ash key.



According to Redfern et al. (2002) this species had not been recorded 'recently' and the earlier records had been from northern England and Scotland, however these galls had been found in 2003 at the Royal Horticultural Society's garden at Wisley (Halstead & Harris 2004).

On returning home to South Norfolk I looked for the galls in my area and dispite there being a very poor key crop I did manage to find one or two galled keys. It may be that this gall is more widespread than thought and that new sites will be found if ash keys are inspected in late June or early July.

Sorosphaera veronicae (J. Schrot.) J. Schrot. a fungus-caused gall on a new host for Britain

In 2001 I found some nodules on the young stems of Germander Speedwell *Veronica chamaedrys* in a garden at Tibbenham which were easily identified as *Sorosphaera veronicae* using Redfern et al. (2002). It turned up again in 2003 at the same site.

In 2005, while weeding a rose-bed in Caistor St Edmunds, I found similar nodules on Wall Speedwell *Veronica arvensis* (see photo between pp.80 and 81). These have been confirmed as being caused by *S. veronicae* which constitutes a new British record since the gall has not been found previously on this species in Britain.

The illustrations are by the author.

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White-letter Hairstreak in Norwich

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Farrow (1998) recorded finding a small colony of White-letter Hairstreak *Satyrium w-album* butterflies on Wych Elm suckers in a north Norfolk hedgerow and suggested lookng for further colonies that may exist in similar circumstances elsewhere. On 11 August 2008, Lynette Dear found a single White-letter Hairstreak outside the Norfolk Wildlife Trust office in Norwich, between Thorpe Road and Aspland Road, grid reference TG 2393708478. The hairstreak was perched motionless with typically folded wings on the bright red bonnet of a Trust vehicle, where it was viewed by Mike Edwards, Steve Henson, George Taylor, Andrina Walmsley *et al.*; it readily perched on the hand and was photographed. Although in an urban fringe location, the Trust's office is adjacent to a belt of trees that contains a number of elms *Ulmus* adjacent to Thorpe Road.

The White-letter Hairstreak is predominantly arboreal, with long periods spent at rest, so it may have been previously overlooked at this newly recorded site. However, their colonies may not be sedentary or isolated, as Watts and McIlwrath (2002) suggest that these may disperse over several kilometres

by frequent movement between groups of elms, so recent colonization is a possibility.

During the period 1989-2000, White-letter Hairstreak was recorded in six tetrads within the 10-kilometre square TG 20 (Watts & McIlwrath 2002), the most tetrads within any 10-kilometre square in the county during the period. However, to date, there have been only two other records in such close proximity to Norwich city centre: at Grapes Hill in 2007 and at Bracondale in 2004 when up to six were seen nectaring on Hemp Agrimony *Eupatorium cannabinum* by a garden pond in the grounds of English Nature at 60 Bracondale between 28 July and 6 August; they were also seen flying around elms on the opposite side of the road (Adrian Gardiner and Peter Lambley *pers. com.*).

The White-letter Hairstreak was added to the UKs Biodiversity Action Plan (BAP) list of priority species in 2007 due to an apparent decline in range and abundance. At the local scale in and on the fringes of Norwich it will be important to confirm further White-letter Hairstreak colonies and identify, map and protect any remaining mature elms and elm sucker re-growth.

Acknowledgements

Many thanks to Pat Lorber at the Norfolk Biodiversity Information Service and Andy Brazil, county butterfly recorder, for providing details of previous White-letter Hairstreaks recorded in the Norwich area.

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Butterflies

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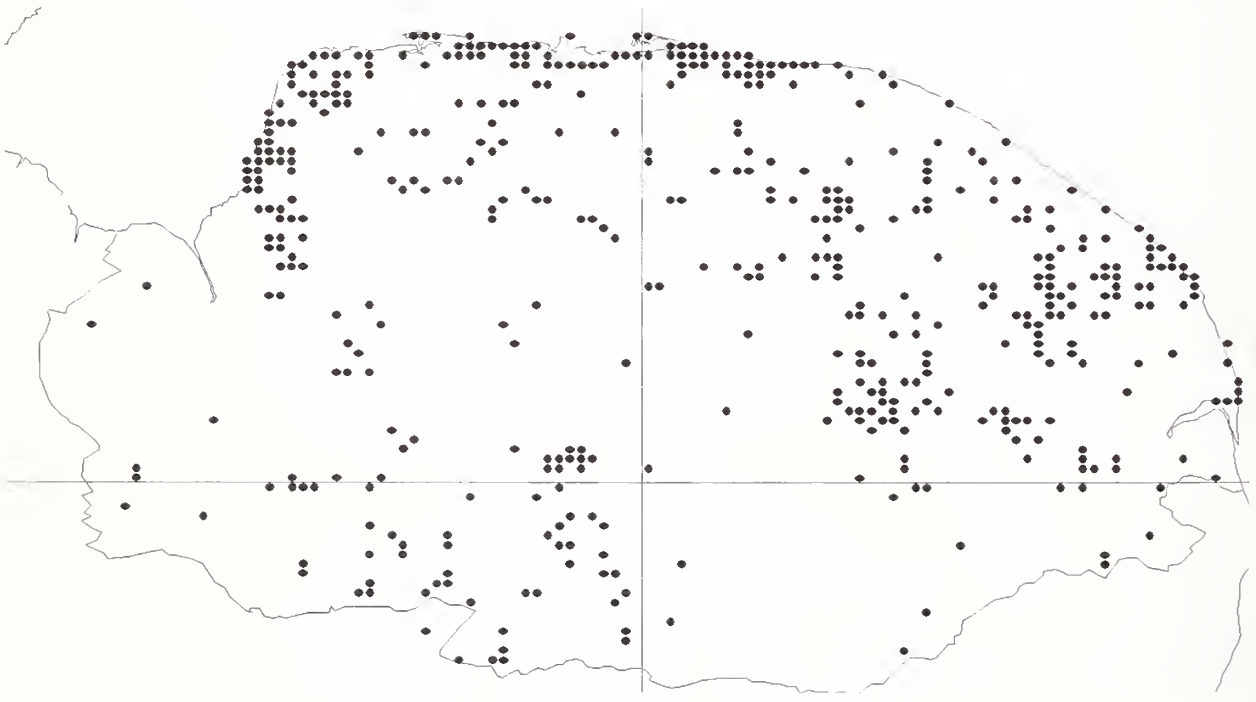
The year was very much a 'game of two halves'. Memories of the floods that accompanied the summer make it easy to overlook the remarkable spring we had. April in particular was the driest and warmest ever recorded, with average temperatures 3.5 degrees above average and only a quarter of average rainfall, while all preceding months were significantly warmer The results of this can be seen in the early emergence of many spring species – with new records set both in the UK and Norfolk. Then La Niňa set in, the jet stream shifted and we had the wettest May ever recorded (250% of average rainfall); sadly a pattern to be repeated for much of the summer. We can only hope that 2008 is better.

Nearly all recorders had a poor season, with comments such as "worst year ever" common to many recording sheets. Nevertheless over 8,200 observations have been submitted so far. (Those who submit garden records via the national scheme should note that, at the time of writing, copies of those records have not yet been received.) A total of 477 1km squares were visited by recorders (426 in 2006), and new locations for a number of species were recorded (Fig. 1).

Fig 1 1km squares for which reports were received in 2007



The year also saw two new species appear on the county list (or at least re-appear after a long absence) with the discovery of Chalk-hill Blue at Warham and the sighting of a Marbled White by a party of botanists on a field trip to the far west of the county. Other rarities included two sightings of Long-tailed Blue (North Burlingham and Bradwell) and 17 Camberwell Beauties. Four of these were seen between 11th March and 26th April, suggesting over-wintering (BP, MBi, RK, Abe), while all but one of the rest were seen between 24th and 27th August, (AF, PE, Plo, RBA, BF, EH, Sho, GW). The last was on 6th Sept (JGo).

SPECIES ACCOUNTS

First and last sightings are listed in Table 1.

Dingy Skipper

Recorded from eight 1km squares. The highest number seen was 14, recorded from Leziate country park on the 20th May. Only eleven recorders managed sightings and the species continues to give grounds for concern. Earliest 19th April; latest 9th June.

Grizzled Skipper

Recorded from 12 squares, maximum count 18 on the 18th May at Foulden Common. Again only eleven recorders managed sightings of this scarce insect. Earliest 19th April; latest 9th June.

Swallowtail

Recorded from 25 squares (22 in 2006). This year was noticeable for the early emergence, with the first appearing on the 27th April (DN)! However it was all over by the 28th June – with a single sighting on the 16th August (SGu) being the only evidence of a second brood.

Clouded Yellow

Reported from 18 squares (14 in 2006), mostly coastal as one would expect for an immigrant. 25 reports from 18 observers. Highest count 3 recorded on the 12th and 25th August. An early sighting from Scolt Head on the 11th April was of interest (MRo) – otherwise 16th June to 30th September, except for an exceptional 1st November (MGo). One-third of the sightings were between 24th and 29th August, the peak Camberwell Beauty period.

Green Hairstreak

Only 21 squares reported (18 in 2006). In general I suspect this species is heavily under-recorded. Maximum seen was 26 on the 11th May, with earliest 16th April (NOA) and latest 9th June (MRo). A total of 59 records received from 16 recorders.

Purple Hairstreak

14 squares (up from 11 in 2006) for another under-recorded insect. Interestingly I appear to be the only recorder to have made the

pilgrimage to the Sheringham gazebo, where you can enjoy the experience of looking down on the butterflies as they wheel through the treetops. Maximum count of five was from there. Both the earliest (24th June (MRo) and 3rd July (AR)) sighting and the latest (28th August (SW)) were exceptional – all other sightings were between 17th July and the 4th August. Fourteen reports from six recorders were received.

Table 1 Earliest and latest sightings (in order of emergence)

Species	Earliest	Recorder	Latest	Recorder
Red Admiral	12/01/07	KB	26/12/07	BCo
Brimstone	13/01/07	NA	13/10/07	GN
Comma	19/01/07	BFN	10/11/07	PK
Peacock	19/01/07	SW	19/12/07	SW
Small Tortoiseshell	01/02/07	SP	29/10/07	SW
Small White	11/03/07	AM	14/10/07	DL
Speckled Wood	22/03/07	MH	21/10/07	PK
Large White	25/03/07	AH	22/10/07	CM
Orange Tip	01/04/07	TC	04/07/07	GN
Green-veined White	05/04/07	NOA	01/10/07	BA
Holly Blue	05/04/07	GN	02/10/07	SW
Small Copper	06/04/07	DL	24/10/07	JD
Clouded Yellow	11/04/07	MRo	01/11/07	MGo
Green Hairstreak	16/04/07	NOA	09/06/07	MRo
Brown Argus	18/04/07	NOA	04/10/07	SH
Dingy Skipper	19/04/07	SH	09/06/07	ABa
Wall Brown	19/04/07	PH	09/09/07	MRo
Grizzled Skipper	19/04/07	SH	09/06/07	ABa
Painted Lady	20/04/07	RA	30/10/07	CD
Common Blue	29/04/07	JD, PH	22/09/07	DL, MH
Small Heath	30/04/07	SG	24/10/07	JD
White-letter Hairstreak	04/07/07	EG	03/08/07	AR
Swallowtail	27/04/07	DN	25/08/07	PW
Meadow Brown	01/06/07	PH	09/09/07	GN
Silver Studded Blue	03/06/07	MG	10/08/07	MG, MR
Large Skipper	07/06/07	GN	16/08/07	GN
Ringlet	07/06/07	BA	12/08/07	PB
Small Skipper	11/06/07	PC	09/09/07	RH
Essex Skipper	16/06/07	PC	16/08/07	GN
Gatekeeper	16/06/07	MH	09/09/07	MRo
Dark Green Fritillary	20/06/07	SGu	31/08/07	MR
White Admiral	22/06/07	MG	07/10/07	JHa
Purple Hairstreak	24/06/07	MH	28/08/07	SW
Grayling	15/07/07	AM	30/09/07	SGu

White-letter Hairstreak
The internet recording project (at http://www.w-album.hertsmiddx-butterflies.org.uk/index.html) strongly suggests this is a massively under-recorded butterfly. Confirmation of this can be seen in the fact that even when eggs and larvae have been found, frequently no adults have been recorded – suggesting either frequent breeding failure or, more likely, that this is an insect that you need to 'get your eye in' to see. If you have any elm around you, it is worth checking the treetops in July.

Adults were reported from eight squares, with eggs or larvae from a further four (16 squares held adults in 2006 – a difference probably explained by the wet weather, as most sites were not visited this year). Apart from a late sighting on 3rd August (AR), all adults were seen in July.

Brown Argus
Recorded from 38 squares (30 in 2006), with the largest count being 40 on May 2nd (PC). A total of 77 reports were received from 22 recorders. Late sightings on 7th Sept (GF) and 4th Oct (SH) were exceptional – the season was effectively over by 30th August. I wonder how many sightings get dismissed as female Common Blues? New colonies of note include Yarmouth and Norwich (where it was found along the Wensum) Genuine expansion or more recorders is the question here.

White Admiral
A poor year for reports – but does this reflect poor breeding or recorders stuck at home by the weather? Recorded from only 23 squares (down from 28) with a highest count of 10. A report on the 7th Oct (JHa) was the only sign of a late third brood this year, otherwise 12th August was the last record (PT). A total of 48 reports received.

Dark Green Fritillary
No change in distribution with records coming from the same 15 squares as last year. An early record of 20th June (SGu) was exceptional, all others were July-August. Estimated counts of 100+ were received on two days, both from the Horsey colony (JW,SW). The Holkham/Blakeney colony was seen in much fewer numbers; peak count was 51 (SC), with most records of singles. A total of 26 records received.

Wall Brown
A pleasing increase in squares reported, up from 36 to 47. This remains a rare insect however, with a maximum sighting of 19 on the 12th May being exceptional (GN). The first brood ran from 19th April (PH) until 13th June (MRo), with second from 28th July (MRo) to 26th August (GN). There were two records between broods: 5th (MRo) and 18th July (ABr). A final sighting on 9th September (MRo) was exceptional. A total of 98 records were received from 24 recorders. All but one sighting were

above a line drawn from the Wash to Lowestoft – but is this genuine or a reflection of where our recorders are?

Grayling
Another increase (37 up from 26) includes a report of what appears to be a major colony at Sculthorpe (TP). Unfortunately the site is on MOD land and access is difficult but initial reports are promising. Coastal colonies remained stable, with 'E' counts from Horsey/Winterton on many days. Again the Holkham/Blakeney area produced much smaller numbers but over a greater area. Main flight period is mid-July to mid September, with late singles seen on 22nd (MH, DL) and 30th (SGu).

Small Heath
Recently designated a BAP species and recorded from 42 squares (up from 39 in 2006). Two main centres of distribution; coastal (Holkham/ Blakeney and Horsey/Winterton) and the Brecks. Seen continuously from 30th April (SG) until the end of September (MH, DL), with two late singletons in October (SH, NOA). A sighting from Mousehold Heath in Norwich underlines this site's importance. Maximum count 23 but many estimates of up to 100, all from Horsey. A total of 128 reports received.

The rest
The Red Admiral was the most widely seen butterfly with reports from 251 squares. It was also the most frequently reported, with a total of 887 records submitted. The largest individual count however, was a total of 641 Ringlets on the 5th July, seen at Harling Heath (GN). Astonishingly the next largest count recorded was a total of 475 Silver-studded Blues at Buxton Heath on the 20th June (MG). It should be noted however that 'E' counts can hide anything from 100 upwards and I have no doubt that the most numerous butterfly is actually the Meadow Brown. In fact the trio of 'browns'- meadow, hedge and ringlet – show just how successful a grass eating strategy can be.

Numbers of insects are a poor measure of success however: even a rare butterfly can exist in large numbers in its favoured locality. If we use squares reported as a measure of 'commonness' however, then we can say that the ten most common butterflies in Norfolk are Red Admiral, Meadow Brown, Peacock, Speckled Wood, Small White, Gatekeeper, Green-veined White, Small Tortoiseshell, Comma, and Painted Lady.

If we use number of sightings as our measure however, then the list becomes: Red Admiral, Painted Lady, Speckled Wood, Peacock, Small White, Meadow Brown, Large White, Comma, Green-veined White and Small Tortoiseshell.

For completeness, we should note that the ten rarest butterflies (ignoring rare migrants like the Camberwell Beauty and Clouded Yellow) are:

- *By number of sightings:* White-letter Hairstreak, White Admiral,

Purple Hairstreak, Dingy Skipper, Swallowtail, Wall Brown, Dark Green Fritillary, Grizzled Skipper , Brimstone and Silver-studded Blue.

- *By distribution:* Dingy Skipper, White-letter Hairstreak, Silver Studded Blue, Grizzled Skipper, Purple Hairstreak, White Admiral, Dark Green Fritillary, Swallowtail, Green Hairstreak and Grayling.

In conclusion it remains for me to thank everyone who has submitted records – without their patient hard work none of the above would have been possible. The records will now go to the national butterfly recording scheme and to the Norfolk Biological Records Centre at Gressinghall, and will eventually appear on the National Biological gateway (at http://www.searchnbn.net/index_homepage/index.jsp) where you can search for data by area and by species and view the distribution maps. The information we have collected is also used by planners and councils to designate and protect areas of high biodiversity, as well as being used to monitor the management of sites.

Records received from

R Abel (RA), B & Y Anderson (BA), N Anderson (NA), A Banwell (Aba), P Banham (PB), K Beckett (KB), A Benson (Abe), M Bishop (Mbi), N Blacker (NB), G Bond (GB), P Branson (PBr), M & J Brewster (MB), A Burkin (AB), R Callf (RC), B & A Carpenter (BC), J Chilvers (JC), P Childs (PC), J Clifton (JCl), B Cobbold (BCo), M Collier (MC), J Cordeaux (JCo), T Court (TC), T Cousins (TCs), S Crafer (SC), J Crouch (JCr), A Daw (AD), C & A Dawson (CD), J Dunmore (JD), A Dyball (Ady), J Eaton (JE), P Eele (PE), B Farndon (BF), G Follows (GF), G Forow (GFr), A Freeman (AF), K & S Futter (KF), J Geeson (JG), M Ghullam (MGh), M & P Gluth (MG), S Goddard (SG), J Goldsmith (JGo), E Goodyear (EG), S Gough (SGu), M R & B M Gough (MGo), M Greenland (MGr), M Gwilliam (MGw), R Hadman (RH), A & S Harrap (AH), J Harrison (JHa), M Harvey (MH), P Heath (PH), S Hearle (SH), E van Hoek (EH), S Hoets (Sho), A Horsefield (Aho), J & H Houghton (JH), M How (Mho), T Irwin (TI), C Jacobs (CJ), J Jarvis (JJ), F Jolliffe (FJ), G Kelly (GK), R Kempley (RK), Dr I Keymer (IK), P Kitchener (PK), K. Knights (KK), N Lawton (NL), D Leech (DL), P & K Limb (PL), Dr J Lines (JL), D Longe (Dlo), P Lorber (Plo), I&M Stemp (IS), C Miller (CM), G Miller (GM), Dr P Moore (PM), A Musgrave (AM), P Nicholson (PN), G & P Ninham (GN), D Nobbs (DN), R Parker (RP), E Phipps (EP), J Powley (JP), T Prater (TP), S Prowse (SP), B & B Pummell (BP), B Rackstraw (BR), D Richmond (DR), M & E Riches (MR), A Riley (AR), M Rooney (Mro), M Rubin (Mru), D Ruthven (Dru), K Saul (KS), T Schofield (TS), S Short (SS), C Stevenson (CS), R Stewart (RS), O Stretton (OS), T Strudwick (TSt). , Dr P Taylor (PT), P Walton (PW), I West (IW), J West (JW), G Woodhouse (GW), M Woodcock (MW), Dr S Wright (SW).

Records were also received from Norfolk Ornithologists Association (NOA), Rare Bird Alert (RBA), BirdGuide (BGd) and via internet postings on the Yahoo UK-Leps, Norfolk Wildlife and Norfolk Birding groups and Birdforum (www.birdforum.net) (BFN).

Bumblebees

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It is now seven years since the publication of the millennium distribution maps in the Transactions of Norfolk & Norwich Naturalists' Society (Richmond 2001). Since then, there have been records of three species which had not been reported since Plowright's earlier work in the 1960s (Plowright 1967):

- Ash Murray has reported the presence of *Bombus muscorum* on Scolt Head Island,
- Dr Nick Owens has reported a colony of *B. ruderatus* in the Fens,
- Both have reported sightings, or possible sightings, of the cuckoo bumblebee *B. rupestris.*

In addition, one new species has been added to the Norfolk list: *Bombus monticola*, of which two specimens were recorded by Ash Murray and one by Neil Lawton on Scolt Head NNR in 2007. Given that its population is usually confined to uplands with Bilberry, these records are most intriguing and highlight the possibility of unusual finds.

The period also saw the publication of two new books on bumblebees:

- Field Guide to the Bumblebees of Great Britain and Ireland by Edwards & Jenner (2005).
- Bumblebees (New Naturalist No. 98 by Benton (2006).

Both include photographs and distribution maps for all species, and discuss foraging behaviour and habitat requirements. Both also follow the modern practice of naming the cuckoo bumblebees as *Bombus* species rather than as *Psithyrus*, and this practice will be used in the following review of the Norfolk species (nomenclature as in Benton 2006).

B.lucorum	Remains common in Norfolk particularly in heathland localities
B.terrestris	Common in the wider countryside
B.jonellus	Reported from Kelling Heath by Owens, 2007. See photo between pp.80 and 81.
B.pratorum	A common garden species with a liking for cotoneaster and currant species
B.monticola	A vagrant species reported by Murray and Lawton from Scolt Head, 2007

B.hortorum	A common garden species with a liking for foxgloves. See photo between pp.80 and 81.
B.ruderatus	Very similar to *B.hortorum* in appearance and at one time considered a variation of that species. Now given specific status. Owens discovered this species, supported by photographic evidence, in the Fens while undertaking survey work for the Norfolk Bird Atlas in 2007. See photo between pp.80 and 81.
B.lapidarius	This red-tailed bumblebee remains common throughout Norfolk
B.ruderarius	The author continued to observe this species at the Thorpe St Andrew Business Park until 2006, but increased development and loss of foraging opportunities meant it was not seen in 2007, although *B.lapidarius* remained common. In addition Murray reported this species from Hunstanton in 2000 and Wolferton in 2007.
B.pascuorum	This common carder bee remains widespread throughout Norfolk.
B.humilis	This biodiversity action plan species has not been recorded in Norfolk since 1964.
B.muscorum	Murray reported a thriving colony on Scolt Head Island in 2003 and a small colony at another location along the north Norfolk coast in 2003 and 2004; it has been less abundant in later years.
B.sylvarum	This biodiversity action plan species has not been recorded in Norfolk since 1963.
B.distinguendus	Murray (2003) cites a previously unpublished record for this species from Scolt Head Island (Ellis, 1960), though it is now presumed to be extinct in the county. This is a nationally scarce species mainly restricted to northern Scotland, Orkney and the Inner and Outer Hebrides.
B.vestalis	Cuckoo of *B.terrestris* widespread across Norfolk.
B.bohemicus	Cuckoo of *B.lucorum* reported by Owens from Weybourne in 2005 and Murray from Scolt Head in 2006.
B.rupestris	Cuckoo of *B.lapidarius* reported by Murray from Scolt Head NNR in 2006 and from Dersingham Bog NNR in 2006, and in 2007 when several females were observed. Also suspected by Owens at Weybourne in 2007.

B.barbutellus	Cuckoo of *B.hortorum* reported by Owens from Hickling Broad, Sheringham Park and Weybourne, 2007. See photo between pp.80 and 81.
B.campestris	Cuckoo of *B.pascuorum* widely distributed across Norfolk though few records received.
B.sylvestris	Cuckoo of *B.pratorum* widely distributed across Norfolk though few records received.

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Wildlife Report 2007

Orthoptera

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For the second year in succession, Speckled Bush-cricket survived until the end of the first week in December, persisting at Reepham until 7th December 2007 in brambles sheltered by conifers. Roesel's Bush-cricket continued its expansion across the county with records from fifteen new 10km squares. The county's other newcomer, Long-winged Conehead, also consolidated its presence with records from twelve new 10km squares.

Oak Bush-cricket *Meconema thalassinum* (De Geer)
A nymph at Santon Warren (TL88) represents a new 10km square record.

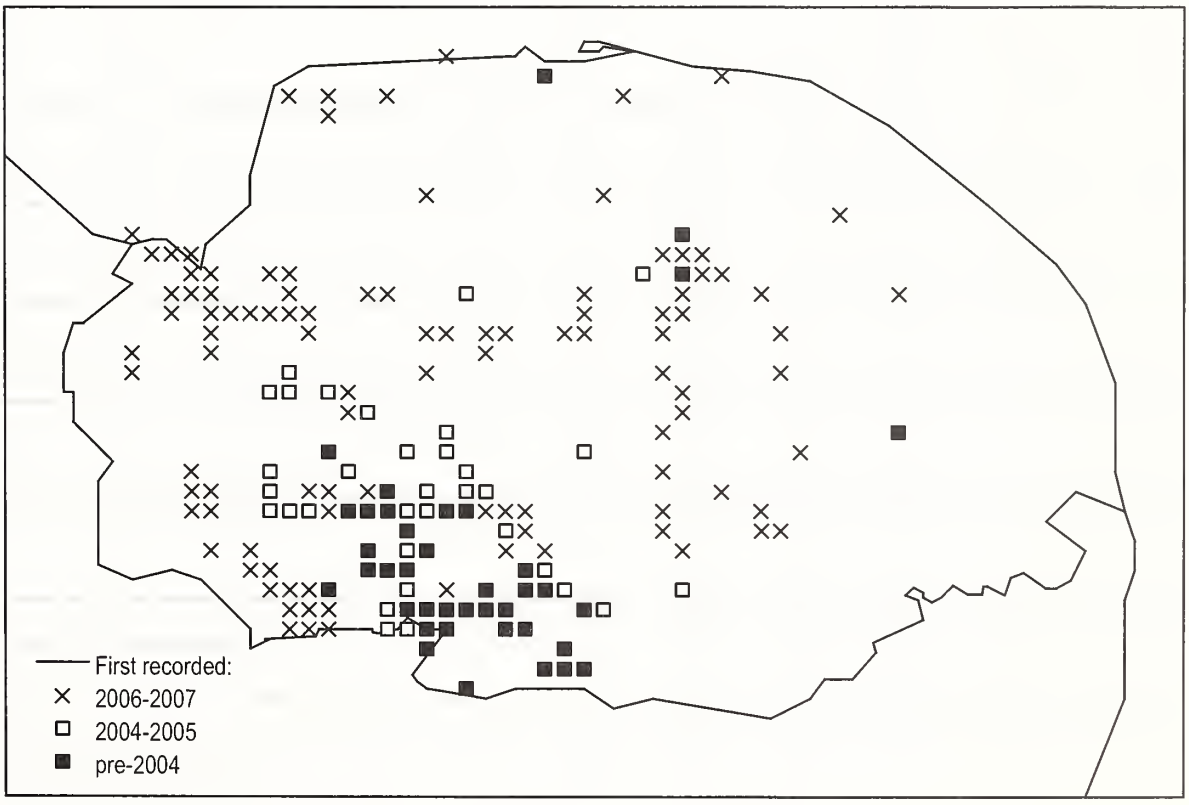
Dark Bush-cricket *Pholidoptera griseoaptera* (De Geer)
Wiggenhall Bridge (TF61) on the west bank of the Relief Channel south of King's Lynn provided another tantalising record from this part of the county. Good numbers were chirping in isolated brambles with no obvious habitat corridors to other Fenland sites, the nearest of which is

4.5km to the south.

Bog Bush-cricket *Metrioptera brachyptera* (L.)
With the landowner's permission, a more detailed study was made of the west Norfolk site first reported in last year's Transactions. The species was found to be well established in an area of 1-2 ha of open Heather *Calluna vulgaris* with some encroaching birch. Management recommendations have been made to the conservation charity which owns the site to which there is no public access. Naturalists wishing to see this charismatic species are recommended to visit Buxton Heath or Holt Lowes where there are well established populations.

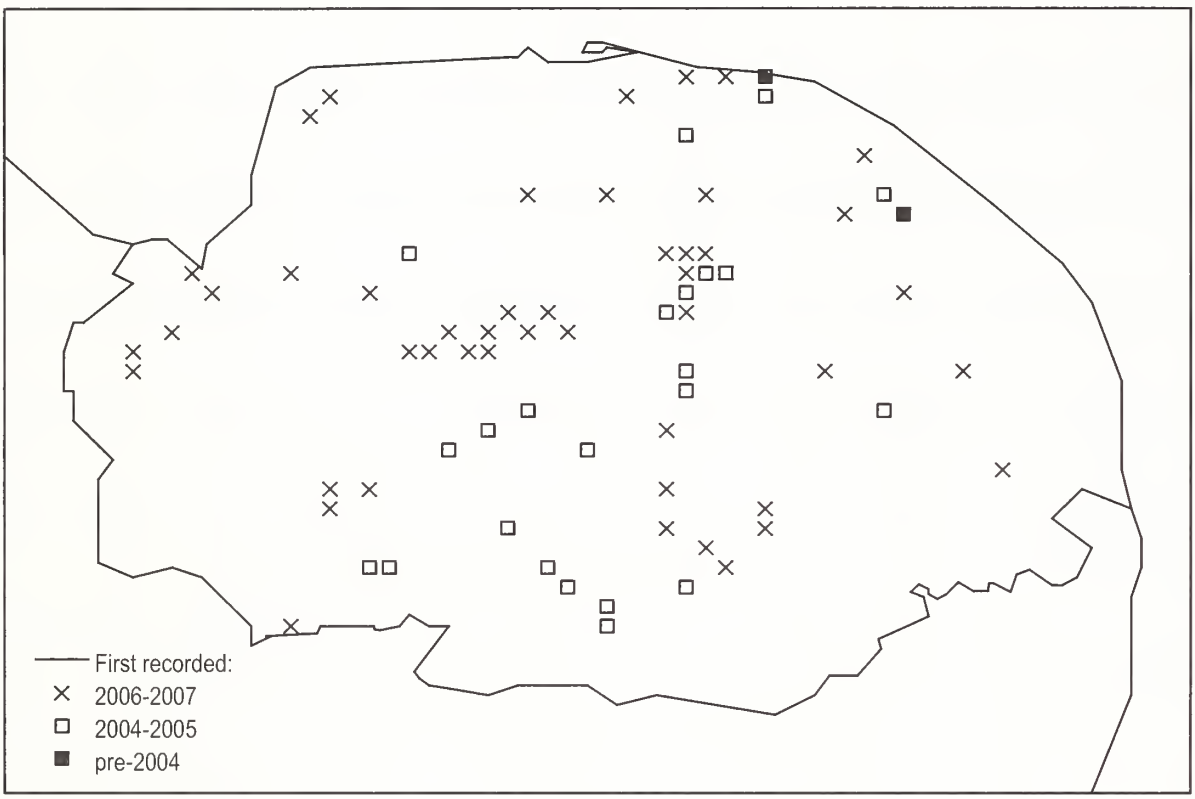
Roesel's Bush-cricket *Metrioptera roeselii* (Hagenbach)
Figure 1 shows the spread of this species in the county from its first known breeding colonies around Santon Warren (TL88). A 2007 recording trip to the extreme west of the county found it to be well established on sea banks around the southern edge of the Wash and at various sites in the Fens. Judging from the colony sizes (and remembering the species' 2-year egg cycle) it has probably been present in these areas for at least four years. The 2006 records from the south-west of the county between Downham Market and Hockwold were similarly of well established colonies. In contrast, the majority of the 2006-7 map records from central Norfolk and from the north Norfolk coast were of small colonies or of single macropterous males, implying much more recent colonisation in these areas.

Figure 1 Distribution of **Roesel's Bush-cricket** in Norfolk



Long-winged Conehead *Conocephalus discolor* (Thunberg)
This species is now widespread across the county (Fig.2). Being fully winged with a single year egg cycle it has presented a different pattern of expansion to Roesel's Bush-cricket. Roesel's seems to have expanded incrementally, moving out from the Brecks where it has built up to high population densities. Long-winged Conehead seems to have a more fragmented dispersal appearing at lower densities over a much wider area.

Figure 2 Distribution of **Long-winged Conehead** in Norfolk



Short-winged Conehead *Conocephalus dorsalis* (Latreille)
This species continues to turn up at new sites, where previous intensive research with a bat detector had shown it to be absent, the most recent examples being Flordon Common (TM19) and Booton Carr (TG12). This expansion of range has also been noted nationally.

Stripe-winged Grasshopper *Stenobothrus lineatus* (Panzer)
A new 10km square record from rough grassland at Hockering playing fields (TG01) provides further evidence for the dispersal of this species away from its traditional Breckland strongholds.

Mottled Grasshopper *Myrmeleotettix maculates* (Thunberg)
Syderstone Common (TF83) is a new 10km square for this species where it seems to have benefited from scrub clearance work by Norfolk Wildlife Trust.

Early and late dates
The season began with Slender Groundhopper at Booton on 11th March,

the author's earliest date for any orthopteran, though milder winters could lead to even earlier dates for this species which overwinters as an adult or late instar nymph. Wet weather in May, June and July meant that grasshoppers and bush-crickets were late reaching maturity. At the end of the season, Dark Bush-cricket survived until 4th November at Reepham (the author's local patch) and Field Grasshopper survived until 21st November on a south facing bank at Thorpe St Andrew (another site monitored on a daily basis). Finally, as mentioned in the introduction, Speckled Bush-cricket survived at Reepham until 7th December, beating the previous year's record by a single day. High winds and rain, rather than frosts, finally brought about its demise.

Wildlife Report 2007

Dragonflies

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2007 was a mixed year for dragonflies in Norfolk. At some sites recorders complained they had observed very few insects on the wing, but at others normal numbers were seen whenever the weather was fine. The season had in fact started well in most places with the first Large Red Damselflies *Pyrrhosoma nymphula* emerging over two weeks earlier than normal. A few other species followed suit, but then cool, wet weather brought things to a halt once more. As the weather improved again, late spring species such as Norfolk Hawker *Aeshna isosceles* were flying just a few days later than normal and by mid-summer the season was back on track. The rest of 2007 was fairly unremarkable, so just a few key points are mentioned here.

Lesser Emperors *Anax parthenope* were reported from several county sites, continuing the trend of recent years, and the first evidence of breeding was obtained when a pair were seen ovipositing close to the county border at Lound on 3rd August. Two days later another pair were ovipositing at Felbrigg Lake, where a handful of Red-veined Darters *Sympetrum fonscolombii* were also observed. In fact it was a good year in the county for Red-veined Darter with others seen at Langmere in the Brecks, on the coast at Scolt Head and even one on the outskirts of Norwich near the River Yare. By way of contrast only two Yellow-winged Darters *Sympetrum flaveolum* were reported, a male and a female from Tottington in West Norfolk on 8th July.

A few of our more resident species also went travelling in 2007. Away from their Breckland strongholds, Scarce Emerald Damselflies *Lestes dryas* turned up at two separate locations in Norwich, at a site near Fakenham and at three sites near Holt in North Norfolk. Wandering Scarce Chasers *Libellula fulva* and Keeled Skimmers *Orthetrum coerulescens* were recorded at a handful of places away from their usual haunts and Black Darter *Sympetrum danae* seems to have established a third breeding site in the county, this time close to King's Lynn where a number of pairs were seen ovipositing in August.

Small Red Damselfly *Ceriagrion tenellum* continues to maintain a small, but significant, toehold in the county, as does Downy Emerald *Cordulia aenea*. Small Red-eyed Damselfly *Erythromma viridulum* and Banded Demoiselle *Calopteryx splendens* on the other hand continued to expand their ranges into new areas during 2007. At some sites Banded Demoiselles were noted on still or very slow-moving water, including lakes and even the occasional garden pond.

One other thing to increase during 2007 was the number of active recorders in the county, especially in West Norfolk. This was reflected in the number of 'unrecorded hectads since the year 2000' reducing from 11 to 6 in that vice-county during the 2007 season. In other hectads, the overall number of species recorded in recent years almost doubled.

However, dragonfly recorders are still fairly few in number, so if you are reading this and do not currently send your Norfolk records in to me, please can I encourage you to do so from 2008 onwards. We have just five seasons to record for the new national atlas project (details on www.dragonflysoc.org.uk) and fewer if a revised Norfolk atlas is to be produced before that. I am, as usual, incredibly grateful to all those who give their time so freely to document the dragonflies of Norfolk.

NORFOLK & NORWICH NATURALISTS' SOCIETY

The County's senior natural history society has as a principal aim the investigation and recording of Norfolk's wildlife and to this end it publishes:

- An annual volume of *Transactions*, consisting of papers and notes on wildlife in the county.
- The *Norfolk Bird and Mammal Report* which contains systematic lists of observations on the county's birds and mammals, as well as relevant articles.
- *The Norfolk Natterjack*, a quarterly illustrated newsletter.

All of these publications are free to members, as are *Occasional Publications* on specific topics.

The Society also arranges lectures and field meetings which are planned to appeal to anyone interested in natural history. More specialist groups cover many aspects of the county's flora and fauna.

The subscription rate is £12 per year, which includes all members of a family living at the same address. Group affiliation is available at £15 per year.

Membership enquiries should be made to: Dr Dave Leech, BTO, The Nunnery, Thetford, Norfolk IP24 2PU Email dave.leech@bto.org

All other enquiries should be directed to the Secretary, Dr Rosemary Carpenter: 33 Low Street, Wicklewood, Wymondham, Norfolk NR18 9QG

NOTES FOR AUTHORS

Authors are requested to obtain a copy of Instructions for Authors from the Editor before submitting papers, which should be with the editor by February 1st of the year of publication. Wherever possible manuscripts should be accompanied with the text on computer disk.

The Editor will be pleased to discuss proposals for papers from anyone and will help novice authors with the production of material.

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Cover: Cedar tree, planted by Robert Marsham at Stratton Strawless in 1747. Now 31m tall and with a girth of 7.2m one metre from the ground. Photo: *Tony Leech*

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Printed by Barnwell's of Aylsham