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# TRANSACTIONS of the NORFOLK & NORWICH NATURALISTS' SOCIETY

Volume 50 Part 1 2017



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*Norfolk & Norwich Naturalists' Society*

**TRANSACTIONS Volume 50 2017**



# TRANSACTIONS OF THE NORFOLK & NORWICH NATURALISTS' SOCIETY

Volume 50 Part 1 2017 (published Feb 2018)

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The Norfolk & Norwich Naturalists' 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 £20 per year, which includes all members of a family living at the same address.

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# The potential impacts of climate change on the biodiversity of Norfolk species

*Jeff Price*

## Introduction

Climate change is posing, and will continue to pose, increasing risks to biodiversity (O'Neill *et al.* 2017). Changes in phenology and range were first noted more than a decade ago (Root *et al.* 2003) with many publications since. Land use change is increasingly a problem as species are being further challenged by barriers to their potential dispersal with their preferred climate across fragmented landscapes (Settele *et al.* 2014). Many studies have examined the potential future impacts of climate change on biodiversity using a variety of modelling techniques. This includes results from Wallace Initiative Phase 1 models showing the potential for range losses of greater than 50% across large fractions of species globally at warming levels of approximately 3.6 °C above pre-industrial levels (Warren *et al.* 2013).

Article 2 of the United Nations Framework Convention on Climate Change (UNFCCC) calls for "...stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system...within a time frame sufficient to allow ecosystems to adapt naturally to climate change..." (UNFCCC 1992). More recently, the Paris Climate Agreement set a goal of limiting the global average temperature increase to "well below 2°C above pre-industrial levels", and 'pursuing efforts' to limit it to 1.5°C, a challenging proposition. However, to date, countries' individual pledges in terms of emission reductions fall far short of the levels necessary to reach 2°C, much less 1.5°C. If countries actually meet their pledges it is estimated that the global temperature is

on a trajectory for ~3.2°C increase (UNEP 2016). While this is an improvement over the previous 'business as usual' estimate of 4°- 4.5°C, it is still likely to have a large impact on biodiversity.

This paper reviews the projected climate change impacts (relative to 1961-1990 baseline) on some of the biodiversity in Norfolk (including birds, mammals, reptiles, amphibians, butterflies, common macro moths, dragonflies, bumblebees, grasshoppers, shieldbugs, ferns, orchids, and some trees and shrubs). The paper concentrates on the species currently found in Norfolk (largely based on lists on the Norfolk and Norwich Naturalist's Society website) and not on potential colonists from Europe. The exception is for some of the birds and dragonflies. For brevity it concentrates on the climate changes associated with just two potential levels of warming: 2°C (the upper end of the Paris Climate Agreement) and 3.2°C (the upper limit of the NDC pledges to date).

## Methods

The projected changes in biodiversity come from the Wallace Initiative Phase II and III which modelled the potential impacts of climate change on nearly 125,000 species of terrestrial plants, birds, mammals, reptiles, amphibians, and invertebrates. The methods used in this study largely follow those in Warren *et al.* 2013 and are summarized here, along with the modifications made since 2013. For a more complete review of the methods, limitations and caveats please see the Supplemental Information in Warren *et al.* (2013).

Biodiversity occurrence data were obtained from the Global Biodiversity Information



Facility (GBIF; Yesson *et al.* 2007). GBIF facilitates acquisition of data from many global datasets, including the National Biodiversity Network. Thus, some of the underlying occurrence data used in this paper may have originally come from the readers of this journal. These data were then checked and cleaned for locational consistency and outliers (Warren *et al.* 2013).

Climate data comes from the Tyndall Climate Change Centre's Community Integrated Assessment System (CIAS) and its component module ClimGEN. In this approach, a simple climate model is used to project global temperature rise probabilistically (in order to encompass the key uncertainties in state-of-the-art global climate change projection) over the 21<sup>st</sup> century. Outputs from 21 general circulation models (GCM) from a model inter-comparison project (CMIP5, used in IPCC AR5; IPCC 2013) provided the pattern of how climate variables are projected to change regionally for particular levels of global temperature rise. ClimGEN scales these patterns to the amount of warming that is provided by the time series in order to create 21 patterns of projected changes corresponding to differing levels of temperature rise (with accompanying changes in precipitation). The global temperature time series used in this study were provided by the UK Met Office Hadley Centre and used in the AVOID2 (Avoiding Dangerous Climate Change) project (Bernie & Lowe 2014). The advantage of using these scenarios is that they are internally consistent as to when a given global temperature is reached across climate models, making them more useful for comparing different policy options.

To model the potential impacts on individual species GBIF occurrence, data was combined with the climate data to develop individual species distribution models using the MaxENT (Phillips *et al.* 2006) program at a spatial scale of 10 arc

minutes (approximately 20 km x 20 km). The eight bioclimatic variables used in the models were the average maximum temperature of warmest month of the year, average minimum temperature of coldest month of the year, annual mean temperature, temperature seasonality, total annual rainfall, rainfall seasonality, rainfall of the wettest quarter, and rainfall of the driest quarter. These variables were selected after extensive testing showed them to be the best predictive variables for the broadest range of species out of the potential 18 bioclimatic variables. A reduced set of variables was used in order to minimize potential issues with autocorrelation and to prevent 'overfitting' of the MaxEnt model species distributions. Ten cross-validated runs were then performed to assess the MaxEnt model accuracy. The Area under the Receiver Operating Characteristic (AUC) was used to select species models for projection over all climate scenarios. Each future climatic range for each species was then projected into the future for each of the 21 climate models at global warming levels of 1.5°C to 6°C.

Lists of species in Norfolk were sourced from the website of the Norfolk and Norwich Naturalists' Society <http://norfolknaturalists.org.uk/wp/>, specifically the species guides. The list of birds came from <http://www.norfolkbirds.com/>; and that of common macro moths from <https://www.norfolkmoths.co.uk/macrolist>. There are many other groups, such as flowering plants, other bees, beetles, micro moths, etc. that could be looked at in future papers. Furthermore, many taxa, especially moths, vagrants and potential immigrants have yet to be examined and some of these may increase with warming. This will be explored in a future paper. The 50<sup>th</sup> percentile (averaged across all climate models for a given temperature) map of each species on the list was then examined to see the degree of potential change (including increasing likelihood of



occurrence) at 2° and 3.2°C. Species not listed likely show no change as almost all Norfolk species had adequate models to assess potential change. It is important to understand that a model result is not a crystal ball. Potential epigenetic or behavioural changes, or persisting microclimatic habitats could allow species to persist for periods of time beyond reaching different temperatures. Similarly, for species that are common in Europe but rare in Norfolk, the English Channel forms a very real barrier to colonization owing to dispersal, with many periods of colonization and extirpation likely before a species is firmly established.

## Results

### Birds

#### Increasing likelihood of occurrence/range expansions:

Little Bittern *Ixobrychus minutus*  
 Black-crowned Night Heron *Nycticorax nycticorax*  
 Cattle Egret *Bubulcus ibis*  
 Squacco Heron *Ardeola ralloides*  
 Purple Heron *Ardea pupurea*  
 Little Egret *Egretta garzetta*  
 Great Egret *Ardea alba*  
 European Spoonbill *Platalea leucorodia*  
 European Honey Buzzard *Pernis apivorus*  
 Kite *Milvus migrans*  
 Montagu's Harrier *Circus pygargus*  
 Hobby *Falco subbuteo*  
 Little Crake *Porzana parva*  
 Black-winged Stilt *Himantopus himantopus*  
 Eurasian Stone-Curlew *Burhinus oedicephalus*  
 Gull-billed Tern *Gelochelidon nilotica*  
 Eurasian Eagle-Owl *Bubo bubo*  
 Eurasian Scops-Owl *Otus scops*  
 Alpine Swift *Apus melba*  
 European Bee-eater *Merops apiaster*  
 European Roller *Coracias garrulus*  
 Eurasian Hoopoe *Upupa epops*  
 Eurasian Wryneck *Jynx torquilla*  
 Red-rumped Swallow *Hirundo daurica*  
 Eurasian Golden-Oriole *Oriolus oriolus*  
 Red-backed Shrike *Lanius collurio*  
 Woodchat Shrike *Lanius senator*

#### Climate largely or completely unsuitable by 2°C:

Great Northern Diver *Gavia immer*  
 Slavonian Grebe *Podiceps auritus*  
 Bewick's swan *Cygnus columbianus*  
 Whooper Swan *Cygnus cygnus*

Taiga Bean Goose *Anser fabalis*  
 Pink-footed Goose *Anser brachyrhynchus*  
 Red-breasted Goose *Branta ruficollis*  
 Velvet Scoter *Melanitta fusca*  
 Rough-legged Buzzard *Buteo lagopus*  
 Grey Partridge *Perdix perdix*  
 Long-tailed Skua *Stercorarius longicaudus*  
 Rock Pipit *Anthus petrosus*  
 Waxwing *Bombycilla garrulus*  
 Lapland Bunting *Calcarius lapponicus*  
 Snow Bunting *Plectrophenax nivalis*

#### Climate largely or completely unsuitable by 3.2°C:

Mandarin Duck *Aix galericulata*  
 Smew *Mergellus albellus*  
 Corncrake *Crex crex*  
 Dotterel *Charadrius morinellus*  
 European Golden-Plover *Pluvialis apricaria*  
 Arctic Tern *Sterna paradisaea*  
 Razorbill *Alca torda*  
 Dunnock *Prunella modularis*  
 Reed Bunting *Emberiza schoeniclus*

### Mammals

#### Climate largely or completely unsuitable by 2°C:

Common Shrew *Sorex araneus*  
 Eurasian Water Vole *Arvicola amphibius*  
 Roe Deer *Capreolus capreolus*  
 Soprano Pipistrelle *Pipistrellus pygmaeus*  
 Nathusius' Pipistrelle *Pipistrellus nathusii*  
 Brandt's Bat *Myotis brandtii*  
 European Badger *Meles meles*  
 Roe Deer *Capreolus capreolus*

#### Climate largely or completely unsuitable by 3.2°C:

Eurasian Red Squirrel *Sciurus vulgaris*  
 Grey Squirrel *Sciurus carolinensis*  
 Whiskered Bat *Myotis mystacinus*  
 Reeves' Muntjac *Muntiacus reevesi*

### Amphibians

#### Climate becoming more suitable/increasing likelihood of occurrence:

Natterjack Toad *Epidalea calamita*.

#### Climate largely or completely unsuitable by 2°C:

Common Frog *Rana temporaria*  
 Great Crested Newt *Triturus cristatus*  
 Smooth Newt *Lissotriton vulgaris*

### Reptiles

#### Climate largely or completely unsuitable by 2°C:

Adder *Vipera berus*  
 Common Lizard *Zootoca vivipara*



## Butterflies

### Climate becoming more suitable/increasing likelihood of occurrence:

Silver-studded Blue *Plebeius argus*

### Climate largely or completely unsuitable by 2°C:

Grizzled Skipper *Pyrgus malvae*  
Large Skipper *Ochlodes sylvanus*  
Essex Skipper *Thymelicus lineola*  
Swallowtail *Papilio machaon*  
Orangetip *Anthocharis cardamines*  
Purple Hairstreak *Favonius quercus*  
White-letter Hairstreak *Satyrium w-album*  
Red Admiral *Vanessa atalanta*  
Peacock *Inachis io*  
Dark Green Fritillary *Argynnis aglaja*  
Ringlet *Aphantopus hyperantus*

### Climate largely or completely unsuitable by 3.2°C:

Small Skipper *Thymelicus sylvestris*  
Green Hairstreak *Callophrys rubi*  
Small Tortoiseshell *Aglais urticae*  
Comma *Polygonia c-album*

## Common macro moths

### Climate largely or completely unsuitable by 2°C:

Orange Swift *Hepialus sylvina*  
Ghost Moth *Hepialus humuli*  
Six-spot Burnet *Zygaena filipendulae*  
Scalloped Hook-tip *Falcaria lacertinaria*  
Pebble Hook-tip *Drepana falcatoria*  
Chinese Character *Cilix glaucata*  
Figure of Eighty *Tethea ocellaris*  
Yellow Horned *Achlya flavicornis*  
December Moth *Poecilocampa populi*  
Pale Eggar *Trichiura crataegi*  
Oak Eggar *Lasiocampa quercus*  
Fox Moth *Macrothylacia rubi*  
Drinker *Euthrix potatoria*  
Small Emperor Moth *Saturnia pavonia*  
Lime Hawk-moth *Mimas tiliae*  
Eyed Hawk-moth *Smerinthus ocellata*  
Poplar Hawk-moth *Laothoe populi*  
Privet Hawk-moth *Sphinx ligustri*  
Elephant Hawk-moth *Deilephila elpenor*  
Small Dusty Wave *Idaea seriata*  
Single-dotted Wave *Idaea dimidiata*  
Small Fan-footed Wave *Idaea biselata*  
Shaded Broad-bar *Scotopteryx chenopodiata*  
Garden Carpet *Xanthorhoe fluctuata*  
Red Twin-spot Carpet *Xanthorhoe spadicearia*  
Dark-barred Twin-spot Carpet *Xanthorhoe ferrugata*  
Flame Carpet *Xanthorhoe designata*  
Silver-ground Carpet *Xanthorhoe montanata*  
Yellow Shell *Camptogramma bilineata*  
Streamer *Anticlea derivata*  
Beautiful Carpet *Mesoleuca albicillata*  
Dark Spinach *Pelurga comitata*

Mallow *Larentia clavaria*  
July Highflyer *Hydriomena furcata*  
May Highflyer *Hydriomena impluviata*  
Pine Carpet *Thera firmata*  
Spruce Carpet *Thera britannica*  
Grey Pine Carpet *Thera obeliscata*  
Blue-bordered Carpet *Plemyria rubiginata*  
Barred Yellow *Cidaria fulvata*  
Broken-barred Carpet *Electrophaes corylata*  
Purple Bar *Cosmorhoe ocellata*  
Phoenix *Eulithis prunata*  
Chevron *Eulithis testata*  
Spinach *Eulithis mellinata*  
Barred Straw *Eulithis pyraliata*  
Red-green Carpet *Chloroclysta siterata*  
Common Marbled Carpet *Dysstroma truncata*  
Dark Marbled Carpet *Dysstroma citrata*  
Green Carpet *Colostygia pectinataria*  
Mottled Grey *Colostygia multistrigaria*  
Water Carpet *Lampropteryx suffumata*  
Northern Winter Moth *Operophtera fagata*  
Winter Moth *Operophtera brumata*  
November Moth *Epirrita dilutata*  
Pale November Moth *Epirrita christyi*  
Autumnal Moth *Epirrita autumnata*  
Small White Wave *Asthenia albulata*  
Fern *Horisme tersata*  
Pretty Chalk Carpet *Melanthia procellata*  
Twin-spot Carpet *Perizoma didymata*  
Rivulet *Perizoma affinitata*  
Small Rivulet *Perizoma alchemillata*  
Sandy Carpet *Perizoma flavofasciata*  
Double-striped Pug *Gymnoscelis rufifasciata*  
V-Pug *Chloroclystis v-ata*  
Sloe Pug *Pasiphila chloerata*  
Green Pug *Pasiphila rectangulata*  
Toadflax Pug *Eupithecia linariata*  
Narrow-winged Pug *Eupithecia nanata*  
Angle-barred Pug *Eupithecia innotata*  
Ochreous Pug *Eupithecia indigata*  
Common Pug *Eupithecia vulgata*  
Mottled Pug *Eupithecia exiguata*  
Tawny Speckled Pug *Eupithecia icterata*  
Bordered Pug *Eupithecia succenturiata*  
Grey Pug *Eupithecia subfuscata*  
Lesser Treble-bar *Aplocera efformata*  
Streak *Chesias legatella*  
Early Tooth-striped *Trichopteryx carpinata*  
Magpie *Abraxas grossulariata*  
Clouded Border *Lomaspilis marginata*  
Tawny-barred Angle *Macaria liturata*  
Latticed Heath *Chiasmia clathrata*  
Brown Silver-line *Petrophora chlorosata*  
Bordered Beauty *Epione repandaria*  
Speckled Yellow *Pseudopanthera macularia*  
Canary-shouldered Thorn *Ennomos alniaria*  
Dusky Thorn *Ennomos fuscantaria*  
September Thorn *Ennomos erosaria*  
Early Thorn *Selenia dentaria*  
Purple Thorn *Selenia tetralunaria*  
Scalloped Hazel *Odontopera bidentata*



Scalloped Oak *Crocallis elinguaris*  
 Swallow-tailed Moth *Ourapteryx sambucaria*  
 Feathered Thorn *Colotois pennaria*  
 March Moth *Alsophila aescularia*  
 Pale Brindled Beauty *Phigalia pilosaria*  
 Brindled Beauty *Lycia hirtaria*  
 Oak Beauty *Biston strataria*  
 Spring Usher *Agriopsis leucophaearia*  
 Scarce Umber Moth *Agriopsis aurantiaria*  
 Dotted Border *Agriopsis marginaria*  
 Mottled Umber *Erannis defoliaria*  
 Satin Beauty *Deileptenia ribeata*  
 Mottled Beauty *Alcis repandata*  
 Grey Birch *Aethalura punctulata*  
 Common Heath *Ematurga atomaria*  
 Bordered White *Bupalus piniaria*  
 Common White Wave *Cabera pusaria*  
 Common Wave *Cabera exanthemata*  
 White-pinion Spotted *Lomographa bimaculata*  
 Clouded Silver *Lomographa temerata*  
 Early Moth *Theria primaria*  
 Barred Red *Hylaea fasciaria*  
 Large Emerald *Geometra papilionaria*  
 Little Emerald *Jodis lactearia*  
 Common Emerald *Hemithea aestivaria*  
 Puss Moth *Cerura vinula*  
 Sallow Kitten *Furcula furcula*  
 Lunar Marbled Brown *Drymonia ruficornis*  
 Iron Prominent *Notodonta dromedarius*  
 Pebble Prominent *Notodonta ziczac*  
 Swallow Prominent *Pheosia tremula*  
 Lesser Swallow Prominent *Pheosia gnoma*  
 Pale Prominent *Pterostoma palpina*  
 Coxcomb Prominent *Ptilodon capucina*  
 Buff-tip *Phalera bucephala*  
 The Herald *Scoliopteryx libatrix*  
 Straw Dot *Rivula sericealis*  
 Snout *Hypena proboscidalis*  
 White Ermine *Spilosoma lubricipeda*  
 Muslin Moth *Diaphora mendica*  
 Ruby Tiger *Phragmatobia fuliginosa*  
 Scarlet Tiger *Callimorpha dominula*  
 Dingy Footman *Eilema griseola*  
 Common Footman *Eilema lurideola*  
 Fan Foot *Zanclognatha tarsipennalis*  
 Small Fan-foot *Herminia grisealis*  
 Spectacle *Abrostola tripartita*  
 Burnished Brass *Diachrysia chrysitis*  
 Golden Plusia *Polychrysia moneta*  
 Beautiful Golden Y *Autographa pulchrina*  
 Gold Spot *Plusia festucae*  
 Marbled White Spot *Protodeltote pygarga*  
 Figure of Eight *Diloba caeruleocephala*  
 Grey Dagger *Acronicta psi*  
 Knotgrass *Acronicta rumicis*  
 Poplar Grey *Acronicta megacephala*  
 The Shark *Cucullia umbratica*  
 Copper Underwing *Amphipyra pyramidea*  
 Mouse Moth *Amphipyra tragopoginis*  
 Green-brindled Crescent *Allophyes oxyacanthae*  
 Early Grey *Xylocampa areola*

Pale Mottled Willow *Caradrina clavipalpis*  
 Brown Rustic *Rusina ferruginea*  
 Angle Shades *Phlogophora meticulosa*  
 Small Angle Shades *Euplexia lucipara*  
 Frosted Orange *Gortyna flavago*  
 Rosy Rustic *Hydraecia micacea*  
 Ear Moth *Amphipoea oculea*  
 Flounced Rustic *Luperina testacea*  
 Large Wainscot *Rhizedra lutosa*  
 Bulrush Wainscot *Nonagria typhae*  
 Small Wainscot *Chortodes pygmina*  
 Small Dotted Buff *Photodes minima*  
 Dusky Brocade *Apamea remissa*  
 Clouded-bordered Brindle *Apamea crenata*  
 Small Clouded Brindle *Apamea unanimitis*  
 Dark Arches *Apamea monoglypha*  
 Light Arches *Apamea lithoxylaea*  
 Double Lobed *Apamea ophiogramma*  
 Common Rustic *Mesapamea secalis*  
 Rosy Minor *Mesoligia literosa*  
 Beaded Chestnut *Agrochola lychnidis*  
 Brown-spot Pinion *Agrochola litura*  
 Flounced Chestnut *Agrochola helvola*  
 Red-lined Quaker *Agrochola lota*  
 Yellow-line Quaker *Agrochola macilentia*  
 The Brick *Agrochola circellaris*  
 Lunar Underwing *Omphaloscelis lunosa*  
 Chestnut *Conistra vaccinii*  
 The Satellite *Eupsilia transversa*  
 Centre-barred Sallow *Atethmia centrago*  
 Grey Chi *Antitype chi*  
 Dark Brocade *Blepharita adusta*  
 Pine Beauty *Panolis flammea*  
 Clouded Drab *Orthosia incerta*  
 Small Quaker *Orthosia cruda*  
 Powdered Quaker *Orthosia gracilis*  
 Hebrew Character *Orthosia gothica*  
 Twin-spotted Quaker *Orthosia munda*  
 Hedge Rustic *Tholera cespitis*  
 Feathered Gothic *Tholera decimalis*  
 Antler Moth *Cerapteryx graminis*  
 Nutmeg *Discestra trifolii*  
 Grey Arches *Polia nebulosa*  
 Bright-line brown-eye *Lacanobia oleracea*  
 The Shears *Hada plebeja*  
 Broad-barred White *Hecatera bicolorata*  
 Varied Coronet *Hadena compta*  
 Tawny Shears *Hadena perplexa*  
 Brown-line Bright-eye *Mythimna conigera*  
 Common Wainscot *Mythimna pallens*  
 Smoky Wainscot *Mythimna impura*  
 White-line Dart *Euxoa tritici*  
 Garden Dart *Euxoa nigricans*  
 Heart and Dart *Agrotis exclamationis*  
 The Flame *Axylia putris*  
 Flame Shoulder *Ochropleura plecta*  
 Purple Clay *Diarsia brunnea*  
 Ingrailed Clay *Diarsia mendica*  
 Small Square-spot *Diarsia rubi*  
 Lesser Broad-bordered Yellow Underwing  
*Noctua janthe*



Red Chestnut *Cerastis rubricosa*  
Double Dart *Graphiphora angur*  
Dotted Clay *Xestia baja*  
Square-spot Rustic *Xestia xanthographa*  
Six-striped Rustic *Xestia sexstrigata*  
Double square-spot *Xestia triangulum*  
Short-cloaked moth *Nola cucullatella*

**Climate largely or completely unsuitable by 3.2°C:**

Common Swift *Hepialus lupulina*  
Lunar Hornet Moth *Sesia bembeciformis*  
Peach Blossom *Thyatira batis*  
Buff Arches *Habrosyne pyritoides*  
Lappet *Gastropacha quercifolia*  
Blood-vein *Timandra comae*  
Common Carpet *Epirrhoe alternata*  
Small Phoenix *Ecliptopera silaceata*  
Brindled Pug *Eupithecia abbreviata*  
Larch Pug *Eupithecia lariciata*  
Lime-speck Pug *Eupithecia centaureata*  
Treble-bar *Aplocera plagiata*  
Brimstone Moth *Opisthograptis luteolata*  
Peppered Moth *Biston betularia*  
Waved Umber *Menophra abruptaria*  
Pale Oak Beauty *Hypomecis punctinalis*  
Engrailed *Ectropis crepuscularia*  
Lobster Moth *Stauropus fagi*  
Yellow-tail *Euproctis similis*  
Pale Tussock *Calliteara pudibunda*  
The Vapourer *Orgyia antiqua*  
Cinnabar *Tyria jacobaeae*  
Red Underwing *Catocala nupta*  
Burnet Companion *Euclidia glyphica*  
Dark Spectacle *Abrostola triplasia*  
Plain Golden Y *Autographa jota*  
Nut-tree Tussock *Colocasia coryli*  
Svensson's Copper Underwing *Amphipyra berbera*  
The Sprawler *Asteroscopus sphinx*  
Marbled Beauty *Cryphia domestica*  
Treble Lines *Charanyca trigrammica*  
Dusky Sallow *Eremobia ochroleuca*  
Clouded Brindle *Apamea epomidion*  
Slender Brindle *Apamea scolopacina*  
Cloaked Minor *Mesoligia furuncula*  
Marbled Minor *Oligia strigilis*  
Tawny Marbled Minor *Oligia latruncula*  
Middle-barred Minor *Oligia fasciuncula*  
Pink-barred Sallow *Xanthia togata*  
The Sallow *Xanthia icteritia*  
Blair's Shoulder-knot *Lithophane leautieri*  
The Dun-bar *Cosmia trapezina*  
Minor Shoulder-knot *Brachylomia viminalis*  
Common Quaker *Orthosia cerasi*  
Beautiful Yellow Underwing *Anarta myrtilli*  
Dot Moth *Melanchra persicariae*  
Broom Moth *Melanchra pisi*  
The Lychnis *Hadena bicruris*  
The Clay *Mythimna ferrago*  
Heart and Club *Agrotis clavis*  
True Lover's Knot *Lycophotia porphyrea*

Autumnal Rustic *Eugnorisma glareosa*  
Green Silver-lines *Pseudoips prasinana*

**Dragonflies**

**Climate becoming more suitable/increasing likelihood of occurrence:**

Southern Emerald Damselfly *Lestes barbarus*  
Migrant Hawker *Aeshna affinis*  
Red-veined Darter *Sympetrum fonscolombii*

**Climate largely or completely unsuitable by 2°C:**

Variable Damselfly *Coenagrion pulchellum*  
Red-eyed Damselfly *Erythronina najas*  
Brown Hawker *Aeshna grandis*  
Downy Emerald *Cordulia aenea*  
Broad-bodied Chaser *Libellula depressa*  
Yellow-winged Darter *Sympetrum flaveolum*  
Black Darter *Sympetrum danae*

**Climate largely or completely unsuitable by 3.2°C:**

Emerald Damselfly *Lestes sponsa*  
Common Hawker *Aeshna juncea*  
Four-spotted Chaser *Libellula quadrimaculata*  
Ruddy Darter *Sympetrum sanguineum*

**Bumblebees**

**Climate largely or completely unsuitable by 2°C:**

Garden Bumblebee *Bombus hortorum*  
Early Bumblebee *Bombus pratorum*  
Heath Bumblebee *Bombus jonellus*  
Red-shanked Carder Bumblebee *Bombus ruderarius*  
Moss Carder Bumblebee *Bombus muscorum*  
Tree Bumblebee *Bombus hypnorum*  
Vestal Cuckoo Bumblebee *Bombus vestalis*  
Barbut's Cuckoo Bumblebee *Bombus barbutellus*  
Gypsy Cuckoo Bumblebee *Bombus bohemicus*  
Four-coloured Cuckoo Bumblebee *Bombus sylvestris*  
Hill Cuckoo Bumblebee *Bombus rupestris*  
Field Cuckoo Bumblebee *Bombus campestris*

**Climate largely or completely unsuitable by 3.2°C:**

White-tailed Bumblebee *Bombus lucorum*

**Grasshoppers**

**Climate largely or completely unsuitable by 2°C:**

Mottled Grasshopper *Myrmeleotettix maculata*  
Field Grasshopper *Chorthippus brunneus*  
Stripe-winged Grasshopper *Stenobothrus lineatus*  
Common Green Grasshopper *Omocestus viridulus*  
Meadow Grasshopper *Chorthippus parallelus*  
Lesser Marsh Grasshopper  
*Chorthippus albomarginatus*  
Common Groundhopper *Tetrix undulata*  
Dark Bush-cricket *Pholidoptera griseoptera*  
Speckled Bush-cricket *Leptophyes punctatissima*



Oak Bush-cricket *Meconema thalassinum*  
Bog Bush-cricket *Metrioptera brachyptera*  
Great Green Bush-cricket *Tettigonia viridissima*  
Roesel's Bush-cricket *Metrioptera roeselii*  
Shortwinged Conehead *Conocephalus dorsalis*

**Climate largely or completely unsuitable by 3.2°C:**

Slender Groundhopper *Tetrix subulata*

## Shieldbugs

**Climate largely or completely unsuitable by 2°C:**

Birch Shieldbug *Elasmotethus interstinctus*  
Juniper Shieldbug *Cyphostethus tristriatus*  
Heather Shieldbug *Rhacognathus punctatus*  
Red-legged Shieldbug *Pentatoma rufipes*  
Forget-me-not Shieldbug *Sehirus luctuosus*  
Hawthorn Shieldbug *Acanthosoma haemorrhoidale*  
Parent Bug *Elasmucha grisea*  
Bronze Shieldbug *Troilus luridus*  
Common Green Shieldbug *Palomena prasina*  
Small Grass Shieldbug *Neottiglossa pusilla*  
Dock Bug *Coreus marginatus*

**Climate largely or completely unsuitable by 3.2°C:**

Bishop's Mitre Shieldbug *Aelia acuminata*  
Blue Shieldbug *Zicrona caerulea*  
Crucifer Shieldbug *Eurydema oleracea*  
Gorse Shieldbug *Piezodorus lituratus*  
Hairy Shieldbug *Dolycoris baccarum*  
Woundwort Shieldbug *Eysarcoris venustissimus*  
Tortoise Shieldbug *Eurygaster testudinaria*  
Bordered Shieldbug *Legnotus limbosus*  
Box Bug *Gonocerus acuteangulatus*  
Denticulate Leatherbug *Coriomeris denticulatus*  
Heath Shieldbug *Legnotus picipes*  
Pied Shieldbug *Tritomegas bicolor*  
Spiked Shieldbug *Picromerus bidens*

## Ferns

**Climate largely or completely unsuitable by 2°C:**

Moonwort *Botrychium lunaria*  
Crested Buckler Fern *Dryopteris cristata*

## Orchids

**Climate largely or completely unsuitable by 2°C:**

Pugsley's Marsh Orchid *Dactylorhiza traunsteineri*

**Climate largely or completely unsuitable by 3.2°C:**

Green-flowered Helleborine *Epipactis phyllanthes*  
Creeping Lady's-tresses *Goodyera repens*  
Common Spotted Orchid *Dactylorhiza fuchsii*  
Early Marsh-orchid *Dactylorhiza incarnata* and  
Southern Marsh-orchid *Dactylorhiza praetermissa*

## Trees and shrubs

**Climate largely or completely unsuitable by 2°C:**

European larch *Larix decidua*

**Climate largely or completely unsuitable by 3.2°C:**

European Aspen *Populus tremula*  
Downy Birch *Betula pubescens*  
Silver Birch *Betula pendula*  
Horse Chestnut *Aesculus hippocastanum*  
Rowan *Sorbus aucuparia*  
Bird Cherry *Prunus padus*  
Eared Willow *Salix aurita*  
Goat Willow *Salix caprea*  
Osier *Salix viminalis*  
Western Hemlock *Tsuga heterophylla*  
Hybrid Larch *Larix marschlinii*  
Scots Pine *Pinus sylvestris*  
Norway Spruce *Picea abies*  
Sitka Spruce *Picea sitchensis*

## Summary

The findings presented here come from the most comprehensive global analysis to date of projected losses in the climatic ranges of plants and animals; nevertheless, all factors of potential importance to a given species could not be included in the analyses. For example, it is unclear how and to what extent species might utilise novel climates, as they need to be able to disperse to them. Changes in the severity of extremes of atmospheric weather and climate variables, such as temperature and precipitation extremes, might exceed the survivability thresholds of some species before the mean climate becomes unsuitable, as has been shown for butterflies in the UK (McDermott Long *et al.* 2017).

The impacts on the biodiversity of Norfolk rapidly increase with increasing temperatures. Under the current Paris pledges a temperature rise of 3.2°C potentially could have major impacts on biodiversity, with even 2°C potentially significantly impacting the species of Norfolk. However, warming of 1.5°C (not shown) could offset many of the potential losses of species' ranges in Norfolk.

Species distribution models should not be considered as 'crystal balls' of the future.



Monitoring, especially by members of the NNNS, will help assess which species over time seem to be tracking the climate and which are not, and the data collected can help to inform the next generation of models. Nevertheless, uncertainties in models are not reasons for complacency or uncertainty paralysis. The potential impacts to some taxa is large, and could have impacts on species otherwise less exposed to climate change.

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The effects of climate change on Norfolk Wildlife Trust reserves will be considered in a future paper.



# The scarce cleptoparasitic satellite fly *Miltogramma germari* (Diptera, Sarcophagidae) in Norfolk

*Mark Welch & Nick Owens*

Miltogrammines are a large worldwide group of 'flesh flies' belonging to the family Sarcophagidae (Pape 1987). Most are cleptoparasites of ground-nesting solitary bees and wasps. Females larviposit inside or near nests and, in the case of ground-wasp hosts, even on prey being dragged into a nest or on the wasp carrying the prey (Polidori 2017). The fly larvae feed on pollen (bee hosts) or prey items (wasp hosts). The host bees and wasps have developed behaviour which can deter or deceive their cleptoparasites, with varying degrees of success (Spofford & Kurczewski 1990, 1992).

The genus *Miltogramma* comprises over 40 Palaearctic species (Pape 1996) which are known collectively as 'satellite flies' on account of their strategy of shadowing or tracking (at a distance of a few centimetres) ground-nesting solitary bees/wasps carrying pollen/prey to nests. There are only two British *Miltogramma* species: *Miltogramma germari* pNationally Scarce (Falk & Pont 2017) and the common *Miltogramma punctata*. The latter is known as a cleptoparasite of the solitary bees Sea Aster Bee *Colletes halophilus*, Heather Colletes *Colletes succinctus*, Davies' Colletes *Colletes daviesanus* and *Dasypoda hirtipes* (a pantaloone bee). In Norfolk, *M. punctata* has been seen at nest aggregations of *C. halophilus* at Holme Dunes NNR and Blakeney Point, and of *C. succinctus* at Weybourne and Kelling Heath. So far, all specimens taken by MW from the Holme nest sites are *M. punctata* as are specimens collected by NO from Weybourne and Kelling Heath (det. A.G Irwin). UK hosts of *M. germari* may include the Flower Bee *Anthophora bimaculata* (S. Falk pers. comm.),

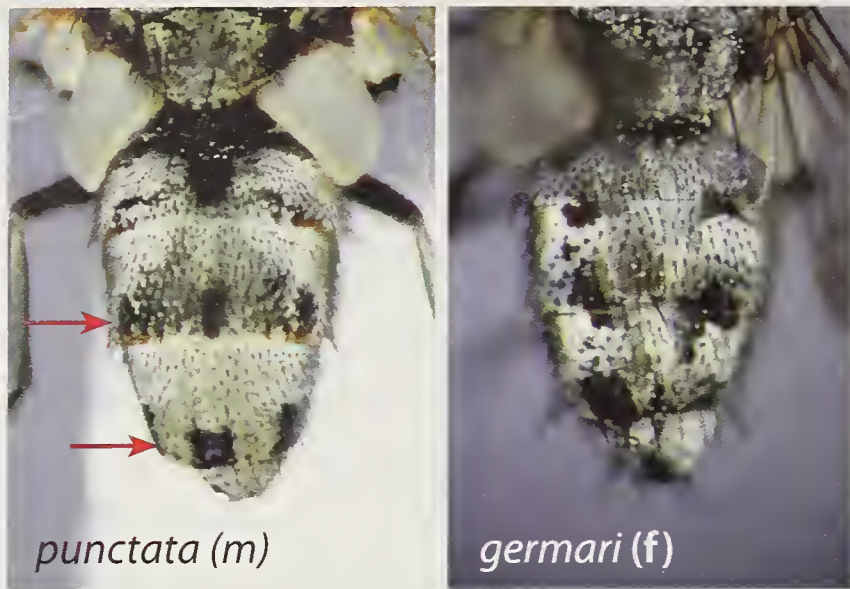
which is known as a host in mainland Europe, as are leafcutter bees *Megachile* spp. (Pape 1987).

The two British *Miltogramma* species are medium-sized flies (typically 5-9 mm long) with wings extending to the end of the abdomen which has a shifting pattern of grey, white, black and orange markings (Figures 1 and 2), the appearance of which depends upon viewing angle. The three black spots on the posterior margins of



**Figure 1.** Above: male *Miltogramma punctata* (Holme Dunes NNR). Below: female *M. germari*, (Leziate). Mark Welch.





**Figure 2.** Abdominal patterns of *M. punctata* (male) and *M. germari* (female). The same specimens as shown in Figure 1. The row of three black marginal spots on tergites 3 and 4 of *M. punctata* is indicated by arrows. Mark Welch.

tergites 3 and 4 are a useful field character for *M. punctata*, but are not always clear. *M. germari* lacks these marginal spots. *M. germari* averages smaller than *M. punctata*. Both species are front-heavy with proportionately large heads, pale yellowish faces and frons, and vibrissae are not distinguishable from other facial setulae. Both species are on the wing June-August. The distinction between *M. punctata* and *M. germari* is discussed further below.

Here, we report the second occurrence of *M. germari* in Norfolk and take the opportunity to describe our recent observations of the behaviour of *M. punctata* at *C. succinctus* nesting aggregations in Norfolk.

## Occurrence

The female *M. germari* reported here was found at Leziate (Brow-of-the-Hill, TF67331897) on 4 August 2017 and is the second Norfolk record after one recorded at Winterton Dunes at TG494204 on 23 July 2003 (recorder not known). *M. punctata* was also recorded on the same day and at the same grid reference as *M. germari* at Winterton. The habitat at Winterton is open dune grassland with some Heather *Calluna vulgaris*, close to the beach.

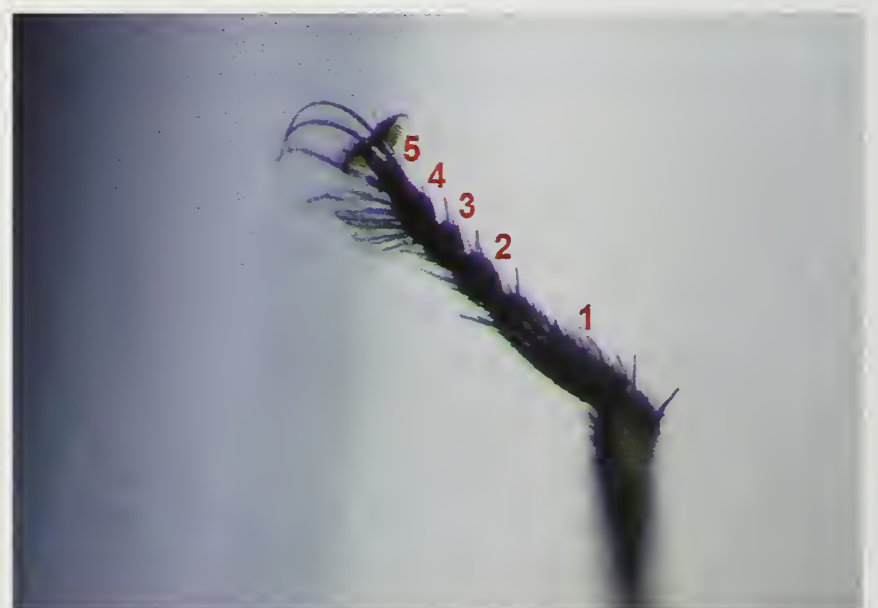
Leziate, lying 5 km east of King's Lynn, is a mosaic of disused flooded sandpits, a

working sandpit, small patches of heathland and a public park. At Leziate, *M. germari* was shadowing a pollen-laden female *Dasypoda hirtipes* less than 50 cm off the ground near a 7 m high sandy bank. The bee did not land at a nest, but flew off after a minute or so of close persistent shadowing by the fly. *Dasypoda hirtipes* occurs in good numbers at Leziate and several small nest aggregations have been found there. The nests are easily located by the circular aprons of excavated sand (up to 15 cm in diameter) dumped to one side of the hole.

## Identification

Male *M. punctata* are easily distinguished from *M. germari* using a hand lens: front tarsomere 4 of *M. punctata* has long dangling black hairs (setulae), as shown in Figure 3, whereas these tarsal hairs are absent in *M. germari*. If the *Miltogramma* has hairy front tarsi it is a male *M. punctata*. A male lacking these hairs is likely to be *M. germari*. However, distinguishing females requires microscopic examination. MW used the key of Whitmore (2016, unpublished manuscript). This key can be downloaded from the Dipterists Forum website by members or obtained on request from Daniel Whitmore (Natural History Museum, London).

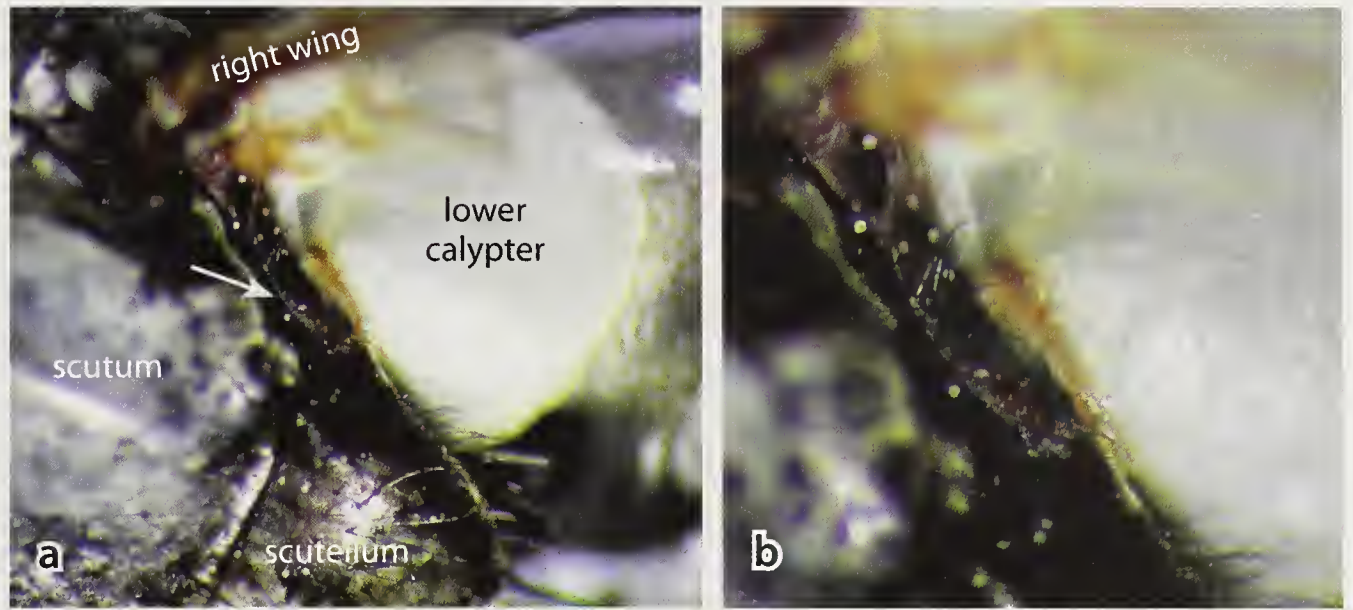
The definitive feature distinguishing the two species is the presence (*M. punctata*) or



**Figure 3.** The right tarsus of a male *M. punctata* showing the long tangled setulae arising from tarsomere 4 which are characteristic of males of this species. Mark Welch.



**Figure 4a.** The location of the supra-squamal ridge (arrowed) in *M. punctata*. The ridge is a curved brown/orange band immediately above the calypters that attaches to the side of the scutellum at its base.



**Figure 4b.** Close-up view of the long black setulae on the ridge that are diagnostic of *M. punctata*. The ridge is bare in *M. germari* but otherwise has the same appearance. *Mark Welch*.

absence (*M. germari*) of long black setulae on the supra-squamal ridge, as shown for *M. punctata* in Figure 4. However, this feature is difficult to see if the wings are not suitably set, as was the case with the Leziate specimen, so that it was necessary to lift the alula to get a clear view of the ridge. Secondary features also consistent with *M. germari* are: (i) extensive orange in antennal segment 3 (post-pedicel), which is completely black in *M. punctata*; (ii) a cryptic and shifting abdominal tessellation lacking the rows of distinct marginal black spots on tergites 3 and 4 (although these spots on worn *M. punctata* can be difficult to discern). The Leziate specimen was confirmed as *M. germari* by Daniel Whitmore, NHM (pers. comm. to MW on 29 September 2017). Further excellent comparative images of pinned *M. punctata* and *M. germari* can be seen on Steven Falk's Flickr website ([www.flickr.com/photos/63075200@N07/collections/72157634490422881/](http://www.flickr.com/photos/63075200@N07/collections/72157634490422881/)).

Another reason for taking vouchers of possible *M. germari* specimens is the very similar appearance in the field of the satellite sarcophagid *Pterella grisea* which parasitizes *Cerceris* wasps (Polidori 2017). Under the microscope this fly can be distinguished (Whitmore 2016) from *Miltogramma* by having obvious vibrissae (not visible in *Miltogramma*). Photos of *Pterella grisea* are shown on Steven Falk's Flickr website. *Pterella grisea* has pNationally Scarce UK

status (Falk & Pont 2017) and has not been recorded in East Anglia.

### UK Status

Falk & Pont (2017) assigned pNationally Scarce status to *M. germari* and considered it to be "Extremely scarce and localised, with several post-1960 localities scattered widely over the known range. A decline seems to have occurred, as earlier records were relatively frequent". As of 13 November 2017, the National Biodiversity Network lists 39 records, of which seven are from Suffolk (Lakenheath Warren, Wangford Warren, King's Forest: all dated 2003) and one is from Norfolk (Winterton Dunes, 2003).

### *Miltogramma punctata* behaviour

At Weybourne there is an aggregation of *Colletes succinctus* numbering thousands. The aggregation is on an east-facing sandy cliff projection which receives the morning sun. The bees first use mostly Ling *Calluna vulgaris* pollen from Kelling Heath which is 1.5 km away, but from early September they start switching to other food sources including Ivy *Hedera helix* pollen as the Ling dries up. The aggregation is attended by large numbers of the cleptoparasitic Red-thighed Epeolus *Epeolus cruciger* and also by *M. punctata*.

Video sequences taken at Weybourne show that *M. punctata* sometimes enters a *C.*





Figure 5. Interactions between a female *C. succinctus* (a), and a female *M. punctata* at Weybourne Cliffs (3 September 2017) (b). The bee blocks the hole entrance and 'faces-off' the fly. (c). After 15 minutes the bee leaves. (d). The fly immediately enters the hole, larviposits and leaves within 15 seconds. Nick Owens.

*succinctus* nest to larviposit when the host is still inside, whereas in other instances it enters after the bee departs. Figures 5 a-d illustrate an example of the behaviour of a female *M. punctata* at Weybourne on 3 September 2017. The fly waits outside the hole for the bee to depart, but before flying off the bee remains in the nest entrance, apparently to prevent the fly from entering. The fly is patient and waits outside the nest hole for 15 minutes, the 'face-off' period, before entering the nest and larvipositing immediately the bee leaves. Strategies other than just 'facing-off' are probably used by the bees to deter *M. punctata*. On arrival the bees sometimes fly directly down their nest

holes (which are not covered on leaving). At other times they sit on the surface and wait, sometimes flying to a series of nest entrances before entering one of them. It is conceivable that the bee can guide the fly to the wrong nest hole or that the fly is diverted by another incoming bee before the first bee enters its nest hole.

*M. punctata* also targets Norfolk's large aggregations of Sea Aster Bee *C. halophilus*. The fly can be observed both on Sea Aster *Aster tripolium* flowers and at *C. halophilus* nest aggregations. It is not known whether there are genetic and/or behavioural differences between the *Miltogramma* parasitising different bee species.



It is possible that *M. germari* occurs with *M. punctata* at nest aggregations of *Colletes* bees, and as such may have been overlooked and so be under-recorded. At Leziate there is some heather that supports a small population of *C. succinctus*, and at Winterton there is a lot of heather supporting large numbers of *C. succinctus*. It is not yet known if *M. germari* uses *C. succinctus*, but *M. punctata* certainly uses it as well as *C. halophilus* and *C. daviesanus*. The few Suffolk records of *M. germari* are associated with heathland and so it possible that *C. succinctus* is being used there. The dates of the *M. germari* records (23 July and 4 August) are consistent with *C. succinctus* being one of its hosts, for which the earliest Norfolk records are 26 July for a male (Winterton) and 31 July for a female (Brecks). For *D. hirtipes* the earliest recorded dates are 10 July (male) and 13 July (female), both from the Brecks. Our studies of satellite flies in Norfolk have just begun and much remains to be discovered about their occurrence, interactions and behaviour.

## Acknowledgments

We thank Steven Falk for his helpful comments on this article and for bringing to our attention the similarity in the field of *M. germari* and *P. grisea*. Thanks also to Tony Irwin for details of the Winterton *M. germari* record.

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# The rise and fall of Autumn Lady's-tresses *Spiranthes spiralis* at Gresham's School, Holt and its status in Norfolk

**Tony Leech**

Not all orchids are showy. Autumn Lady's-tresses *Spiranthes spiralis* is one of the smaller of the British orchid species but when examined closely reveals its charm (see front cover). Rarely more than 20 cm high, its flowering spike rises from just beside a rosette of small, shiny, dark green leaves. The white flowers, typically 10 – 20 in number, are arranged spirally around the stem, sometimes completing more than two full turns but in other inflorescences hardly a quarter-turn. Another variable feature is the direction of rotation, to the left or the right; out of 100 flowers examined in 1999, 58 spiralled clockwise (from the tip downwards) and 40 anticlockwise, with just two having no discernible rotation. It is this spiral arrangement that is responsible for both elements of its scientific appellation and, indeed, its vernacular name; the tresses allude to plaited hair, probably of the Virgin Mary, a resemblance more clearly seen when the flower is in bud. The common name also reflects the fact that this is the last of our native orchids to flower in the year. A detailed description of the plant will be found in Harrap & Harrap (2005) and an even more detailed account in Jacquemin & Hutchings (2010).

## Development

As with other species of orchid, development of Autumn Lady's-tresses from seed to flower is complex and lengthy. Consideration is relevant here because of its effect on the time course of population changes.

Pollination of the slightly honey-scented flowers is by bumblebees (and possibly other bee species) with typically good seed set (Jacquemin & Hutchings 2010). Seeds

are small even by orchid standards but dispersal distances seem to be very short with 95% falling within 135 cm of their source (Machon *et al.* 2003).

On germination, these tiny seeds form mycorrhizal associations with fungi, generating food storage compounds that accumulate in the mycorrhizome (protocorm). Around 12 species of fungus have been identified (at least to generic level) from surface-sterilised tubers and root tissue of Autumn Lady's-tresses (Tondello *et al.* 2010). Although some are basidiomycetes, none form fruiting bodies recognisable in the field. Some are known pathogens in other situations and it is far from clear what the roles of the different fungi are. This will probably vary for different growth stages of the plant and is a situation now recognised to be widespread in orchid species that have been studied in this way.

During its development, which may take up to eight years (Ziegenpeck 1936, quoted in Jacquemin & Hutchings 2010), although this has been disputed, the food reserves move from the mycorrhizome into short stocky roots which grow from it and the mycorrhizome disappears. At this stage the first leaves appear and a flowering spike is initiated (but does not yet develop). Photosynthesis takes over as the main means of



Tony Leech



nutrition. In May the rosette of leaves dies off, several months before the flower spike elongates and becomes visible, explaining why the spikes are observed *next* to the leaf rosette. Before the leaves die off, a bud may well have formed which develops into a short lateral stem bearing another leaf rosette during the next season. In this way the plant forms small vegetative clusters but these are short-lived with a half-life of around seven years (Wells 1967).

## Habitat and distribution

Autumn Lady's-tresses is a plant of short nutrient-poor turf, often occurring close to the sea where this habitat is more frequent. It favours well drained calcareous soils and does not tolerate shade. Such habitats have long been maintained by grazing but over the past 60 or so years this has diminished

and in some places has been replaced by the lawnmower with the result that the orchid not infrequently occurs in gardens.

As far as is known (the first record was in 1548) Autumn Lady's-tresses has been restricted to the southern part of England, occurring only as far north as Yorkshire and the northern edge of Morecambe Bay. There has been a steady loss of sites and it is now only reasonably frequent in certain counties south of a line between the Rivers Severn and Thames. It is widespread in parts of the Mediterranean region but is becoming increasingly scarce in more northerly European countries. It has been found in North Africa and Asia.

## Norfolk records

In Petch and Swann's *Flora of Norfolk* (1968),

**Table 1. Norfolk records of Autumn Lady's-tresses.**

Place	10 km grid	Date 1st record	First recorder	Source
near Yarmouth	(TG50)	1797	Dawson Turner	Eric Swann pers.comm. 1984
Ringstead Downs	TF63/64	1886		Petch & Swann 1968
Beeston Common [1]	TG14	1885	B.A.F. Pigott	Petch & Swann 1968
Lime Kiln Hills, Wells	TF94	1907		Eric Swann pers.comm. 1984
Foulden	TF70/79	1915		Petch & Swann 1968
Hill House, Holt [2]	TG03	1936-45	Mrs Gomersal	Alec Bull pers. comm. 1992
Caldecote Fen	TF70	1950	Francis Rose [3]	
Lascelles Meadow/ Race-course Plantation/ Holt Country Park [4]	TG03	1951	? Philip Simon	Gresham's School Nat. Hist. Soc. Report 1952
Gresham's School	TG03	1952	Philip Simon	See below
Old Rectory, Holt	TG03	ca 1988	Anne Starling (now Anne Harrap)	pers. comm. [5]

Notes: 1. In *Flowers and Ferns of Cromer and its Neighbourhood* (1885) B.A.F. Pigott writes of the Top Common [north of the A149. Ed.] 'Here we find quantities of a most interesting plant, the smallest of our orchids, Lady's Tresses (*Neottia spiralis*).' The last record for the plant there was in 1915 (pers. comm. F. Farrow).

2. This record is taken from the Wild Flower Society diary of Mrs Gomersal (of High Kelling, near Holt) which was passed, via David McClintock and Gillian Beckett, to Alec Bull. The date is not specified. Hill House is probably the house opposite the end of Holt High Street, overlooking Spout Hills (and only 300m from the Old Rectory).

3. In Petch & Swann 1968, Francis Rose's name is attached to the 1915 Foulden record but this is clearly an error.

4. Lascelles Meadow and Racecourse Plantation were areas which have become Holt Country Park. The orchid was seen here in the late 1970s by Eric Swann and by Peter Lambley (12 plants).

5. On the lawn in front of the house, often wet from the overflow of a pond. In 1998, 36 spikes were counted and in 1999 12 spikes. The property is under new ownership and it is unlikely that the orchids have persisted.





Figure 1. Farfield Lawn 2006 from the north-west. Tony Leech.

six sites were listed for Autumn Lady's-tresses but it had already disappeared from most of these. Known records are summarised in Table 1 in date order.

Mention should be made of the occurrence of Autumn Lady's-tresses at Tydd Gote (TF41) which lies on the border between vice-county 29 (Cambridgeshire) and vice-county 53 (South Lincolnshire) but is just 2 km from vice-county 28 (West Norfolk). Since 1961 the plant has been found at a number of sites around the village (see <http://www.cambridgeshireflora.com/index2.html>) and appears still to be present.

## Autumn Lady's-tresses at Gresham's School

### History

Gresham's School is an independent coeducational boarding school situated on the eastern edge of Holt in north Norfolk. Its grounds include around 12 hectares of semi-natural woods and extensive playing

fields. It has long encouraged natural history studies and from 1919 to 1969 had an active Natural History Society which published annual reports. In the 31<sup>st</sup> Report (1953) it was noted, under the heading 'Records of Orchidaceae 1949-1952' that '*Spiranthes spiralis* had persisted as a rosette on the Chapel Lawn'. This suggests that it flowered before 1952 but there is no mention of it in the 1952 Report. It is very likely that biology teacher Philip Simon, was responsible for the identification. Perhaps surprisingly there is no further record of the orchid in these Reports but in 1955 Charles Daplyn, a pupil at the School, saw it at the south-east corner of the Cricket Field, adjacent to the Chapel Lawn (pers. comm.) and in 1956 Charles Petch was shown it there (pers. comm. Eric Swann 1984). In the 1970s, Oliver Barnes, a biology teacher at Gresham's, saw the plant near the north edge of the Rugby Field about 300 m north of the Chapel Lawn.

In my first term at Gresham's, in 1978, Dave Horsley, a fellow biology teacher, showed me the plant on the upper part of Farfield Lawn (TG08943931) where we counted 27 flowering spikes. Situated immediately to the west of Farfield (a boys' boarding house), this lawn was in the last stages of dereliction as a tennis court; the net was still in place and the lawn mowed but the court was hardly ever used (Figure 1). A shallow bank leads down to the lower part of the lawn to the north. The total area of



Figure 2. Autumn Lady's-tresses flowering on Farfield Lawn at Gresham's School, Holt, 2006. Tony Leech.



both lawns is just over 1000 m<sup>2</sup> with a soil pH of 6.9.

### Annual count of flower spikes

In most years from 1979 to 2010, the number of flowering spikes on the two parts of the lawn was counted in early September, usually with the help of pupils (Figure 2). The lawn was divided into 6 x 6 ft squares using string and bamboo canes, and the number counted in each square. This allowed monitoring of any change in pattern. During this time total numbers varied from 201 to 1759 (Table 2). Since 2010, only casual observations have been made but numbers have dropped to a handful. In 2016, six spikes were seen and in 2017 only two.

In the mid-1990s a few spikes appeared on the a lawn to the south of Farfield House but the mowing regime was not conducive to their survival.

### Distribution on the lawn

The distribution of flowering spikes across the lawn is not even, even in 'good' years. Shading at the south end of the lawn and by a mature beech tree on the eastern edge of the upper lawn (until this was felled for safety reasons in 2007) effectively prevented the orchid from appearing in these areas.

On the lower lawn, 51% of the flowering spikes (351 out of 689) occurred in one 24 x 24 ft square (7.3 x 7.3 m), just 12% of the area available. In 2000 this had increased to 74%. No explanation was apparent for this but it rendered the population vulnerable.

### Use of the lawn

Since the upper lawn was decommissioned as a tennis court, the lawns have been used recreationally but with limited access, especially during September and October. Students were allowed to play during winter and spring on the lower lawn but this has not resulted in obvious damage. Until recently (see below) the lawn has been regularly mowed except between the end of July and the end of October. As far

**Table 2. Number of flowering spikes on Farfield Lawn, 1978-2010.**

Year	Upper lawn	Lower lawn	Total
1978	27	0	27
1979	831	541	1372
1980	893	233	1126
1981	419	17	436
1982	608	121	729
1983	534	140	674
1984	523	120	643
1985	358	254	612
1986	193	334	527
1987	439	689	1128
1988	107	94	201
1989	466	819	1285
1990	744	811	1555
1991	358	1401	1759
1992	364	1091	1455
1993	290	1038	1328
1994	123	1089	1212
1995	27	662	689
1996	20	749	769
1997	-	-	-
1998	38	652	690
1999	10	728	738
2000	8	874	882
2001	7	430	437
2002	-	-	-
2003	3	463	466
2004	5	467	472
2005	-	-	-
2006	15	603	618
2007	-	-	-
2008	5	378	383
2009	1	353	354
2010	12	606	618

as is known, mineral fertilizers have never been applied to the lawn.

In 1981, the northern part of the lower lawn was lost to the construction of an extension to Farfield House and a car parking area,



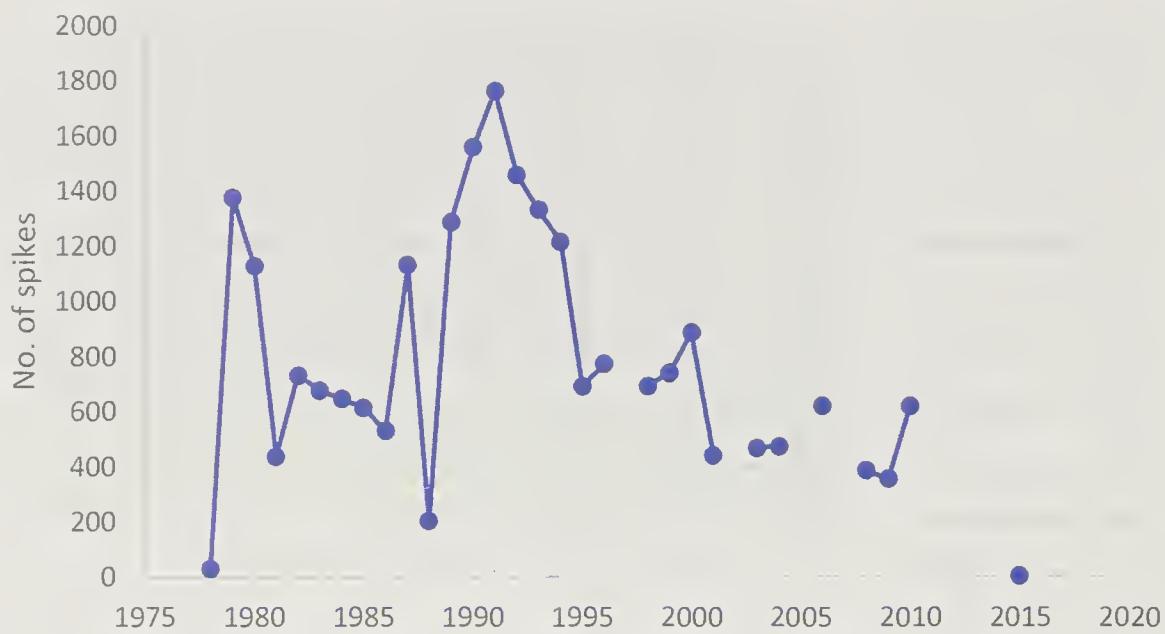


Figure 3a. Total numbers of flowering spikes 1978-2010.

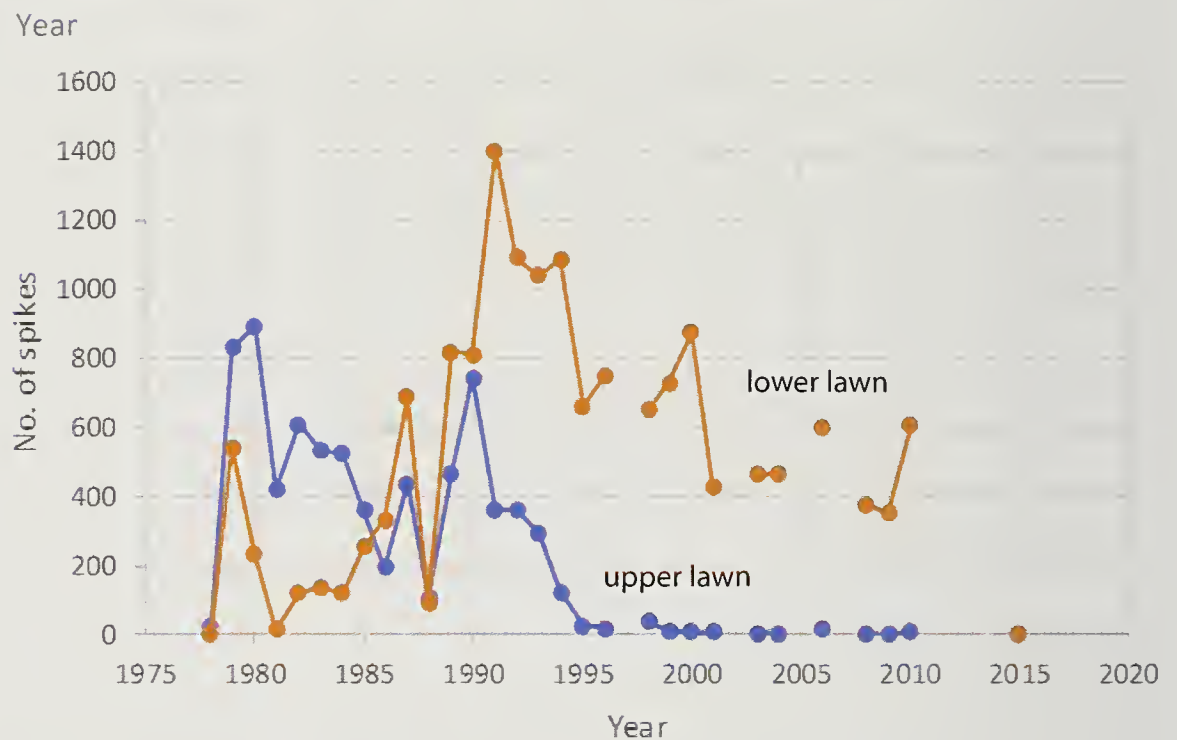


Figure 3b. Numbers of flowering spikes on upper and lower lawns 1978-2010.

resulting in a significant loss of habitat available to the orchids; in the preceding year 68 spikes were counted in the area later built over. Construction materials were stored on a further third of the lawn for around six winter months but remarkably the lawn flora, including the orchids, returned to normal within the year. In 1987 a plan to site a new classroom block on the upper lawn was rejected.

In 2004, Farfield Lawn was designated a County Wildlife Site 2094, the smallest in Norfolk. Despite this some further disturbance has occurred. An electricity substation has been built in the south-west corner and cables have been laid down the western edge of the lawn. Neither operation appears to have affected the Autumn Lady's-tresses population.

#### Other plants of interest on Farfield Lawn

Besides the Autumn Lady's-tresses, Farfield Lawn is of some botanical interest. Fairy

Flax *Linum catharticum*, Common Centaury *Centaureum erythraea* and Field Madder *Sherardia arvensis* all occur in the short turf. In 2000, a flowering plant of Green-winged Orchid *Orchis morio* was found on the lower lawn and persisted there for at least ten years although it now seems to have disappeared. In 2005, Common Spotted Orchid *Dactylorhiza fuchsii* was seen for the first time and by 2010 the number had increased to 208 flowering spikes on the lower lawn. Unfortunately, the appearance of this showy but common species provided a reason for not mowing the lawn leading to its deterioration as a habitat for Autumn Lady's-tresses. The appearance of two Bee Orchid *Ophrys apifera* plants in 2010 brought the number of orchid species on this small site to four. A total of 59 species of vascular plant has been recorded from the lawn since 1978. In addition, over 100 species of fungus have been recorded from the lawn (see p.20).



## Discussion of changes

On the upper lawn, the period 1980 to 1995 saw a decline in numbers, albeit with fluctuations (Figure 3). Subsequently, very few orchids have been seen on the upper lawn. The dramatic fall coincided with just one year in which the grass was left long for much of the summer due to illness of the gardener, a likely but unproven cause. On the lower lawn, numbers built up to a peak in 1991 and have since fallen steadily. It is difficult to find an explanation for the explosive increase but a possible contributor to the subsequent fall may have been competition from the Common Spotted Orchid which predominantly occupies the 24 x 24 ft square in which Autumn Lady's-tresses had been most prolific. That said, the factor which has virtually eliminated the orchid is likely to have been lack of regular mowing allowing long grass to shade out the orchid leaf rosettes during winter and spring. It is paradoxical that the profusion of attractive summer flowers had caused those responsible for mowing to desist! For many years the Gresham's School ground staff looked after the lawn and are now keen to do so again.

In his New Naturalist book on orchids, Summerhayes (1951) claimed that the species shared with some other orchids the habit of fluctuating in numbers greatly from year to year at the same site. Wells (1967), in his very detailed study of a population at Knocking Hoe NNR, Bedfordshire from 1962-1965, disputed this but admitted that his study period was short. He pointed out, however, that flowering was not *per se* an indication of abundance since plants could exist in a vegetative state. Furthermore, changes in weather from year to year may be a factor driving fluctuations but with the long period of development and lack of knowledge of the plants specific requirements it is difficult to explain such fluctuations.

In addition to any local changes it is pertinent to note that Autumn Lady's-

tresses is experiencing steep population declines over much of its range (Jacquemin & Hutchings 2010). In addition to habitat losses and climatic factors, increasing nitrogen deposition from the atmosphere could be playing a part.

Summerhayes (1951) noted that 'there are many records of Autumn Lady's-tresses appearing in large numbers on lawns which have not been cut'. Perhaps a change in gardening practices in the Holt area could reveal more populations.

## Acknowledgements

My thanks are due to Simon Harrap and Dave Horsley who have kindly commented on this paper.

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# Notable fungi from Farfield Lawn, Gresham's School, Holt

*Tony Leech*

The exceptional flora of a small lawn at Gresham's School, Holt, has been described in a previous paper (Leech 2017). In addition, over 100 fungus species have been recorded there between 1980 and 2010.

The lawn of approximately 1000 m<sup>2</sup> is situated to the west of Farfield House at TG089393. The upper part was used as a tennis court until the mid-1970s. It is surrounded by trees which include willow, birch, beech and yew. A soil pH of 6.9 has been measured and the flora suggests a low level of nutrients in the soil. It is unlikely that any mineral fertilizers or herbicides have ever been applied. The lawn was designated a County Wildlife Site (No. 2090) in 2004.

Just under half of the fungi recorded were grassland species (Table 1). Most of the remainder were mycorrhizal with surrounding trees or growing on vascular plants or their dead remains (including wood). Three of the fungi recorded were parasitic on other fungi, two of which which were first records for Norfolk: *Hypomyces papulasporae* (on Plain Earthtongue *Geoglossum umbratile*) and *Paecilomyces marquandii* (which causes patches of violet to appear on the gills of its host, Snowy Waxcap *Hygrocybe virginea*).

The often brightly coloured waxcaps are the best-known fungi of this type of grassland and seven species plus one variety have appeared on the lawn. Spindle (clavarioid) fungi are



Figure 1. The parasitic fungus *Paecilomyces marquandii* turns the gills of its host Snowy Waxcap violet. *Tony Leech*.



Figure 2. Big Blue Pinkgill on the lower lawn in 1998. *Tony Leech*.

another group characteristic of this habitat and nine have been recorded, including the scarce Smoky Spindle *Clavaria fumosa*, again a first for Norfolk. Pinkgills (Entolomas) are notoriously difficult to identify but it is likely that more than the 11 species are present. Notable amongst those that have is the rare but distinctive Big Blue Pinkgill *Entoloma bloxamii*, one of the few British blue fungi although the colour fades as the fungus matures. Both this and the small brown *Entoloma ameides* were new for Norfolk. Completing the list of CHEG species (C=clavarioid; H=Hygrocybe; E=Entoloma; G=Geoglossum) is a single earthtongue, the Plain Earthtongue *Geoglossum umbratile*, also a first Norfolk record. A CHEG score of 29 (C=9; H=8; E=11; G=1) indicates a grassland of some fungal significance.

Of the remaining fungi, the cup fungus *Geopora arenicola* on bare ground and the enormous white Warty Amanita *Amanita strobiliformis* under Goat Willow *Salix caprea* completed the list of firsts for Norfolk, bringing the total to eight (out of total of 105 species). Regularly visiting a small patch and working at identifications clearly brings rewards.

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**Table 1. Grassland fungi recorded from Farfield Lawn, Gresham's School.**

Scientific name	English name	Year first recorded	Scientific name	English name	Year first recorded
<i>Agaricus comptulus</i>		1990	<i>Lepista saeva</i>	Field Blewit	2009
<i>Calocybe gambosum</i>	St. George's Mushroom	1997	<i>Marasmius oreades</i>	Fairy Ring Champignon	1987
<i>Clavaria acuta</i>	Pointed Club	1990	<i>Melanoleuca polidoleuca</i>	Common Cavalier	1998
<i>Clavaria fragilis</i>	White Spindles	1980	<i>Mycena aetites</i>	Drab Bonnet	1991
<i>Clavaria fumosa</i>	Smoky Spindle	1994	<i>Mycena leptcephala</i>	Nitrous Bonnet	1995
<i>Clavulina cinerea</i>	Grey Coral	2006	<i>Rickenella fibula</i>	Orange Moss-cap	1991
<i>Clavulinopsis corniculata</i>	Meadow Coral	1991	<i>Rickenella swartzii</i>	Collared Moss-cap	1992
<i>Clavulinopsis helvola</i>	Yellow Club	1981	<i>Rugosomyces carneus</i>	Pink Dome-cap	1994
<i>Clavulinopsis laeticolor</i>	Handsome Club	1995	<i>Stropharia aeruginosa</i>	Verdegris Agaric	1993
<i>Clavulinopsis luteoalba</i>	Apricot Club	1997	<i>Stropharia coronilla</i>	Garland Roundhead	1996
<i>Clitopilus prunulus</i>	The Miller	1981	<i>Tephroclybe tylicolor</i>		2010
<i>Entoloma ameides</i>		2006			
<i>Entoloma asprellum</i>		2006			
<i>Entoloma bloxamii</i>	Big Blue Pinkgill	1998			
<i>Entoloma conferendum</i>	Star Pinkgill	1996			
<i>Entoloma incanum</i>	Mouse-pee Pinkgill	1980			
<i>Entoloma papillatum</i>	Papillate Pinkgill	1992			
<i>Entoloma poliopus</i>		2007			
<i>Entoloma porphyrophaeum</i>	Lilac Pinkgill	1987			
<i>Entoloma sericellum</i>	Cream Pinkgill	2000			
<i>Entoloma sericeum</i>	Silky Pinkgill	1994			
<i>Entoloma serrulatum</i>	Blue Edge Pinkgill	1980			
<i>Geoglossum umbratile</i>	Plain Earth-tongue	1981			
<i>Hygrocybe conica</i>	Blackening Waxcap	1980			
<i>Hygrocybe insipida</i>	Spangle Waxcap	2009			
<i>Hygrocybe mucronella</i>	Bitter Waxcap	1981			
<i>Hygrocybe persistens</i>	Persistent Waxcap	1992			
<i>Hygrocybe pratensis</i>	Meadow Waxcap	1996			
<i>Hygrocybe psittacinus</i>	Parrot Waxcap	1996			
<i>Hygrocybe virginea</i>	Snowy Waxcap	1990			
<i>H. virginea v. ochraceopallida</i>		1990			



# Marsh Clubmoss *Lycopodiella inundata* (L.) Holub in West Norfolk

*Robin Stevenson & Julia Masson*

## Introduction

Marsh Clubmoss *Lycopodiella inundata* is a rather small inconspicuous plant (Figure 1) which is regarded as Endangered in England (Stroh *et al.* 2014). Despite its name it is not a moss, but a lycopod, a group of primitive vascular plants reproducing by means of spores.

In the third edition of his flora, Stace (2010) confidently asserted that *Lycopodiella*

*inundata* was “extinct in Central and Eastern England”. However, also in 2010, several colonies of this plant were found growing by the side of a lake at a site managed by the RSPB in West Norfolk. Note that the site is private and not open to the public.

## *Lycopodiella* in Norfolk

*Lycopodiella inundata* has had a long history in Norfolk. As Table 1 shows, this plant appears to have been most widely

**Table 1. A list of localities cited by the main Floras of Norfolk.** Many of the sites listed by Nicholson had been taken from Trimmer. ‘New’ localities have been *italicised*.

Trimmer (1866)	Trimmer (1885)	Nicholson (1914)	Petch & Swann (1968)	Beckett & Bull (1999)
Briston		Briston		
			<i>Bryants Heath</i>	
			<i>Buxton Heath</i>	
		Cawston		
Dersingham		Dersingham		
Ellingham Fen		Ellingham Fen		
			<i>Felmingham</i>	Felmingham (1971)
Felthorpe		Felthorpe		
		<i>Filby</i>		
		Hevingham	Hevingham	Hevingham (1971)
Holt Lowes		Holt Lowes	Holt Lowes	Holt Lowes (1959)
Horning		Horning		
Horsford		Horsford		
	<i>Leziate</i>	Leziate		
Mousehold		Mousehold		
	<i>Old Buckenham</i>	Old Buckenham		
Saint Faith's		Saint Faith's		
Stratton Strawless		Stratton Strawless		
Swannington		Swannington		
	<i>Witton</i>			
		<i>North Wootton</i>	North Wootton	North Wootton (1962)
11	3	17	6	4



Figure 1.  
*Lycopodiella inundata* embedded in a carpet of *Campylopus introflexus*. The upright stems are spore bearing.  
Robin Stevenson.



distributed around the beginning of the last century. By the late 1960s, although new localities were still being found, the available habitat appears to have declined quite severely.

### The biology of *Lycopodiella*

The most comprehensive accounts of the ecology of this plant are provided by Page (1982; 1988), who notes that it is the only clubmoss in the UK able to grow in acidic wet ground, where it favours “moist, peaty, sandy or muddy sites which are almost competition free”, thriving in areas which remain “wet in summer and...may be flooded in winter”. Figure 2 shows a section



Figure 2. Section through sandy soil colonised by *Lycopodiella*. Note thin surface humic layer. Robin Stevenson.

through a surface on which *Lycopodiella* was growing whilst Figure 3 show the rhizoids which penetrate at least 1 cm down into the underlying sands.

The site in Norfolk, on the shores of a lake in the bottom of an old sandpit, is certainly acid - the area around the lake is littered with nodules of iron pyrite ( $\text{FeS}_2$ ) which weathers down to produce a variety of acidic chemicals which, presumably, drain down into the lake, via the adjacent sands (Figure 2). However, pH measurements revealed that the lake water itself is not as acid as expected (Table 2) although soil conditions certainly are.

Table 2. pH measurements from the extant colony of *L. inundata*.

Habitats (see Fig. 4)	pH
A) Lake water	6.7 - 7
B) Under <i>Campylopus introflexus</i>	4
B) Under <i>C. introflexus</i> , overlain by organic rich mud.	5

In some respects the Norfolk colonies are rather different from any of those described by Page, the chief difference being that the surfaces on which the *Lycopodiella* is growing are not bare, but subject to intense competition (?) from a closed sward of the





Figure 3. Portion of stem showing rhizoids. Robin Stevenson.

alien moss Heath Star Moss *Campylopus introflexus*, accompanied in places by the alien liverwort Southern Crestwort *Lophocolea semiteres* (and, in damper positions, by Greasewort *Aneura pinguis*. (The presence of the latter is slightly odd since both Hill *et al.* (2007) and Atherton *et al.* (2010) suggest it is a plant of basic habitats. Plants are, however, notorious for not reading the books).

The *Lycopodiella* only occurs in a limited area fairly near the shoreline (Figure 4, E); Table 3 lists the other associated species.

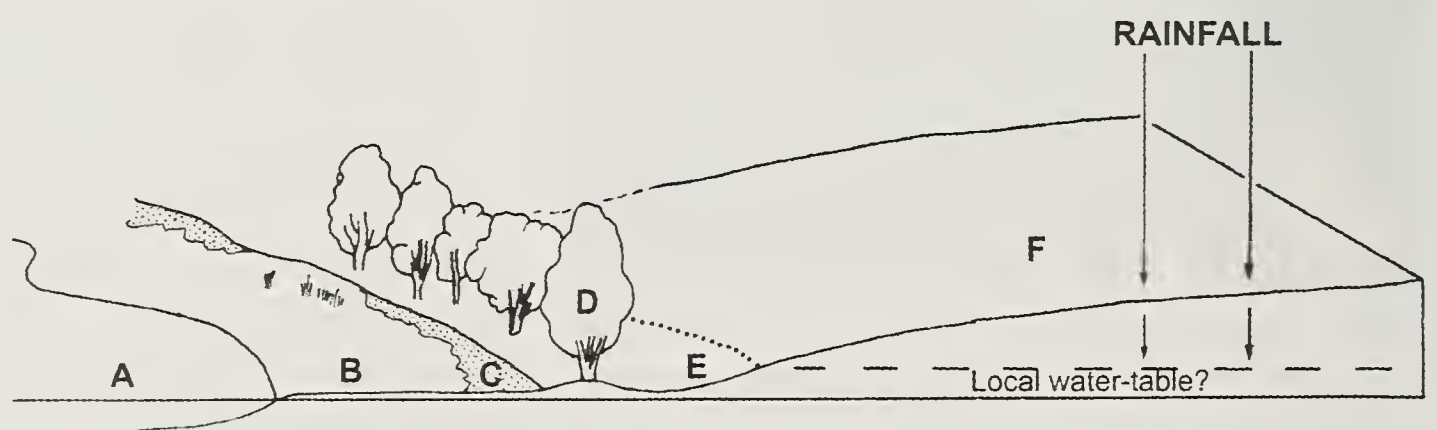
The two bryophytes both hail from the Southern hemisphere and both are considered to be aggressive colonisers. It has been suggested (Equihua & Usher 1993) that *C. introflexus*, is capable of inhibiting the germination of vascular plants, whilst *L. semiteres* is regarded as a 'plague species' in the Low Countries (Stieperaere 1994; Stieperaere *et al.* 1997). New Zealand Pygmywort *Crassula helmsii* is, of course, well known as an aggressive coloniser of aquatic habitats, so clearly *L. inundata* is not fussy about the company it keeps and is capable of holding its own amongst them. Curiously it has not colonised adjacent areas of bare, and more obviously damp, sand.

Visits so far suggest that the colonies in Norfolk get perilously close to drying out

Table 3. The vegetation associated with the habitats identified on Figure 4. Nomenclature follows Stace (2010) and Hill *et al.* (2008).

Zone	Habitat / Topography	Vegetation
A	Open water	<i>Myriophyllum spicatum</i> ; <i>Crassula helmsii</i>
B	'Beach' / Draw-down zone	Largely bare sand with patchy colonisation by <i>Crassula helmsii</i> ; <i>Juncus bufonius</i> ; <i>J. bulbosus</i> ; <i>J. acutiflorus</i> & <i>Eleocharis palustris</i> , as well as some <i>Aneura pinguis</i> , <i>Riccardia incurvata</i> and <i>Fossombronia</i> spp.
C	Upper Beach	Patchily colonised by more extensive sheets of <i>R. incurvata</i> > <i>A. pinguis</i> > <i>Fossombronia</i>
D	Scrub colonisation	<i>Salix cinerea</i> ; <i>Alnus glutinosa</i> ; <i>A. incana</i> and <i>Betula</i> spp. Underlain by <i>Campylopus introflexus</i> and <i>Lophocolea semiteres</i> .
E	Lower edge of 'High Ground' (Figure 5).	<i>C. introflexus</i> > <i>L. semiteres</i> . Patchily colonised by <i>L. inundata</i> , <i>Betula</i> seedlings and <i>Carex arenaria</i>
F	'High Ground'	Dominated by <i>C. introflexus</i> . <i>Betula</i> seedlings and saplings occasional.

Figure 4. The habitats adjacent to where *L. inundata* occurs.







**Figure 5. Typical habitat.** Scrub colonisation by willow, etc., on the right and birch saplings on the left; *Campylopus introflexus* carpet in between. Robin Stevenson.

completely in summer, whilst the 'beach' areas (B & C on Figure 4) do get flooded occasionally. The relationship between the bryophytes, the *Lycopodiella* and soil moisture levels might prove interesting.

The 2010 population was monitored for two years but then apparently died out, prompting a cessation of visits. It has reappeared in 2017, growing in the same habitat and the same limited area, and it seems safe to assume that the same colonies

survived over this seven year period, although not always visible when visited.

In the intervening period the number of colonies appears to have increased from the original group of three to seven (Table 4); however, some of the additional colonies may have been missed first time round though their small size suggests they may be new. Petch (1980) monitored a colony of *Lycopodiella inundata* at Ling Common, North Wootton (TF653242, which is just a

**Table 4. Numbers of plants recorded per quadrat.** The quadrat size used in 2011 was 40 x 40 cm; this was increased to 60 x 60 cm in 2017. Quadrats were located using different GPS devices, which are only accurate to c. 3 m anyway, so the position of the quadrats 1-3 were probably not exactly the same. Quadrat 4 was one of the 'new' sites which was deemed big enough to warrant quadrating. The numbers quoted are approximations: it is difficult to know exactly where one plant stops and another starts (Figure 6).

Quadrats	2010	2011	2012	2013	2017
	Nothing gridded, but c. 50 plants counted.		Nothing found	Nothing found	
Q1		3 strands			17 strands
Q2		15 strands			2 strands
Q3		25 strands			17 (+2)
Q4					28+ strands
Casual 1					4 strands
Casual 2					3 strands
Casual 3					2 strands





**Figure 6.** Portion of a *Lycopodiella* patch (2017). Whilst some strands seem to be clearly joined, in other instances it is difficult to see whether this is the case. Numbers cited are therefore, at best, estimates. *Robin Stevenson.*

few kilometres away from the present site), over a 13 year period, between 1949 until it finally disappeared in 1962. Initially he found only two plants; numbers rose to 17 plants in 1951, but declined thereafter. Unfortunately, in his account he did not give actual figures for the intervening years; however, as Figure 6 illustrates, it is often very difficult to see where one plant ends and another begins. Page (1988) quotes a colony as surviving for 30 years.

Petch's locality was also in the damp bottom of an old sand pit, but his associated plants were somewhat different, including *Juncus effusus*, *J. acutiflorus*, *J. squarrosus*, *J. bulbosus*, *Agrostis stolonifera*, *Calluna vulgaris*, *Leontodon saxatilis*, *Plantago major*, *Sagina procumbens* and *Trifolium dubium*. He made no mention of any accompanying bryophytes.

The late Gillian Beckett, the then vice-county recorder for West Norfolk (VC 28), did some research which produced the following extra records:

- 1847. S. Wootton, B. Wardale (Hb Birm)
- 1918. East Winch "damp spot in heathland", Hb BM, F. Robinson & F.C. Newton. This record she regarded

as somewhat dubious - "any specimen from Robinson has to be viewed with doubt."

- 1961. South Runcton (TF635078, "sandy track in wood"). E.L. Swann (& probably R.P. Libbey). Hb LTR. (This is an odd record since it is not mentioned in Petch & Swann 1968).

The Atlas (Preston et al. 2002) shows a number of other old 10 km records for Norfolk.

## Conclusions

Beckett *et al.* (1999) noted that the majority of the sites cited by Trimmer have "been afforested or become overgrown", however, other factors have probably affected the distribution of this species. Modern quarrying operations are much larger scale, and are subject to various regulations related to land restoration once extraction has finished, meaning that large areas of bare acid sand are not left exposed. So, although there are many large shallow pits in the area around King's Lynn, where access has been possible, no other colonies have, as yet, been found.

## Acknowledgements

The owners and managers of this site are thanked for giving permission to visit



the site for monitoring and recording purposes. Dr. Chris Page encouraged me to monitor the population. Bob Ellis read through this note, made useful suggestions for its improvement, and also supplied bibliographic information. Michael Petch supplied me with a separate of his father's note in *Watsonia*, and the late Gillian Beckett sent me the results of her researches into herbarium records of this species.

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# Current status of the Mud Pond Snail *Omphiscola glabra* in Norfolk

*Roy Baker & Derek Howlett*

This article provides an update of the Norfolk status of the Mud Pond Snail *Omphiscola glabra* (Müller) syn. *Lymnaea glabra* (Müller). An earlier review of Norfolk's fresh and brackish water snails was given by Baker & Howlett (2000). The Mud Pond Snail is a UK BAP Priority Species (2007) of conservation concern: UK Red Data Book 2 (Vulnerable – likely to become endangered if current threats continue). This species has become extinct over much of lowland England and is continuing to decline. Over the last 25 years the UK population is thought to have declined by 25-49% (Prié *et al.* 2001).

## Identification

The shell of the Mud Pond Snail is almost cylindrical, glossy, often greyish or brownish-horn in colour (Figure 1). There are seven to eight moderately convex



Figure 1. Mud Pond Snail *Omphiscola glabra*.

whorls, with the last whorl being twice as high as the narrow aperture. The spire has a blunt apex and the umbilicus is scarcely visible. The aperture normally has a white lip. Shell height 14-25 mm, width 4-7 mm.

Adult snails have distinctive shells but inexperienced recorders may confuse

juvenile specimens of the Marsh Pond Snail *Lymnaea palustris* and the Dwarf Pond Snail *Lymnaea truncatula* with this species.

## Current distribution

Only two confirmed Norfolk sites are currently known (East Walton Common and Thompson Common).

**East Walton Common** TF7316. Ownership West Acre Estates. Two shallow pingos, one of which is partially shaded by birch and hawthorn, the other is in more open ground. The mud snail was discovered with the Button Ram's-horn Snail *Anisus leucostoma* and the Porous-shelled Pea Mussel *Pisidium obtusale* (Baker & Howlett 2002). The water is low in mineral nutrients and is subject to periodic drying.

The water table levels are monitored by the Environment Agency 200 m from the pingo site since water extraction from the system may be a problem in the future. Some scrub clearance may be necessary in time. There are no problems with agricultural run-off, herbicides etc. The Common in the early 21<sup>st</sup> century was grazed by Soay sheep which close graze the grassland, which is beneficial to the Mud Pond Snail on this site.

**Thompson Common** TL 9395. Ownership Norfolk Wildlife Trust. The exact pingo(s) site within the Thompson complex was not recorded by David Bilton in 1988. The authors have examined many of the pingos on Thompson Common but to date they have failed to record the Mud Pond Snail. Recent field studies in 2014 and 2016 by the Freshwater Habitats Trust have discovered the snail in a number of ponds (pingos) in Stow Bedon Covert in the northern part of the Common at TL9384296471. One site is



a small marsh at TL9393996086. Further studies are necessary to define its habitat requirements and conservation strategies

### Previous records

**North Tuddenham Common** by E.A. Ellis in 1960 in mud at the edge of a small pond. Surveys by the authors in 2011 and 2012 failed to record the Mud Pond Snail in this pond. Local people have planted White Water-lily *Nymphaea alba* and Rigid Hornwort *Ceratophyllum demersum* and so changed the whole character of the pond. Two years previously, Australian Swamp Stonecrop *Crassula helmsii* was introduced and it took nine months of shading with plastic sheets to part eradicate the alien invasive species.

**Eaton Marshes, Norwich** by Roy Baker 1969 but the site has been subsequently destroyed by management strategies and the snail is no longer present.

**Brigham** by the Great Ouse River Authority 1968-70. The identification and site have yet to be confirmed.

**North Runcton TF62** by Tom Petch in 1890. The largest pond is overgrown with encroaching willow and no evidence of the snail was found in 2012 by the authors. A second pond has been deepened and enlarged by an angling club and the habitat is now unsuitable for the Mud Pond Snail, whilst a third pond has been developed by having a retaining wall for the adjacent housing development. No evidence of the snail was recorded in this survey.

**Reffley** by Tom Petch in 1890 and 1894. The site has been urbanised by 2000 due to the expansion of King's Lynn.

### Current factors causing loss and decline in Norfolk.

- Loss of small ponds and wetlands through development or neglect.
- Habitat fragmentation limiting colonization or decolonization.

- Ploughing and other agricultural practices leading to enrichment and run-off into areas containing the mud pond snail. Improvements in field drainage destroying boggy areas.
- Chemical run-off from crop pesticides and livestock treatments.
- Lack of grazing to limit the succession of marginal vegetation and the loss of wet areas.
- Inappropriate management such as deepening of seasonal pools to create permanent ponds to benefit other species of conservation interest.
- Introduction of other aquatic plants.

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# Winterton Dunes Survey

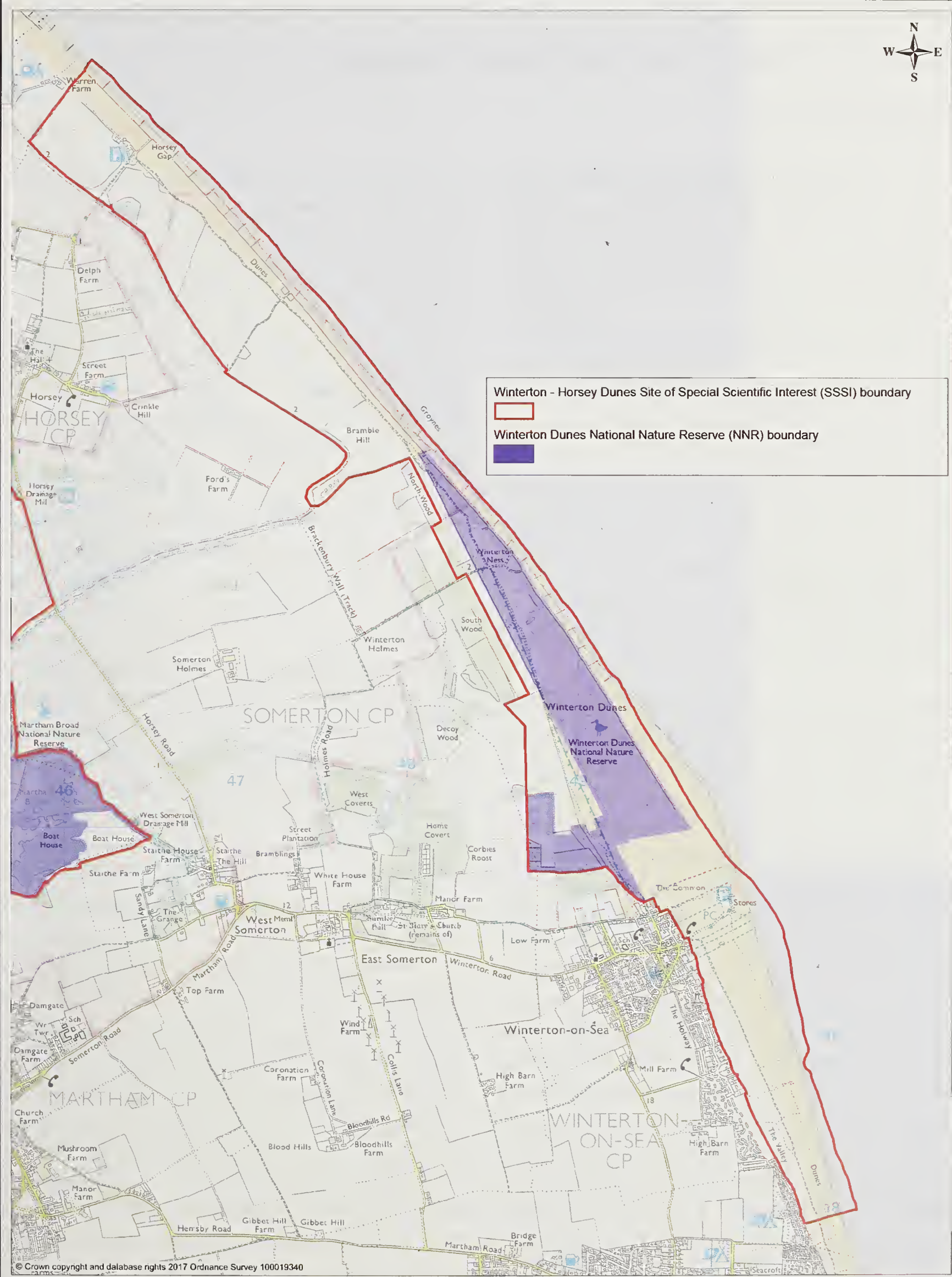
*Tony Irwin Chairman Research Committee*

Well-known for its migrating birds, Little Tern and Natterjack Toad colonies, Winterton Dunes, on the east coast of the county, is a hugely popular area for people too. Visitors to the beach, dog-walkers and horse-riders all take advantage of the open access which most of the Reserve offers, and many of them are probably unaware of the wealth of wildlife that lives there. As the current survey has shown, our knowledge of the species that depend on this site is far from complete, and it is important to try to discover more about them, as the area is subject to increasing human pressure.

The idea of a biological survey of Winterton NNR was first mooted by the NNNS Research Committee in late 2013. Initial visits with Natural England staff were made in 2014 with a full-day field meeting held on 7 September 2014. Surveying by NNNS members continued until the end of 2016, and many of the results are presented in the following series of papers. For some groups of organisms, samples collected in an afternoon may take months of work for them to be identified. Further papers will appear in the next issue of *Transactions*, as it was not possible to complete them all in time for this issue.



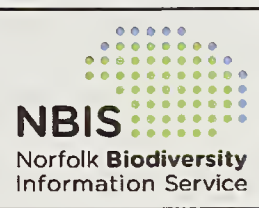




## Winterton Dunes

Location Map

Compiled by NBIS on 12 December 2017



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County Hall  
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## Winterton Dunes National Nature Reserve

### *Rick Southwood*

Part of a dynamic coastline, with a long history of human involvement and with some habitats more akin to those found on Baltic coasts than those typical of UK dune systems, Winterton Dunes was declared a National Nature Reserve (NNR) by agreement with the owners in 1956. It forms part of the Winterton-Horsey Dunes Site of Special Scientific Interest (SSSI) running from Horsey Gap to just north of Hemsby, itself a Special Area of Conservation (SAC) for its decalcified fixed dunes and humid dune slacks, along with the embryonic and shifting dunes. The beach forms part of the Great Yarmouth North Denes Special Protection Area (SPA), designated for its breeding Little Tern population.

The acidic nature of the system is unusual and thought to be primarily due to its orientation with respect to prevailing winds, which means that windblown sand tends to be formed of small particles, not the heavier shell fragments which give many dune systems their calcium-rich soils. The succession from foreshore through dunes, wet and dry slacks, to variable dune heath grading into scrub woodland, and the presence of areas of open water, has resulted in high habitat diversity. Further diversity arises from variations within habitat types such as differences in topography, grazing and trampling, and fluctuating water tables. This is reflected in the vegetation, with 25 NVC communities identified.

The area has a long, if sometimes unclear, history of human involvement, from sheep-grazing in the 16<sup>th</sup> century and rabbit warrening in the 18<sup>th</sup> to the construction of wartime coastal defences in 1940/41 and subsequent use as a military training area up to the early 1950s. The dynamic nature

of this part of the Norfolk coast is shown by records of sea floods going back to the 13<sup>th</sup> century, while the famous floods of 1938 and 1953 led to the building of major coastal defence works, including the construction of the Sea Palling reefs and the 14 km-long Happisburgh - Winterton seawall. This has had significant effects on the stability of the system and the groundwater quality, while doing its job of keeping the North Sea out of the Norfolk Broads and peoples' living-rooms.

The system remains dynamic, with occasional major erosion events, most notably from 1997 to 2003 when the dune line in front of Winterton village retreated by around 80 m, stopping just in front of the Beach Road café, which would have been a sad loss, especially considering the quality of its cakes. Winterton Ness, a mobile sand promontory, currently lies just to the north of the car park and continues to move north, providing a large area of embryonic and fore-dunes which have in places buried the seawall and many of the original wooden groynes, as well as providing nesting habitat for what in some years is Britain's largest Little Tern colony.

Interest in the area is high; with permissive open access over most of the dunes and dune heath, it is used by a combination of holidaymakers, dog walkers, naturalists and those who just like to be in one of Norfolk's most unusual and attractive coastal areas. The work described in the accompanying papers has greatly expanded our knowledge of this beautiful NNR, enhancing the lives of all who know and love the area.

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# Winterton Dunes Report

## Beetles of Winterton Dunes

*Martin J. Collier*

### Old records

Winterton has received less attention, in terms of beetle recording, than some other Norfolk coastal sites with sand dune systems, e.g. Scolt Head (Welch 1986) and Holkham (Sage 1996, 2001, 2003, 2017). Even the Invertebrate Site Register (Foster 1987) only managed to offer two beetles in a list of invertebrates with Nationally Notable (Scarce) or Red Data Book status recorded from Winterton, and one of these almost certainly no longer occurs there (see *Cicindela maritima* in Species of interest below). The earliest records from Winterton I have entered on the Norfolk Beetle Database are from 1901 (Elliott & Morley 1901) and there are variable but generally low numbers of records from most decades from the 1950s onwards. The resulting totals, up to the end of 2013, were just 233 records, 21 recorders and a very modest 175 species.

### Recent records

More intensive recording work was carried out from 2014 to 2016, mainly using trapping methods. Pip Collyer and I set and maintained pitfall traps in a variety of habitats for periods in 2014 and 2015 (Table 1). In addition, beetles were caught in Malaise traps run by Tony Irwin during various times between 2014 and 2016. Combined with general field collecting, mainly when servicing these traps, this recording effort increased the number of beetle species to a somewhat more respectable total of 298.

### Conservation status

A full list of the 298 species recorded at Winterton is provided in Appendix 1 and 25 (8%) of these have conservation statuses. Hyman (1992, 1994) produced the first

**Table 1. Pitfall trap location and habitat.**

Date range	Grid references <sup>1</sup>	Habitat
16.v.2014 – 23.vi.2014	TG49522038	Yellow dunes with marram
	TG49342046	Lichen heath
	TG49202046	Lichen & heather heath
17.ix.2014 – 16.ii.2015	TG48982035	Heather
	TG49342076	Yellow dunes with marram
	TG49162092	Grey dunes
	TG49152081	Heather & moss (sometimes flooded)

<sup>1</sup> Centre point in a row of five traps, approximately ten metres apart.

comprehensive accounts of the conservation status of British beetles in a two-part Review of the Scarce and Threatened Coleoptera of Great Britain, in which qualifying species were allocated Nationally Notable (Scarce) or Red Data Book (RDB) statuses. These classifications are now out of date and revisions are currently in progress, with reviews of individual or groups of families being released in 2010 (Foster), 2014 (Alexander; Hubble; Alexander, Dodd & Denton), 2016 (Lane & Mann; Telfer) and 2017 (Alexander; Lane), with remaining families to be covered over the next few years. These latest reviews use IUCN Guidelines classifications, with the addition of British Rarity Status categories (Nationally Rare or Nationally Scarce) for qualifying species. The statuses shown in Appendix 1 are from the most recent review available.

### Species of interest

*Cicindela maritima* The Dune Tiger Beetle formerly occurred at several Norfolk coastal sites, including Burnham Market



and Caister (Edwards 1893), Holme (Edwards 1914) and Winterton (Wakely 1952). However, after the terrible floods of 1953 this species was feared extinct in the county until it was found at Thornham Point in 1995 (Key 1996). This colony has developed into a thriving population spreading from Thornham Point to the eastern side of Titchwell and possibly further. Although I am not aware of any specific searches for this beetle at Winterton, it seems unlikely that such a large and active beetle would have gone unnoticed, especially as the site has become quite popular with wildlife watchers. It was last recorded at Winterton in 1951 (Wakely 1952).

*Cymindis axillaris* This Nationally Rare ground beetle (see photo) is associated with calcareous grassland, sandy heaths and shingle banks (Luff 1998). A few individuals were found at Winterton during 2014 and 2015 in pitfall traps set in lichen and heather heath, yellow dunes and grey dunes. There are old (up to 1980) county records from Wiveton Downs, Stanford Training Area and Weeting Heath but subsequent recording at these sites, including pitfall trapping, has failed to confirm its continued presence. The only other known county site is the RSPB reserve at Snettisham, where it was recorded in 1993 and 2008.



*Cymindis axillaris*. Josef Dvorak.

*Mantura chrysanthemii* This small, very local leaf beetle feeds on sheep's sorrel *Rumex acetosella* and other sorrels. Larvae mine the leaves and adults can be found on the plants or by grubbing at the roots. Most Norfolk records are from the Brecks. A few specimens were found at Winterton in pitfall traps, mainly in the grey dune area, during the winter trapping period of 2014-2015.

*Platynaspis luteorubra* In Britain, this small, hairy, myrmecophilous (ant-loving) ladybird is restricted almost entirely to south-east England and it has been recorded from several Norfolk Breckland sites. A single specimen was caught in a pitfall trap set in lichen heath at Winterton in May 2014.

*Scymnus limbatus* Adults of this very small (1.5-2.0 mm) ladybird feed on aphids and coccids and are usually found on deciduous trees in marshy areas. There are very few recent British records (Roy *et al.* 2011), although it is probably under-recorded due to its small size. In recent years it has only been recorded from two other Norfolk sites, one in each vice-county. A single specimen was caught in a Malaise trap at Winterton in 2014, in an area of lichen and heather heath with birch.

*Cryptorhynchus lapathi* The larvae of this scarce weevil (see photo) feed for two years in the stems of various willows *Salix* spp., where they cause the formation of galls (Duff 2016). A single specimen was caught in a Malaise trap at Winterton in 2014, in an area of birch *Betula*, lichen and heather heath. There are a few recent Norfolk records from the Broads and the Brecks but this is the first coastal site.

*Dytiscus dimidiatus* One of Britain's rarest (IUCN – Near Threatened) great diving beetles (*Dytiscus* spp.), this species prefers richly vegetated drains and ponds. It has been recorded from a very small number of Broadland and Breckland sites in





*Cryptorhynchus lapathi*. Frank Köhler.

Norfolk. A specimen identified by Nigel Cuming was found at Winterton dunes on 26 Feb 2014 by Mr A.P. Thompson.

*Leiodes longipes* Species in this genus are believed to feed on underground fungi, including truffles. *L. longipes* is associated with sandy habitats and there have been few British records in recent decades. It was recorded at Winterton on 31 Oct 1994 by Mark Telfer (det. Jon Cooter) and this is still the only county record.

*Sogda suturalis* This fungus beetle is associated with sandy coastal sites, where it probably breeds in underground fungi. This species has been recorded from only a few British sites but it is almost certainly under-recorded, not least because it seems to be most active during winter months. The first modern county record was from Blakeney Point in Nov 2013 (Harrison 2014) and subsequent targeted searches for this species during winter months by Steve Lane have added Old Hunstanton, Holme and Wells-next-the-Sea. Specimens were caught in pitfall traps at Winterton between Nov 2014 and Jan 2015.

*Oxypoda lurida* Two specimens of this rove beetle were caught in pitfall traps set in the dunes at Winterton between

Oct and Dec 2014, the first records for East Norfolk. Although not a particularly scarce beetle in Britain, the only previous county record, also of specimens caught in a pitfall trap, was from an arable field margin at Hilborough in May 2000, by Dr K. Haysom (det. Roger Booth).

### Acknowledgements

I am most grateful to all the recorders who sent me beetle records for Winterton and the other sites mentioned in the individual species accounts. I apologise for not naming these recorders individually but unfortunately there are too many to list in a short account like this. I also thank Tony Irwin for sorting and retaining the beetles from his Malaise trap samples, without which the species list would be far shorter.

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## Appendix 1. Coleoptera recorded from Winterton Dunes.

### Anthicidae

*Notoxus monocerus*  
*Omonadus floralis*

### Apionidae

*Apion frumentarium*  
*Aspidapapion aeneum*  
*Betulapion simile*  
*Ceratapion onopordi*  
*Exapion ulicis*  
*Perapion marchicum*  
*Protapion trifolii*

### Byrrhidae

*Byrrhus fasciatus*  
*Byrrhus pilula*

### Byturidae

*Byturus tomentosus*

### Cantharidae

*Cantharis bicolor*  
*Cantharis nigricans*  
*Cantharis pallida*  
*Cantharis rustica*  
*Cantharis thoracica*

*Rhagonycha fulva*

*Rhagonycha lignosa*

### Carabidae

*Acupalpus dubius*  
*Agonum fuliginosum*  
*Agonum muelleri*  
*Amara aenea*  
*Amara communis*  
*Amara convexior*  
*Amara familiaris*  
*Amara lunicollis*  
*Amara tibialis*



*Anchomenus dorsale*  
*Asaphidion curtum*  
*Bembidion aeneum*  
*Bembidion articulatum*  
*Bembidion iricolor*  
*Bembidion lunulatum*  
*Bembidion varium*  
*Bradycellus harpalinus*  
*Bradycellus ruficollis*  
*Bradycellus verbasci*  
*Brosicus cephalotes*  
*Calathus ambiguus* NS  
*Calathus erratus*  
*Calathus fuscipes*  
*Calathus melanocephalus*  
*Calathus mollis*  
*Carabus problematicus*  
*Cicindela campestris*  
*Cicindela maritima* NT/NR  
*Cymindis axillaris* NR  
*Dyschirius globosus*  
*Elaphrus cupreus*  
*Elaphrus riparius*  
*Harpalus affinis*  
*Harpalus anxius*  
*Harpalus smaragdinus* NS  
*Harpalus tardus*  
*Leistus ferrugineus*  
*Nebria brevicollis*  
*Nebria salina*  
*Notiophilus aquaticus*  
*Notiophilus biguttatus*  
*Notiophilus germinyi*  
*Paradromius linearis*  
*Philorhizus melanocephalus*  
*Poecilus versicolor*  
*Pterostichus diligens*  
*Pterostichus madidus*  
*Pterostichus minor*  
*Pterostichus niger*  
*Stomis pumicatus*  
*Syntomus foveatus*  
*Trechus obtusus*  
*Trechus quadristriatus*  
**Cerambycidae**  
*Rutpela maculata*  
**Chrysomelidae**  
*Aphthona euphorbiae*  
*Chaetocnema concinna*  
*Chrysomela populi*  
*Crepidodera fulvicornis*  
*Donacia versicolorea*  
*Lochmaea caprea*  
*Lochmaea suturalis*  
*Longitarsus dorsalis*  
*Longitarsus parvulus*  
*Luperus longicornis*  
*Mantura chrysanthemii* NS  
*Oulema duftschmidti*  
*Phyllotreta nigripes*

*Psylliodes chrysocephala*  
*Psylliodes marcida*  
*Sermylassa halensis*  
*Timarcha goettingensis*  
**Coccinellidae**  
*Adalia decempunctata*  
*Anatis ocellata*  
*Chilocorus bipustulatus*  
*Chilocorus renipustulatus*  
*Coccidula scutellata*  
*Coccinella hieroglyphica*  
*Coccinella septempunctata*  
*Coccinella undecimpunctata*  
*Halyzia sedecimguttata*  
*Harmonia axyridis*  
*Platynaspis luteorubra* Na  
*Propylea quattuordecimpunctata*  
*Rhyzobius litura*  
*Scymnus auritus*  
*Scymnus frontalis*  
*Scymnus limbatus* Nb  
*Scymnus suturalis*  
**Cryptophagidae**  
*Atomaria atricapilla*  
*Atomaria testacea*  
*Micrambe ulicis*  
**Curculionidae**  
*Andrion regensteinense*  
*Anoplus plantaris*  
*Archarius pyrrhocerus*  
*Archarius salicivorus*  
*Barypeithes pellucidus*  
*Ceutorhynchus erysimi*  
*Ceutorhynchus obstrictus*  
*Ceutorhynchus pallidactylus*  
*Coeliodinus rubicundus*  
*Coelositona cambricus*  
*Cryptorhynchus lapathi* Nb  
*Curculio venosus*  
*Micrelus ericae*  
*Orchestes quercus*  
*Orchestes rusci*  
*Otiorhynchus ovatus*  
*Otiorhynchus sulcatus*  
*Philopodon plagiatum*  
*Phloeotribus rhododactylus*  
*Phyllobius pyri*  
*Polydrusus cervinus*  
*Rhamphus pulicarius*  
*Rhinoncus castor*  
*Sitona hispidulus*  
*Sitona lineatus*  
*Tychius picirostris*  
**Dasytidae**  
*Dasytes aeratus*  
**Dryopidae**  
*Dryops luridus*  
**Dytiscidae**  
*Acilius sulcatus*

*Agabus bipustulatus*  
*Agabus nebulosus*  
*Colymbetes fuscus*  
*Dytiscus circumflexus*  
*Dytiscus dimidiatus* NT  
*Dytiscus marginalis*  
*Dytiscus semisulcatus*  
*Graptodytes pictus*  
*Hydroporus gyllenhali*  
*Hydroporus memnonius*  
*Hydroporus palustris*  
*Hydroporus planus*  
*Hydroporus pubescens*  
*Hygrotus confluens*  
*Hygrotus inaequalis*  
*Hygrotus parallelogrammus* NS  
*Hyphydrus ovatus*  
*Ilybius ater*  
*Ilybius fuliginosus*  
*Laccophilus minutus*  
*Liopterus haemorrhoidalis*  
*Rhantus frontalis* NS  
*Rhantus suturalis*  
**Elateridae**  
*Agriotes obscurus*  
*Agriotes pallidulus*  
*Agrypnus murinus*  
*Athous haemorrhoidalis*  
*Kibunea minuta*  
*Prosternon tessellatum*  
*Stenagostus rhombeus*  
**Geotrupidae**  
*Geotrupes stercorarius*  
**Gyrinidae**  
*Gyrinus marinus*  
*Gyrinus substriatus*  
**Haliplidae**  
*Haliplus ruficollis*  
*Peltodytes caesus* NS  
**Helophoridae**  
*Helophorus grandis*  
*Helophorus minutus*  
*Helophorus obscurus*  
**Heteroceridae**  
*Heterocerus fenestratus*  
**Histeridae**  
*Saprinus semistriatus*  
**Hydraenidae**  
*Ochthebius minimus*  
**Hydrochidae**  
*Hydrochus angustatus* NS  
**Hydrophilidae**  
*Anacaena globulus*  
*Anacaena limbata*  
*Anacaena lutescens*  
*Enochrus coarctatus*  
*Enochrus testaceus*  
*Helochares obscurus* V



*Helochares punctatus* NS  
*Hydrobius fuscipes*  
*Hydrophilus piceus* NT  
*Laccobius colon*  
*Laccobius minutus*  
*Sphaeridium lunatum*  
*Sphaeridium scarabaeoides*

#### Hygrobiidae

*Hygrobia hermanni*

#### Latridiidae

*Cartodere nodifer*  
*Corticarina minuta*  
*Corticarina gibbosa*  
*Enicmus transversus*

#### Leiodidae

*Agathidium laevigatum*  
*Catops chrysolaeloides*  
*Catops fuliginosus*  
*Leiodes furva* Nb  
*Leiodes longipes* RDBI  
*Sciodrepoides watsoni*  
*Sogda suturalis* RDBK

#### Malachiidae

*Anthocomus rufus*  
*Cordylepherus viridis*

#### Mordellidae

*Mordellistena neuwaldeggiana* NS

#### Nitidulidae

*Epuraea aestiva*  
*Epuraea biguttata*  
*Glischrochilus hortensis*  
*Meligethes aeneus*

#### Noteridae

*Noterus clavicornis*

#### Oedemeridae

*Oedemera lurida*

#### Phalacridae

*Olibrus aeneus*  
*Olibrus affinis*  
*Olibrus corticalis*  
*Stilbus testaceus*

#### Ptiliidae

*Ptenidium laevigatum*  
*Ptenidium nitidum*

#### Ptiniidae

*Anobium punctatum*

#### Rhynchitidae

*Caenorhinus mauerheimi*  
*Deporaus betulae*  
*Tennocerus nanus*

#### Scarabaeidae

*Aegialia arenaria*  
*Anomala dubia*  
*Aphodius contaminatus*  
*Aphodius prodromus*  
*Aphodius sphacelatus*  
*Serica brunnea*

#### Scirtidae

*Cyphon coarctatus*  
*Cyphon hilaris*  
*Cyphon ochraceus*  
*Cyphon padi*  
*Microcara testacea*

#### Scraptiidae

*Anaspis maculata*  
*Anaspis thoracica* NS

#### Silphidae

*Nicrophorus vestigator* Na  
*Silpha atrata*  
*Thanatophilus sinuatus*

#### Silvanidae

*Psammocerus bipunctatus*

#### Sphindidae

*Aspidiphorus orbiculatus*

#### Staphylinidae

*Aleochara bipustulata*  
*Aleochara intricata*  
*Aloconota gregaria*  
*Anotylus rugosus*  
*Anotylus sculpturatus*  
*Anthobium atrocephalum*  
*Anthobium unicolor*  
*Atheta triangulum*  
*Drusilla canaliculata*  
*Euasthetus laeviusculus*  
*Gnypeta carbonaria*  
*Ischnosoma splendidum*  
*Lathrobium brunneipes*  
*Liogluta longiuscula*  
*Mycetoporus rufescens*  
*Ocypus brunneipes*  
*Ocypus olens*  
*Ocypus ophthalmicus* Na  
*Olophrum piceum*  
*Omalium caesium*  
*Omalium rivulare*  
*Oontholestes murinus*  
*Othius laeviusculus*  
*Othius punctulatus*  
*Othius subuliformis*  
*Oxypoda acuminata*  
*Oxypoda lurida* Nb  
*Oxypoda opaca*  
*Philonthus carbonarius*  
*Philonthus varians*  
*Platydracus stercorarius*  
*Quedius fuliginosus*  
*Quedius levicollis*  
*Quedius nigriceps*  
*Quedius semiobscurus*  
*Rugilus orbiculatus*  
*Sepedophilus immaculatus*  
*Sepedophilus marshamii*  
*Sepedophilus nigripennis*  
*Stenus cicindeloides*  
*Stenus clavicornis*  
*Stenus geniculatus*

*Stenus impressus*  
*Tachyporus hypnorum*  
*Tachyporus nitidulum*  
*Trichiusa immigrata*  
*Xantholinus gallicus*  
*Xantholinus linearis*  
*Xantholinus longiventris*

#### Throscidae

*Trixagus dermestoides*

#### Tenebrionidae

*Crypticus quisquilius* NS  
*Isomira murina*  
*Lagria hirta*  
*Melanimon tibialis*  
*Phylan gibbus*

**Nomenclature:** Duff 2012

#### National status abbreviations

Current status, where available (various authors 2010-2017).

**NR** Nationally Rare (1-15 hectads)

**NS** Nationally Scarce (16-100 hectads)

**NT** Near Threatened

**V** Vulnerable

Older status, where no more recent review (Hyman 1992, 1994).

**Na** Nationally Scarce A (30 or fewer hectads)

**Nb** Nationally Scarce B (31-100 hectads)

**RDBK** Suspected to be of RDB status but species insufficiently known

**RDBI** Considered to be of RDB status but insufficient information to decide category (1, 2 or 3).



## Dragonflies of Winterton Dunes

*Pam Taylor*

Situated as it is on the east coast of Norfolk, Winterton Dunes is a significant site for dragonflies. Not only do the natterjack pools hold a suite of resident species, they have also proved attractive to an increasing number of incoming migrants in recent years. Data collected shows that since 2010 at least twenty-five different species have been recorded from the site. This equates to over two-thirds of the county's full dragonfly list.

**Southern Emerald Damselfly** *Lestes barbarus* was discovered for the first time in Britain at Winterton Dunes on 30 July 2002. The finder, Geoff Nobes, subsequently located two further males on 7 August the same year. Since these initial finds, the species has been recorded many times, but only a handful are seen in any one season. Maximum counts are usually in single figures. In some years however, none are reported at all. In 2010 a male was seen in early August and a female later that month. In 2012 up to five were seen together. 2013 was a particularly good year for the species with reports from 26 July to early September. There was a maximum count of six individuals including a pair and an ovipositing female. In fact, ovipositing was reported on four separate occasions that year. In 2014 singles were seen on 2 August and 7 August, then two females together on 3 September. There was a single sighting in 2015, on 1 August, and one on 18 August 2016. There is reason to believe the species may have established a small colony in the area, but this is still unproven. Equally the repeated sightings could stem from fresh immigrations from Europe.

**Small Red-eyed Damselfly** *Erythromma viridulum* first appeared at Winterton Dunes on 14 August 2001. The species was new to Britain as recently as 1999 and these Winterton records were the first for Norfolk. The initial influx numbered several hundred individuals, many of which paired and started ovipositing soon after arrival. Within days the numbers at Winterton had dropped significantly as individuals moved further inland to sites such as Catfield Fen, Scottow and Felbrigg. Further immigrations from the continent have continued in most years to the present time, with the dune pools proving a consistent draw for breeding pairs.

**Scarce Blue-tailed Damselfly** *Ischnura pumilio* is another migrant species to have reached Winterton Dunes. The first two individuals to be reported arrived in September 2012 and a small colony has since established at a nearby private site. One of the individuals from 2012 was an andromorph female; only the second ever record for Britain of this colour-form.

**Southern Migrant Hawker** *Aeshna affinis* was found at Winterton Dunes on 22 August 2010 when a single individual was seen. One of only a handful of records for this species in Norfolk so far, the sighting has not yet been repeated at this location. However, the situation could change in future years, because the species is now well established in Essex and spreading out quite rapidly from its initial colonies.

**Common Hawker** *Aeshna juncea* has a small, but apparently stable population at Winterton Dunes. This is important, because it is one of the few sites in Norfolk where this species can be found.



More usually associated with heaths and moorland in the west and north of Britain, this species favours the dune pools at Winterton and a few select marshes in east Norfolk. After a plea for records the previous year, several reports of the species were received from Winterton in 2013, including records of emergence.

**Norfolk Hawker** *Aeshna isosceles* has been recorded a few times from Winterton Dunes where it is considered a local migrant. The most recent sightings were of individuals in 2010 and 2011. It is unclear whether these originated from nearby broadland nature reserves or from continental Europe. Although usually a sedentary species, occasional wanderers are seen and colonies are now established as far afield as Cambridgeshire and Kent.

**Lesser Emperor** *Anax parthenope* is an increasingly frequent visitor to the southern half of Britain and there are now regular records from Norfolk, particularly from the Trinity Broads area just a few miles from Winterton. A single male was reported from Winterton Dunes on 27 May 2017.

**Hairy Dragonfly** *Brachytron pratense* is an infrequent visitor to the coastal dunes.

In common with Norfolk Hawker it is more usually associated with the dykes and marshes of several broadland nature reserves. However, individuals of this species were reported from Winterton in 2012 and 2015.

**Keeled Skimmer** *Orthetrum coerulescens* is another species of heathland sites and valley mires. The species formerly had only one breeding site in the county, at Holt Lowes, but in recent years it has spread to several new areas. As its numbers have increased, new colonies have been located at Buxton Heath, Beeston Common, Grimston Warren and other sites in west Norfolk. Wandering individuals have been recorded regularly at Winterton since 2013 when two males were found. On 22 July 2015 a further individual was observed, then in mid-August 2016 three males were seen together. There were also reports in both July and August 2017, but only single individuals were seen on each of these occasions.

**Yellow-winged Darter** *Sympetrum flaveolum* was once a regular visitor to Britain, but since 1995 occurrences have declined. Only four records exist for the species in recent years at Winterton with a single



**Keeled Skimmer**  
*Orthetrum coerulescens*.  
Mark Clements.





**Red-veined Darter**  
*Sympetrum fonscolombii*.  
Francis Farrow.

individual being seen on 6 August 2010 and three reports between 1 August 2015 and 7 August 2015. Interestingly, the 2015 records included both a male and a female on different days.

**Red-veined Darter** *Sympetrum fonscolombii* sightings have increased as those for Yellow-winged Darter have declined. In late June 2012 several pairs were seen ovipositing in the dune pools at Winterton. Further sightings occurred between June and August 2014, and between July and August 2015. In 2017 pairs and ovipositing were observed in May with more individuals, thought to have resulted from these early breeding attempts, being seen in August.

Other species to have been recorded at Winterton Dunes since 2010 include **Emerald Damselfly** *Lestes sponsa*, **Azure Damselfly** *Coenagrion puella*, **Common Blue Damselfly** *Enallagma cyathigerum*, **Blue-tailed Damselfly** *Ischnura elegans*, **Large Red Damselfly** *Pyrrhosoma nymphula*, **Southern Hawker** *Aeshna cyanea*, **Brown Hawker** *Aeshna grandis*, **Migrant Hawker** *Aeshna mixta*, **Emperor** *Anax imperator*, **Broad-bodied Chaser** *Libellula depressa*, **Four-spotted Chaser** *Libellula quadrimaculata*, **Black-tailed Skimmer**

*Orthetrum cancellatum*, **Ruddy Darter** *Sympetrum sanguineum* and **Common Darter** *Sympetrum striolatum*.

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## Flies (Diptera) of Winterton Dunes: part 1

*Tony Irwin*

### Introduction

Flies have diverse life-histories and are (generally) very mobile. The wide range of habitats at Winterton is fully exploited by the fly fauna, many adults taking advantage of feeding on wildflowers in open areas, while their larvae live in rotting wood, sandy soil, or in other invertebrates. To sample this diverse fauna, a variety of techniques were used, but the primary tool was a Malaise trap (Figure 1), a tent-like structure which guides flying insects up to a collecting jar containing alcohol. Large species are not sampled, as my traps are fitted with a quarter-inch steel mesh to exclude butterflies, dragonflies, bumblebees and larger moths and beetles. (This has the advantage that the samples are not full of moth scales!)

The advantages of Malaise traps are that they catch species that are flying early or late in the day, or at night (when entomologists are less likely to be active), and catch specimens in the winter, as long as the weather is clement. The problems are potential vandalism, the need for maintenance, and the time needed to process, sort and identify the large quantity of material that can be caught. Most flying



Figure 1. Malaise trap at Winterton. *Tony Irwin*.

insects (and quite a few crawling insects) are sampled, but clearly there is a bias as it relies on insects moving to catch themselves. Sedentary species tend not to be sampled.

The trap was used for 26 fortnightly sessions at 19 different sites on the reserve, from 29 April 2014 to 19 October 2014, then from 16 October 2015 to 30 April 2016, so that all months were covered. See Table 1.

In addition to the Malaise trap, flies were collected by general sweeping, rearing, hand searching, vacuum sampling, water traps, and funnel extraction. In addition, material was extracted from pitfall traps set for spiders and beetles. Older records were extracted from the literature and from the collections in Norwich Museum, and these were supplemented with casual records from other observers in the county.

There is still a large quantity of specimens to identify, particularly among the more difficult families, but so far nearly 450 species have been identified from Winterton. This paper is the first of two which will detail the flies of Winterton. A complete species list will appear in Part 2.

One term that may need explanation is parasitoid. This refers to a species in which the larva starts as an internal parasite of its host, but then consumes all of the host's internal organs, thus killing it. The following family accounts give an idea of the variety of flies found on the Reserve, their national status and points of interest.

### **Agromyzidae (leaf-mining flies)**

The leaf-miner flies were mostly common species, associated with *Juncus* and grasses, but no targeted searching for leaf mines was undertaken, so there are likely to be many more species to add.



**Table 1. Schedule of Malaise trapping at Winterton, 2014-2016.**

Start date	End date	Grid Ref	Habitat
29/04/2014	06/05/2014	TG48882026	<i>Molinia</i> and heather clearing in birch scrub
06/05/2014	16/05/2014	TG48812027	<i>Molinia/Ulex/Calluna</i> /birch/oak
16/05/2014	29/05/2014	TG48902046	heather/bracken/grey dunes
29/05/2014	13/06/2014	TG49052090	near pond in dunes
13/06/2014	28/06/2014	TG48712150	sallow near small peaty ponds in dunes
28/06/2014	12/07/2014	TG48522155	birch/lichen/heather
12/07/2014	26/07/2014	TG48642096	<i>Molinia</i> /birch/oak
26/07/2014	09/08/2014	TG49122050	<i>Molinia</i> /birch in slack (Note: this trap was vandalised)
09/08/2014	23/08/2014	TG49142097	yellow dunes - marram hillside
23/08/2014	07/09/2014	TG49112002	birch scrub/woodland
07/09/2014	21/09/2014	TG48992002	damp ride through birch wood
21/09/2014	05/10/2014	TG49342015	dune depression with birch
05/10/2014	19/10/2014	TG48982023	birch/pine/ <i>Molinia</i> /lichen heath
16/10/2015	31/10/2015	TG49181997	birch/oak wood with gorse/fern understorey
31/10/2015	15/11/2015	TG49181997	birch/oak wood with gorse/fern understorey
15/11/2015	27/11/2015	TG48962000	wet ditch at edge of birch scrub/ <i>Molinia-Juncus</i> area
27/11/2015	15/12/2015	TG48962000	wet ditch at edge of birch scrub/ <i>Molinia-Juncus</i> area
15/12/2015	30/12/2015	TG48942024	birch scrub/wood with <i>Molinia</i> tussocks
30/12/2015	16/01/2016	TG48942024	birch scrub/wood with <i>Molinia</i> tussocks
16/01/2016	30/01/2016	TG48942024	birch scrub/wood with <i>Molinia</i> tussocks
30/01/2016	13/02/2016	TG48862045	gorse/heather/ <i>Molinia</i>
13/02/2016	27/02/2016	TG48862045	gorse/heather/ <i>Molinia</i>
27/02/2016	12/03/2016	TG48762068	birch grove among <i>Molinia</i>
12/03/2016	26/03/2016	TG48762068	birch grove among <i>Molinia</i>
26/03/2016	09/04/2016	TG48712083	<i>Molinia</i> /gorse beside heather
09/04/2016	30/04/2016	TG48712083	<i>Molinia</i> /gorse beside heather

### **Anthomyiidae (root flies and shoot flies)**

Apart from the ubiquitous species of *Delia* which are major crop pests, there were a few more interesting species. The nationally scarce *Pegomya conformis* is a leaf miner of *Chenopodium*, while the more widely distributed *Phorbia moliniaris* is a stem miner of *Molinia*, so not surprising that it was taken in abundance. It appears to be previously unrecorded in Norfolk.

### **Asilidae (robber-flies)**

The robber flies are easy to spot (though difficult to catch) while they sunbathe on

paths and other areas of bare sand. Some species such as *Neoitamus cyanurus* are



*Philonicus albiceps*. Steven Falk.



associated with the more wooded areas of the site, while *Dioctria baumhaueri* preys on ichneumon wasps among scrub. Others, like *Dysmachus trigonus* are to be found hunting in open areas on the fixed dunes. *Philonicus albiceps* is an insect of the yellow dunes, where it hunts primarily for flies. Most asilid larvae are presumed to be predatory, but observations are lacking for many species.

### Bombyliidae (bee-flies)

The tiny grey *Phthiria pulicaria* is a nationally scarce species associated (mostly) with



*Phthiria pulicaria* female. Steven Falk.

coastal sand dunes throughout much of Britain. Its larva is thought to be a parasitoid of gelechiid moths. It is not as obvious as its more widespread springtime cousin, *Bombylius major*, which also feeds on flowers, and whose hosts are *Andrena* and other solitary bees. The Dune Bee-fly *Villa modesta* differs from the two previous species in having a very short proboscis. Lepidoptera larvae are thought to be the hosts of this species.



*Villa modesta*.  
Male  
Muckleburgh  
Hill Nick  
Owens.

### Canacidae (beach-flies)

Two *Tethina* species, *T. grisea* and *T. illota*, are regularly blown from their normal habitat on the beach to more sheltered spots among the dunes, but although the immature stages are largely unknown, it is likely that they depend on jetsam for their development.

### Chamaemyiidae (silver-flies)

Species of *Chamaemyia* can be very abundant on coastal grasslands, including dunes, and two species (*C. herbarum* and *C. sylvatica*) have been recorded at Winterton. They feed on coccid scale insects on grasses. *Leucopis atritarsis* is a predator of aphids on nettles, and looks rather like a miniature hoverfly larva.

### Chaoboridae (phantom-midges)

Two species of phantom midges were trapped at Winterton: *Chaoborus crystallinus* and *C. flavicans*. While the former can breed in small water bodies such as dune ponds and drainage ditches, *C. flavicans* is generally associated with much larger bodies of water, and it seems likely that they came from one of the broads at Horsey, Martham or Ormesby, over 2.5 kilometres away. They serve as a reminder that nature reserves are not closed systems, and surrounding habitats can influence the faunal composition of any site.

### Chloropidae (grass-flies)

Of the chloropids identified so far, two deserve mention, though neither is rare. *Elachiptera brevipennis* is a tiny (1.5 mm) species with reduced wings. It is flightless, and spends its time buried in grass tussocks. Special searching techniques are required to find it. The other species is much more obvious. *Meromyza pratorum* is large for a chloropid (up to 6 mm!) bright lime-green with black stripes, with swollen hind femora, and is easily found by sweeping.

### Chyromyidae (chyromyid flies)

This small family of little-known flies is represented at Winterton by *Gymnochyromyia*





*Meromyza pratorum* female. Steven Falk.

*inermis* and *Gymnochiromyia mihalyii*. It is likely that both species are associated with bird nests. Flies in this family have bright metallic green or copper-coloured eyes, and females exhibit physogastry: enormous swelling of the abdomen as the eggs mature.

#### Conopidae (thick-headed flies)

The black and yellow *Conops* species, which are parasitoids of wasps and bumblebees, can be found feeding on flowers, but the plain brown *Sicus ferrugineus* appears to be the more abundant species at Winterton. It has only been recorded on bumblebees.



*Sicus ferrugineus* male. Steven Falk.

#### Culicidae (mosquitoes)

Three species of mosquito were recorded during the survey. *Ochlerotatus punctor* and *Culiseta annulata* both feed on mammalian blood, including humans. The third species was reared from larvae collected in one

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of the dykes which was notable for the abundant water-violet (*Hottonia plaustris*). This was *Culiseta fumipennis*, a species that is seldom caught, perhaps because it does not feed on humans at all. It is most likely to be a bird or amphibian feeder.

#### Dolichopodidae (long-legged flies)

The wing-waving *Poecilobothrus nobilitatus* is abundant on some of the reserve's ponds, while species of *Dolichopus* and *Gymnopternus* also occur more widely across the dunes, where they catch their small insect prey. Species of this family are often associated with damp areas, so finding thirty-two species on the reserve is interesting. Seven of these were in the genus *Medetera*, which prefer drier conditions, probably because of their larval requirements.

#### Drosophilidae (vinegar-flies)

Apart from the more common native species of drosophilid, the alien *Drosophila suzukii* was trapped in abundance at several sites across the reserve in September and October 2014, and from October 2015 to January 2016. The lack of captures prior to September 2014 is likely to be because the species had not yet arrived on the reserve, the September records being the first for Norfolk, and at the time the most northerly location in Britain. It appears to be a specialist feeder on soft fruit, including blackberries, so is likely to be a permanent resident at Winterton now. Male *D. suzukii* are distinguished from other British *Drosophila* in having a dark spot at the tip of the wing. This species was described from Japanese specimens in 1931, and recorded as widespread in SE Asia at that time. By 1980 it had arrived in Hawaii, then mainland North America by 2008 and Italy by 2009. No doubt the global shipment of soft fruit contributed to its recent spread.

#### Empididae (dance-flies)

*Rhamphomyia caliginosa* is a nationally scarce species associated with high quality wetlands. Its life-history is unknown, but



it occurs widely throughout southern England and Wales. Of the twenty species of dance-fly collected on the reserve, eight are in *Hilara*, a genus which is generally associated with wet conditions.

### **Ephydriidae (shore-flies)**

Despite their English name, this family contains a number of species that are associated with well-drained sandy soils. Among them is the tiny *Nostimapieta*, seldom spotted in the field, but often abundant in vacuum samples. It is thought that the young stages probably graze on blue-green algae in the soil. *Discomyza incurva* is a flightless species, with short black wings, that breeds in the liquefied remains of moribund snails. In that sense, it has an aquatic larva, but is usually found in dry grass heaths. One of the more typical sand dune species is *Philygria punctatonervosa*, which can be very abundant, but whose life-history is unknown. Other species of ephydriids are more typically associated with fresh- or salt-water habitats, and may be found around the ponds, in the drainage ditches, or on the beach.

### **Heleomyzidae (heleomyzid flies)**

This family includes many species that are associated with mammal burrows and bird nests. Nine of them occur at Winterton, and one, *Oecothea praecox*, is regarded as nationally scarce, although it occurs widely across England and Wales, with a couple of records in Scotland. It seems to require rabbit, fox or badger burrows for larval development, and is usually found in the spring. The Winterton specimens were caught in April and May.

The other important group of heleomyzids are the fungus-feeding *Suillia* species, of which eight have been recorded at Winterton. As the larvae feed in fungal fruiting bodies, they have to complete their development quickly, and spend most of the year in the pupal stage with the adults emerging in the autumn to mate and lay eggs.



*Liptoptena cervi*. Steven Falk.

### **Hippoboscidae (flat-flies)**

The Deer Ked *Lipoptena cervi* is a parasitic fly that feeds on deer. The female fly retains the egg, and nourishes the larva, eventually producing a fully-fed larva that pupates immediately on laying. When the adults emerge, they are fully winged and fly around seeking a host, sometimes accidentally landing on people if they are available. When they find a suitable host, the wings are shed, and they stay on that host for the rest of their lives.

### **Hybotidae (small dance-flies)**

Among the fourteen species of *Platypalpus* recorded at Winterton, *P. praecinctus* is regarded as nationally scarce. Most records of this species are from wetlands throughout southern and central England. The single female was taken at a small peaty pool just behind the yellow dunes.

### **Keroplastidae (fungus gnats)**

Seven species of this family have been recorded at Winterton. *Pyratula perpusilla* is nationally scarce, with records from a variety of habitats in southern England and Wales. Its biology is unknown, but the larvae of other members of the family are predators, creating webs of toxic slime under bark and dead wood. The Winterton specimens were taken at several sites, including scrub, grey dunes and yellow dunes.





*Pseudolyciella pallidiventris* female. Steven Falk.

### **Lauxaniidae (lauxaniid flies)**

Where a species is recently added to the British list, or is in a group that is not extensively collected, the lack of records may indicate genuine rarity, or it may indicate that the species is under-recorded. Such species are often classified as 'data deficient' and a decision on conservation status is delayed until more targeted collecting can be done. *Pseudolyciella pallidiventris* is one of these species. It had previously been confused with another, more common species, and although there is a good spread of records across England and Scotland, it is not yet clear whether the species should be given nationally scarce status. *Sapromyza quadricincta* is a better-known species that is nationally scarce with records across southern England and Wales.

### **Muscidae (house-flies, etc.)**

The nationally scarce *Helina quadrinotata* is a rather undistinguished looking fly, known from sand dunes at a few scattered localities in East Anglia, Northern England and Scotland. It was last recorded from Winterton in 1933, and from Britain in 1976.

*Helina protruberans* is a similar species, with records from dunes around the coast of Great Britain. Although there are lots of records of this species, both it and *H.*

*quadrinotata* live in a threatened habitat, so they retain their conservation status.

### **Mycetophilidae**

Among this large family of fungus gnats, forty-seven species have been identified from Winterton. *Mycetophila deflexa* is a 'data deficient', recently described species, known from a few wooded sites in southern England and East Anglia, while *Cordyla insons* is nationally scarce, with a scattering of sites across Scotland, and a few in England. The biology of these species is unknown.

### **Opomyzidae (opomyzid flies)**

Several species of this family are found commonly and abundantly among grasses and low vegetation. Among the six species found at Winterton, *Opomyza lineatopunctata* is considered nationally scarce. It is widespread throughout England and Wales, and is also known from Argyll, but appears to be local. Its preferred niche is within the base of grass tussocks, so it is probably under-recorded using standard collecting techniques.

### **Phaeomyiidae (millipede-parasite flies)**

*Pelidnoptera fuscipennis* is a medium sized rather drab brown fly with darkened wings that used to be included in the Sciomyzidae (the snail-killing flies). However a related species, *P. nigripennis*, has been discovered to be a parasitoid of millipedes (*Ommatoiulus* spp.) and this fact, together with some larval characteristics, has prompted its move to a separate family. *P. fuscipennis* is thought to have a similar biology, but this needs confirmation, if anyone fancies keeping millipedes as pets to see what hatches out!

### **Phoridae (scuttle-flies)**

*Aenigmatias lubbockii* is a 'data deficient' species, known from a few scattered localities in Southern England and Scotland. It is a parasite of *Formica* species, two of which were collected with *A. lubbockii* specimens at Winterton: *F. fusca* and *F. lemani*. Of the two, *F. fusca* predominated in



the catches, and is known to be a host for *A. lubbockii*, whereas *F. lemani* has never been recorded as a host. So we can conclude that *Formica fusca* is the most likely host for this species at Winterton. The wingless females of *A. lubbockii* look like tiny immature cockroaches, and it is difficult to understand how they are caught in Malaise traps. However the winged males carry the earth-bound females with them during the mating flight, in order to colonise new ants' nests, and thus into a trap designed for flying insects. An earlier record from Winterton (in 1983) derives from specimens caught in a pitfall trap.

### **Piophilidae (skipper-flies)**

Two species of these carrion-flies are recorded from Winterton, where they feed on dry carcasses, after the greenbottles and bluebottles have finished. Neither *Allopiophila vulgaris* nor *Prochyliza nigrimana* is scarce, but they do rely on a supply of carcasses to keep them going. At Winterton this is likely to be rabbit-based, with the occasional bonanza of a dead seal on the beach.

### **Pipunculidae (big-headed flies)**

The big heads of these flies are mainly eyes. Both male and females have excellent vision (the males to find the females, and the females to find their plant-hopper prey). *Tomosvaryella minima* has been given the status 'near threatened', indicating that there are few recent records. It is known from sand dunes and dry, sandy heaths in East Anglia and S. Wales. Members of this genus are internal parasitoids of leaf hoppers of the family Cicadellidae. The Winterton record dates from 1930.

### **Sarcophagidae (flesh-flies and satellite-flies)**

The nationally scarce *Miltogramma germari* is found in scattered sandy localities in Southern England and South Wales, with a 2003 record from Winterton. The larvae feed on food stores of *Colletes* bees. Like many species in this family, the females fly behind the bees at a fixed distance while

they follow them to their burrows. This has given them the name 'satellite flies' (see p. 9).

The related flesh-flies are commonly seen sunning themselves on paths in the dunes. Some of the species do feed on carrion, but the larger species are actually parasitoids of earthworms, while several are specialists feeding on terrestrial snails.

### **Sciomyzidae (snail-killing flies)**

Only a few species of sciomyzids were caught at Winterton, perhaps because of their sedentary nature. Two of the more remarkable-looking species are *Sepedon sphaecea* and *Trypetoptera punctulata*. The former is a slender black and silver fly with long red legs and long antennae, perhaps mimicking an ichneumon wasp. The larva is an active aquatic snail predator, killing several dozen individuals of a variety of species in its lifetime. *Trypetoptera* is a parasitoid/predator of terrestrial snails, but in appearance is very like a species of *Tephritis* (Tephritidae). The wing pattern is so similar that *T. punctulata* is regularly declared to be a new species of *Tephritis* by dipterists who have not met it before. Whether its appearance is a result of mimicry or coincidence is difficult to say. Some oriental Tephritidae are known to sequester poisons from their foodplants, so that they are distasteful to predators. If the same is true for our *Tephritis* species, that



*Trypetoptera punctulata* female. Steven Falk.



would provide the evolutionary pressure for *Trypetoptera* to mimic *Tephritis*.

### **Sepsidae (black scavenger-flies)**

Twelve species of the ant-like sepsids were trapped during the survey, though they are all fairly common. The larvae are an important component of the 'recycling team', feeding on dung and decaying animal and vegetable matter. Unlike many other families, the records were just from April to October, and there was no sign of them during the winter months.

### **Sphaeroceridae (lesser dung-flies)**

Of the fourteen species of sphaerocerid at Winterton, eight were found only in the Malaise trap, two were caught only in pitfall traps, one by hand searching only, and one in the vacuum sampler only. The remaining two were found in both pitfall and Malaise traps. This demonstrates the advantage of using a variety of sampling techniques. They occurred throughout the year, mostly in low numbers, and it is likely that there are several more species to be added to the list.

### **Stratiomyidae (soldier-flies)**

So far, only rather common terrestrial species of stratiomyid have been found on the reserve.

### **Syrphidae (hoverflies)**

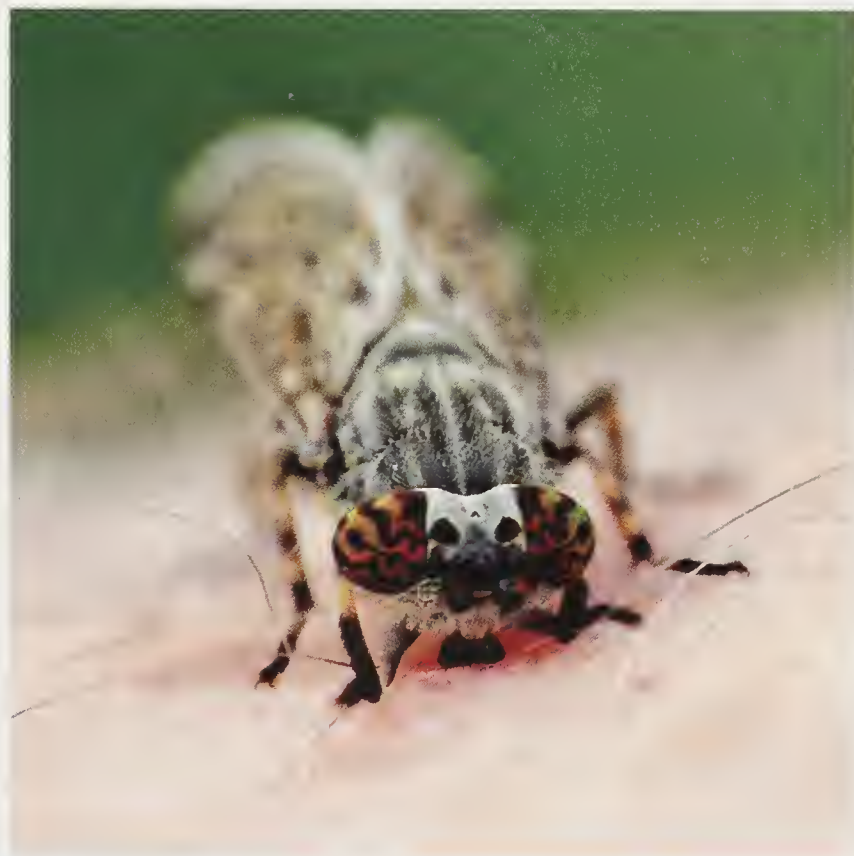
See separate paper by Stuart Paston, p. 51.

### **Tabanidae (horse-flies)**

*Haematopota pluvialis* and *Hybomitra bimaculata* have been caught on the reserve. Both will bite people and livestock, but fortunately the larger *H. bimaculata* is less frequent.

### **Tachinidae (parasite-flies)**

Species in this family are well-known as parasitoids of caterpillars, but they have evolved to use all sorts of invertebrates as hosts. Adults are commonly found feeding on flowers, or flying low over the ground looking for potential hosts. The following notes concern those Winterton species



*Haematopota pluvialis* female. Tony Irwin.

which are rare, or have more interesting life histories.

*Actia lamia* is listed as notable. The larvae parasitize caterpillars of Tortricidae.

*Chetogena acuminata* is classified as vulnerable. It is a parasite of dune-dwelling tenebrionid beetles, and was last recorded in Britain in 1933. In this country, it is only known from Winterton, Great Yarmouth and Felixstowe. Unfortunately it was not found during the current survey.

*Erynnia ocypterata* is regarded as vulnerable. It is only known from a few scattered sites in East Anglia and southern England. The larvae of this species are parasitoids of various micromoth caterpillars. It was caught during May in birch/oak scrub between rear of dunes and adjacent farmland.

*Loewia foeda* is a specialist parasitoid of large *Lithobius* centipedes, and is classified as notable.

*Germaria angustata* is vulnerable. The most recent British record is 1993 (from Winterton). It is known from most of the Norfolk dune systems from Holme to Winterton, as well as one site in Essex and two in Kent, and is probably parasitic on dune caterpillars.



*Ocytata pallipes* is a common species that develops in earwigs (*Forficula auricularia*).

*Phebellia villica* is classified as near threatened. Its host is the Coxcomb Prominent moth, *Ptilodon capuchina*, and the last British record is from 1955. It is known with certainty from Norfolk, Dorset, Kent and Warwickshire, and is not restricted to sand dunes.

*Siphona geniculata* is a common species that attacks Tipulidae larvae (leatherjackets).

The widespread but local *Tachina grossa* is the largest British tachinid, jet black with an orange head and wing bases, very fat and spiky. It relies on large Lasiocampidae moth caterpillars for its development. In recent years it has been very abundant at some coastal localities, including Winterton, which must be a reflection of how its host species are faring.



*Tachina grossa*. Steven Falk.

### Tephritidae (picture-wing flies)

The larvae of this family are plant feeders, tunnelling into the leaves, flower heads or fruit of their host plants, or causing galls. The five species recorded from Winterton feed in thistles or other Asteraceae.

### Trixoscelididae (trixoscelid flies)

Three of the five British species are recorded from Winterton. One of them, *Trixoscelis marginella*, is regarded as nationally scarce, with a wide but local British distribution on sandy heaths and dunes. Its biology is unknown.



*Acrosathe annulata* male. Steven Falk.

### Therevidae (stiletto-flies)

Three species are known from Winterton: *Thereva nobilitata*, *T. bipunctata* and *Acrosathe annulata*. While *T. nobilitata* is found widely in a variety of habitats (including gardens), the other two are associated with (mostly coastal) dunes, the brown-coloured *T. bipunctata* tending to favour fixed dunes, whereas *A. annulata* is more often found in mobile dunes, where its silvery colour allows it to sit unnoticed on the sand. The narrow, elongate larvae wriggle through soil and sand to catch their prey, but the feeding habits of the adults remain a bit of a mystery.

### Xylomyiidae (wood soldier-flies)

*Solva marginata* is a local species that is associated with dead wood, especially poplar, where the larvae feed under the bark on rotting organic material. The black and yellow adults look similar to some wasp-mimicking sawflies.

### Part 2

In Part 2 of this paper, I will cover the families Calliphoridae, Ceratopogonidae, Chironomidae, Rhinophoridae, Sciaridae, Scathophagidae and further Chloropidae, Phoridae and Muscidae, as well as giving a full list of species in each family including those covered in this paper.

### Acknowledgements

I am very grateful to a number of individuals who have helped in the production of this paper.



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For casual records, Tim Hodge and Martin Greenland.

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The literature on British Diptera is widely scattered, and listing all the works consulted in the preparation of this paper would not be helpful. Fortunately the Dipterists Forum website has comprehensive lists of books and papers that deal with specific families. For biological information, Chandler (2010)

is considered the most useful, while the JNCC/NE status reviews contain a wealth of information about the scarcer species.

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## Winterton Dunes Report

# Hoverflies (Diptera) of Winterton Dunes

## Stuart Paston

### Introduction

This report draws on personal observations made on two visits to Winterton Dunes NNR in 2014 along with determinations of syrphid material from a Malaise Trap operated by Tony Irwin in the same year (see Tables 1 & 2) and historical data forwarded by Norfolk Biodiversity Information Service. The main source of the historical data is the Hoverfly Recording

Scheme which indicates there has been patchy recording in the past and four site additions were made during the research period.

For a site of such extent, current knowledge suggests Winterton Dunes NNR supports a modest list of species reflecting in large part the homogenous nature of its habitat. However the species list is clearly far from comprehensive; it seems very unlikely



for instance that such a common and widespread species as *Eupeodes luniger* is absent!

### Species overview

There are no hoverfly species on the Norfolk list that are specific to dune habitat and the majority of the species occurring at Winterton Dunes are those that may be encountered in a variety of open dry habitats. Some of these are migratory species that will inevitably turn up in numbers at coastal locations during periods of influx from the near continent. Members of this group belong to the genera *Episyrphus*, *Eupeodes*, *Scaeva*, *Sphaerophoria* and *Syrphus*, all of which have aphidophagous larvae. *Syrphus pipiens*, whose larvae develop in a range of decaying organic matter, is also suspected of long distant movement on occasions (Stubbs & Falk 2002). One resident species at Winterton that is likely to be widespread is *Paragus haemorrhous*, a small black hoverfly that mimics solitary hymenopterans in appearance and behaviour and is liable to be overlooked as such. Its larvae predate aphids on low-growing plants. An old record of interest is that of *Sphaerophoria philanthus* which was found at TG4820 and TG4920 in 1991 but has not been recorded since. This species is very scarce in East Anglia where it is stated to be confined to major heathlands (Ball *et al.* 2011). There are only three other Norfolk site records, none of which are from this century (*op. cit.*) which suggests it may have been lost to the county. Elsewhere in the UK it is said to be one of the commonest *Sphaerophoria* sp. to occur on western coastal dunes (Stubbs & Falk 2002). Among other older site records are *Cheilosia illustrata*, *Cheilosia scutellata* and *Leucozona lucorum* which are likely to originate from the Burnley Hall estate where suitable habitat in or bordering woodland can be found. Three site additions were made from Malaise trap material. Two of these species, *Anasimyia contracta* and *Trichopsomyia flavitarsis*, will have originated from wetland areas

inland from the dunes whilst *Platycheirus angustatus* occurs in a variety of grassland situations.

### Floral sources

With few exceptions, hoverflies as a group regularly visit flowers for nectar and pollen but no research on floral sources used at Winterton was undertaken. However plants very likely to be important include blossom of willows *Salix* spp., brambles *Rubus* spp., ragworts *Senecio* spp., other yellow composites and Yarrow *Achillea millefolium*.

### Observations made in 2014

The first of two visits to Winterton Dunes NNR made by the author in 2014 occurred on 16 May when members of the research

**Table 1. Malaise trap site details.**

Trap	Location	Habitat	Period
A	TG490209	Near pond in dunes	29 May – 13 June
B	TG485215	Birch/lichen/heather	28 June – 12 July
C	TG491200	Birch scrub/woodland	23 Aug – 7 Sept
D	TG489200	Ride through birch wood	7 Sep – 21 Sept

**Table 2. Hoverflies taken in Malaise trap 2014.**

Specimens determined by the author. Species in bold are site additions.

Species	A	B	C	D
<i>Anasimyia contracta</i>		1m		
<i>Episyrphus balteatus</i>	1m	1f		
<i>Eupeodes corollae</i>	1f	5f		
<i>Melanostoma mellinum</i>		2f		
<i>Melanostoma scalare</i>			1f	1m 1f
<i>Paragus haemorrhous</i>		1m 2f		
<i>Platycheirus albimanus</i>		1m		
<b><i>Platycheirus angustatus</i></b>		2m		
<i>Scaeva pyrastris</i>	1m			
<i>Syrphus ribesii</i>		1m		
<b><i>Trichopsomyia flavitarsis</i></b>		2m 4f		



group were given permission to sample part of the Burnley Hall estate. Although the weather was set fair there were few hoverflies to be seen and the only records related to *Eristalis pertinax*, a male hovering beside oak *Quercus robur* TG490200 (apparently a first site record for this very common species) and *Syrphus ribesii*, with several males hovering within woodland TG489200. The second visit was made on 13 June when once again syrphids were scarce and time spent on the dunes produced just two species with around 10 male *Episyrphus balteatus* observed hovering within sheltered willow *Salix* sp. scrub TG487215 and a single *Helophilus pendulus* seen near a pond TG490209.

### Winterton Dunes NNR Hoverfly species list

The systematic order follows Stubbs & Falk (2002). Year at right is that of last record.

#### Sub-family: Syrphinae

##### Tribe: Bacchini

<i>Melanostoma mellinum</i> (Linnaeus, 1758)	2014
<i>Melanostoma scalare</i> (Fabricius, 1794)	2014
<i>Platycheirus albimanus</i> (Fabricius, 1781)	2014
<i>Platycheirus angustatus</i> (Zetterstedt, 1843)	2014
<i>Platycheirus clypeatus</i> agg.	1991
<i>Platycheirus peltatus</i> agg.	1968

##### Tribe: Paragini

<i>Paragus haemorrhous</i> , Meigen 1822	2014
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##### Tribe: Syrphini

<i>Episyrphus balteatus</i> (Degeer, 1776)	2014
<i>Eupeodes corollae</i> (Fabricius, 1784)	2014
<i>Leucozona lucorum</i> (Linnaeus, 1758)	1993
<i>Meliscaeva auricollis</i> (Meigen, 1822)	1993
<i>Scaeva pyrastris</i> (Linnaeus, 1758)	2014
<i>Sphaerophoria philanthus</i> (Meigen, 1822)	1991
<i>Sphaerophoria scripta</i> (Linnaeus, 1758)	2003
<i>Syrphus ribesii</i> (Linnaeus, 1758)	2014

#### Sub-family: Eristalinae

##### Tribe: Cheilosini

<i>Cheilosia illustrata</i> (Harris, 1780)	1964
<i>Cheilosia scutellata</i> (Fallen, 1817)	1993

##### Tribe: Eristalini

<i>Anasimyia contracta</i> Clauss. & Torp, 1980	2014
<i>Eristalis abusivus</i> Collin, 1931	1964
<i>Eristalis intricarius</i> (Linnaeus, 1758)	1964
<i>Eristalis pertinax</i> (Scopoli, 1763)	2014
<i>Eristalis tenax</i> (Linnaeus, 1758)	2012

<i>Helophilus pendulus</i> (Linnaeus, 1758)	2012
<i>Trichopsomyia flavitarsis</i> (Meigen, 1822)	2014

##### Tribe: Volucellini

<i>Volucella inanis</i> (Linnaeus, 1758)	2012
<i>Volucella pellucens</i> (Linnaeus, 1758)	1993

##### Tribe: Xylotini

<i>Syritta pipiens</i> (Linnaeus, 1758)	1993
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### Acknowledgments

My thanks to Nicola Dixon of NBIS for supplying historical records.

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## Bees and aculeate wasps of Winterton Dunes

*Tim Strudwick*

### Aculeate habitats at Winterton

On a calm late summers day with the Heather *Calluna vulgaris* in bloom, Winterton Dunes is quite literally buzzing with bees and wasps, but it is not always so. Pollen and nectar sources on the dunes may be seasonally abundant but are limited in diversity, and in the spring and early summer are very thin on the ground. The sandy substrate is in places too unstable for many ground-nesting species, and with almost constant wind, frequent sand blasting and almost permanent drought conditions, coastal dunes can be a difficult place for a flying insect to live.

Unsurprisingly, sand dunes support a characteristic assemblage of bees and wasps that are adapted to the challenges of this environment. Most of these are ground nesters, some adapted to loose sand but others requiring firmer soil which they find where the sand is bound by roots or compacted by human feet. All are dependent on a degree of ground disturbance, by wind, water or animal activity, to maintain suitable nest sites. As well as dune specialists, there are also species at Winterton best characterised as species of heathland (some dependent on heather), grassland, wetland or scrub and woodland, and many of these find nest sites in stems of Bramble *Rubus fruticosus* agg., Elder *Sambucus nigra* and Common Reed *Phragmites australis* or dead wood. Many generalist species visit the dunes from adjacent gardens, woodland and farmland to take advantage of seasonal abundance of nectar and pollen or nest sites, and the mass of honey bees *Apis mellifera* and many of the bumblebees *Bombus* spp. that visit in late summer fall into this category.

This survey recorded 42 bee and 47 wasp species between 2014 and 2017. The records came from seven visits by the author, surveying by hand netting and field observation, and one by Nick Owens and Tim Hodge. Visits took place between April and August, but April and May visits were in less than ideal temperatures and early species may be particularly under-represented for this reason. Many records also came from Malaise and water traps deployed by Tony Irwin which contributed many species that were not detected by other survey methods. The extensive areas of woodland and damp grassland with restricted access were not considered to have great potential to support an important aculeate fauna and the surveys primarily targeted the mobile and fixed dunes within the NNR. All records have been submitted to NBIS and BWARS. Species recorded, with survey methods, and historical records are listed in Appendix 1.

### Bees and wasps at Winterton

Throughout the spring and summer, bumblebees are the most conspicuous aculeates on the dunes, and in the spring, when gorse, sallow and a few dandelions *Taraxacum* spp. are the only pollen sources, nest searching and foraging queens can be the only aculeates to be seen. Later in the summer, when heather and Bramble are in flower, huge numbers of bumblebees visit from the surrounding countryside and village. Among the thirteen *Bombus* species recorded during this survey, White-tailed Bumblebee *B. lucorum* is perhaps the most abundant species, and Heath Bumblebee *Bombus jonellus* is the most notable (see below). Two species seen in the 1960s, Red-shanked Carder Bee *Bombus ruderarius*



and Moss Carder Bee *B. muscorum*, have declined markedly in East Anglia and are likely to be locally extinct.

As spring progresses, a succession of yellow-flowered Asteraceae attracts a range of bees that specialise on their pollen. These include three small dark 'furrow-bee' species, *Lasioglossum leucozonium*, *L. villosulum* and *L. brevicorne*, and *Andrena humilis* which all favour Common Cat's-ear *Hypochaeris radicata* and similar 'hawkish' species. In June, three almost identical plasterer bee species start to appear; *Colletes daviesanus*, *C. fodiens* and *C. similis*, often on Common Ragwort *Senecio jacobaea* but seeming to prefer the Tansy *Tanacetum vulgare* outside the NNR along Beach Road. *C. fodiens* has the dubious distinction of being the only bee species extant in Norfolk that is on the European Red Data list due to large declines in many N European countries. In late summer, Common Ragwort also attracts the blue-eyed *Osmia spinulosa*, the second brood of the smartly-banded *Andrena flavipes*, its cleptoparasite *Nomada fucata* and the large and distinctive *Dasypoda hirtipes*, whose long, bushy pollen collecting hairs on the hind legs have recently given rise to a common name of Pantaloon Bee.

Brambles play havoc with an insect net, but the flowers are great places to observe bees at eye level, including the two dune specialist leafcutter bees, *Megachile maritima* and *M. leachella*. The latter species also frequents Greater Birds-foot Trefoil



*Megachile leachella*, Winterton. Nick Owens.

*Lotus pedunculatus*, and is one of the most abundant bees at Winterton, nesting in large conspicuous aggregations on E and S facing slopes on fixed dunes throughout the site. Bramble flowers are also a good place to find the cleptoparasite of *M. maritima*, *Coelioxys conoidea*, and the ubiquitous *Andrena dorsata*, though these species will use a wide range of flowers.

From July to September, the flowering heather attracts large numbers of bees, including three that are heather-dependent. These are *Colletes succinctus*, its cleptoparasite *Epeolus cruciger* and *Andrena fuscipes*. The cleptoparasite of *A. fuscipes*, *Nomada rufipes*, has been recorded just north at Horsey so is likely to be present at Winterton.

Spider-hunting wasps are well-represented at Winterton with eleven species recorded. These wasps tend to keep to vegetation or move very rapidly across open ground so are not easy to observe and most records came from water or malaise traps. While easily recognisable as a family by their long-legged form and distinctive movements, alternating short flights and running and with constant nervous wing-flicking, most are extremely difficult to identify to species. Two that are not are the uniquely blue-grey *Pompilus cinereus*, which prefers the mobile dunes, and *Episyron rufipes* with diagnostic red legs and white-spotted abdomen which was abundant, flying around the edge of bare ground patches everywhere.

Social wasps dislike very dry habitats and the few that were encountered on the dunes were close to trees and scrub to the west of the site. Mason wasps also like damp conditions since they need to collect water to moisten soil to build their nest cells and are scarce at Winterton, with just two *Ancistrocerus trifasciatus*, a species associated with willows, appearing in malaise and water traps on this survey, and single previous records of *A. gazella* and *A. scoticus*. Perhaps the most unexpected



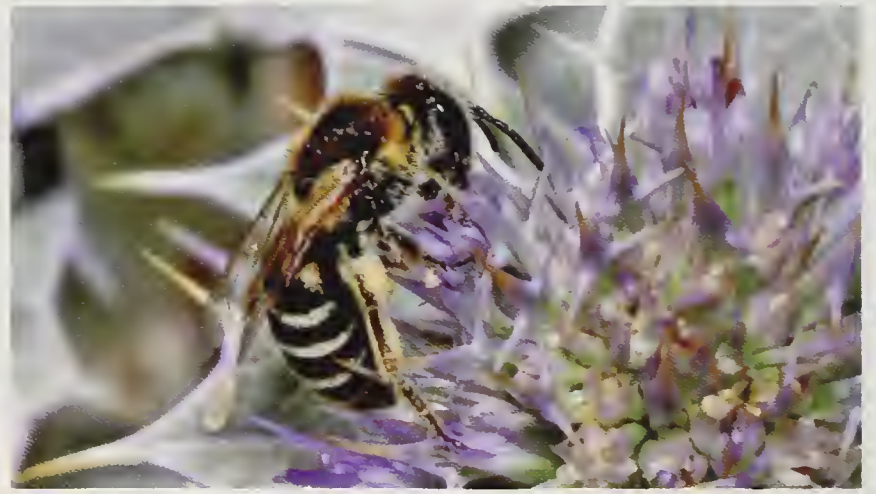
record of the survey was two tiny male *Microdynerus exilis*, the smallest mason wasp and a rare species in Norfolk, as discussed below.

The sand wasps *Ammophila arenaria* and the more chunky and hairy *Podalonia hirsuta* and *P. affinis* were often the most conspicuous wasps at Winterton. On warm days from May onwards these large black and red wasps were frequently seen chasing each other across bare sandy ground or hunting moth larvae in the marram on both mobile and fixed dunes.

Among the many digger wasps present, three of the larger species were conspicuous among the heather flowers, *Cerceris arenaria* nectaring, *Mellinus arvensis* hunting flies (and males hunting females) and the Bee-wolf *Philanthus triangulum*, stalking honey bees. The flowers of Apiaceae, generally good places to find digger wasps, were in short supply at Winterton. *Ectemnius continuus* and *Gorytes quadrifasciatus* were found on the very few patches of Hogweed *Heracleum sphondylium* and on Milk Parsley *Peucedanum palustre* in the dune slacks. The all black *Tachysphex nitidus* and black/red *Tachysphex pompiliformis* were both found where short grass, where they hunt grasshopper nymphs, and bare ground to nest occurred together. The dune-specialist *Oxybelus argentatus* and *O. mandibularis*, both recorded previously but not on this survey, were probably just missed. These and many other smaller digger wasps run or fly very rapidly over bare ground or stick to thick vegetation and can be hard to see and even harder to catch. Seven small digger wasp species were only detected with malaise and water traps.

### Some notable species

***Bombus jonellus* (Apidae).** Though given the common name Heath Bumblebee, this species appears to be absent from many heaths in Norfolk, perhaps because they are too dry, and it is more of a coastal species. *B. jonellus* was seen on five dates



*Colletes marginatus*, Scolt Head. Nick Owens.

between May and August throughout the fixed dunes and in reasonable numbers so clearly has a strong population.

***Colletes marginatus* (Colletidae).** This scarce bee has a sparse coastal population between Snettisham and Weybourne and a much stronger Breckland population. Winterton is an isolated eastern outpost and the population is evidently very small with just a single male recorded 19 July 2017 and another previously on 26 July 2008. It is known to collect pollen from many plant families though where present it seems to favour Wild Mignonette *Reseda lutea*.

***Lasioglossum brevicorne* (Halictidae).** A male was found on 24 August 2014 and then large numbers of females were recorded on yellow Asteraceae throughout the stable dunes on 27 May 2017, when it was the most abundant solitary bee, and on 19 June 2017. These are the first records for VC27 of this Breckland specialist which may well be a recent colonist at Winterton.

***Goniozus claripennis* (Bethyridae).** Bethyrids are rather obscure aculeate wasps that are left out of most books due to the difficulty of identifying them or indeed of finding them. They are very under-recorded in the UK, and it is pleasing to record this group. *G. claripennis* is a parasitoid on microlepidoptera larvae and a male from a malaise trap on 29 May 2014, determined by John T Burn, is the first record for VC27 and the third for Norfolk.



*Cleptes semiauratus* (Chrysididae). This parasitoid of a common currant sawfly, *Nematus ribesii*, is an enigma. Once common in gardens, it is now very rarely recorded, most often on dry, sandy sites where it may be using a different host. 5 July 2015 was the second post-2000 record from Norfolk.

*Hedychridium cupreum* (Chrysididae). This tiny 'jewel wasp', a parasitoid of the digger wasp *Dryudella pinguis*, was recorded on ground disturbed by vehicles near the concrete blocks at Winterton Ness on 27 June 2015 and 19 June 2017. Previously recorded only from Scolt Head, Thetford Warren and Santon Warren, these are the fourth and fifth Norfolk records.

*Anteon jurineanum* (Dryinidae). A female from a Malaise trap on 29 May 2014, determined by John T Burn (in the same trap on the same day as *Goniozus claripennis*) was the first Norfolk record of this parasitoid of leafhoppers.

*Lonchodryinus ruficornis* (Dryinidae). Found in Malaise traps on 12 July 2014 and 9 August 2014, determined by John T Burn, these are the first Norfolk records of this parasitoid of leafhoppers.

*Anoplius caviventris* (Pompilidae). This black spider-hunting wasp was found in a Malaise trap on 5 July 2014 providing the fifth Norfolk record for this rare wasp. All other records are from Broadland fens where it is known to nest in reed stems, sometimes in the vacated galls of *Lipara lucens* (Diptera: Chloropidae).

*Vespula rufa* (Vespidae). A male on 24 August 2014 near the south boundary of the NNR was only the eighth post-2000 Norfolk record of this apparently scarce social wasp species.

*Microdynerus exilis* (Vespidae). Two males of this tiny mason wasp were netted by the concrete walled track onto the beach at Winterton Ness on 19 June 2017, and had possibly emerged from nests in

chestnut palings or marram stems. This is only the 5<sup>th</sup> Norfolk site in for this nationally scarce species and is atypical since this wasp is usually found in more sheltered environments.

## Conclusions

For such a prominent site of conservation significance, surprisingly few old records could be found in the public domain, so it is hard to judge if the aculeate fauna has changed over time. Between the 1960s and 2012, and mostly within the last 25 years, eight bee and 16 wasp species were recorded at Winterton that were not found during this survey. Four of the bees (*Bombus muscorum*, *B. ruderarius*, *Andrena nigriceps*, *Coelioxys rufescens*) have declined nationally and may well have been lost from the site. For most of the others there is no obvious reason why any should have been lost and it is considered likely that most were present but overlooked during this survey.

Michael Archer (2015) has compared solitary bee and wasp records at 21 English dune systems including Winterton. He described a characteristic fauna of 54 species which were frequently recorded on dunes, and 47 of these have been found at Winterton. He listed 22 species which had the greater part of their UK range on sand dunes, and 11 of these are found at Winterton (identified in Table 1). Species diversity ranged from 118 species at Sandwich Bay, Kent to 25 at Bamburgh, Northumberland. He found no correlation between dune area and species diversity, but he did notice a geographical influence, with E coast sites supporting fewer species than S and W coast sites. Even in an E coast context, Winterton looks rather species-poor with only 63 species, compared with 67 in North Norfolk and 91 at Gibraltar Point. However, the 2014-17 survey found 72 solitary species at Winterton, giving an all-time count of 93 species, so variation in survey effort could explain Archer's low species count.



A few expected common *Andrena* and *Lasioglossum* mining bees and their associated *Nomada* and *Sphecodes* cleptoparasites do seem to be strangely absent at Winterton and this may be down to the limited range of pollen and nectar sources on the predominant acidic soil of the fixed dunes.

### Acknowledgements

I am grateful to Tony Irwin for the very many excellent records that came from his malaise and water traps, to Tim Hodges and Nick Owens for their records, to John Burn

for determination of DEBs and to Nick for commenting on the draft of this paper.

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### Appndix 1. Aculeate wasps and bees recorded at Winterton Dunes during this survey by different recording methods, with additional records from the previous 25-year period and earlier.

Family <sup>1</sup>	Species	2014-2017 survey			1989-2013	Pre-1989
		Net <sup>2</sup>	Malaise	Water		
<b>BEES</b>						
<b>Andrenidae</b>	<i>Andrena bicolor</i>	+				
	<i>Andrena dorsata</i>	+			+	
	<i>Andrena flavipes</i>	+				
	<i>Andrena fuscipes</i>	+			+	
	<i>Andrena humilis</i>	+				
	<i>Andrena nigriceps</i>				+	
<b>Apidae</b>	<i>Andrena nigroaenea</i>	+		+		
	<i>Anthophora furcata</i>	+				
	<i>Apis mellifera</i>	+			+	
	<i>Bombus campestris</i>				+	+
	<i>Bombus hortorum</i>	+			+	
	<i>Bombus hypnorum</i>	+				
	<i>Bombus jonellus</i>	+		+		
	<i>Bombus lapidarius</i>	+		+	+	
	<i>Bombus lucorum</i> agg.	+	+	+	+	
	<i>Bombus muscorum</i>				+	+
	<i>Bombus pascuorum</i>	+		+	+	
	<i>Bombus pratorum</i>	+		+	+	
	<i>Bombus ruderarius</i>					+
	<i>Bombus rupestris</i>	+				+
	<i>Bombus sylvestris</i>	+			+	
	<i>Bombus terrestris</i>	+		+	+	
	<i>Bombus vestalis</i>	+		+	+	+
	<i>Epeolus cruciger</i>	+			+	
	<i>Epeolus variegatus</i>	+			+	+
	<i>Nomada fucata</i>	+				
<b>Colletidae</b>	<i>Colletes daviesanus</i>	+				
	<i>Colletes fodiens</i>	+			+	+
	<i>Colletes marginatus</i> <sup>3</sup>	+			+	



Family <sup>1</sup>	Species	2014-2017 survey			1989-2013	Pre-1989
		Net <sup>2</sup>	Malaise	Water		
	<i>Colletes similis</i>	+				
	<i>Colletes succinctus</i>	+			+	
	<i>Hylaeus brevicornis</i>	+				
	<i>Hylaeus hyalinatus</i>	+			+	
<b>Halictidae</b>	<i>Halictus rubicundus</i>	+				
	<i>Halictus tumulorum</i>	+		+		
	<i>Lasioglossum brevicorne</i>	+				
	<i>Lasioglossum leucozonium</i>	+			+	
	<i>Lasioglossum villosulum</i>	+				
	<i>Sphecodes puncticeps</i>	+		+		
	<i>Sphecodes reticulatus</i>	+				
<b>Megachilidae</b>	<i>Coelioxys conoidea</i> <sup>3</sup>	+			+	
	<i>Coelioxys elongata</i>				+	
	<i>Coelioxys inermis</i>				+	
	<i>Coelioxys rufescens</i>				+	
	<i>Megachile leachella</i> <sup>3</sup>	+	+	+	+	
	<i>Megachile maritima</i> <sup>3</sup>	+			+	
	<i>Megachile versicolor</i>	+	+			
	<i>Osmia spinulosa</i>	+				
<b>Melittidae</b>	<i>Dasydoda hirtipes</i> <sup>3</sup>	+			+	
<b>ACULEATE WASPS</b>						
<b>Bethylidae</b>	<i>Goniozus claripennis</i>		+			
<b>Chrysididae</b>	<i>Chrysis ignita</i> agg.	+	+	+		
	<i>Chrysis mediata</i>				+	
	<i>Cleptes semiauratus</i>		+			
	<i>Hedychridium ardens</i>	+		+	+	
	<i>Hedychridium cupreum</i>	+				
	<i>Pseudomalus auratus</i>		+			
<b>Crabronidae</b>	<i>Cerceris arenaria</i>	+			+	
	<i>Crabro cribrarius</i>				+	
	<i>Crossocerus megacephalus</i>	+				
	<i>Crossocerus podagricus</i>		+		+	
	<i>Crossocerus quadrimaculatus</i>				+	
	<i>Crossocerus wesmaeli</i>				+	
	<i>Dryudella pinguis</i>				+	
	<i>Ectemnius continuus</i>	+				
	<i>Ectemnius lapidarius</i>				+	
	<i>Gorytes quadrifasciatus</i>	+			+	
	<i>Harpactus tumidus</i>		+		+	
	<i>Mellinus arvensis</i>	+		+	+	
	<i>Nysson trimaculatus</i>				+	
	<i>Oxybelus argentatus</i> <sup>3</sup>				+	
	<i>Oxybelus mandibularis</i> <sup>3</sup>				+	
	<i>Oxybelus uniglumis</i>	+	+		+	
	<i>Passaloecus corniger</i>		+			
	<i>Passaloecus gracilis</i>		+			
	<i>Passaloecus insignis</i>		+			



Family <sup>1</sup>	Species	2014-2017 survey			1989-2013	Pre-1989
		Net <sup>2</sup>	Malaise	Water		
	<i>Pemphredon inornata</i>		+			
	<i>Pemphredon lethifer</i>		+	+	+	
	<i>Philanthus triangulum</i>	+			+	
	<i>Psenulus pallipes</i>	+		+	+	
	<i>Tachysphex nitidus</i>	+	+	+	+	
	<i>Tachysphex pompiliformis</i> <sup>3</sup>	+	+	+	+	
	<i>Trypoxylon attenuatum</i>				+	
	<i>Trypoxylon figulus</i>				+	
<b>Dryinidae</b>	<i>Anteon jurineanum</i>		+			
	<i>Lonchodryinus ruficornis</i>		+			
<b>Pompilidae</b>	<i>Anoplius caviventris</i>		+			
	<i>Anoplius infuscatus</i>	+				
	<i>Anoplius nigerrimus</i>		+			
	<i>Anoplius viaticus</i>				+	
	<i>Arachnospila anceps</i>			+		
	<i>Arachnospila consobrina</i> <sup>3</sup>				+	
	<i>Arachnospila spissa</i>				+	
	<i>Arachnospila trivialis</i>	+		+		
	<i>Dipogon subintermedius</i>			+	+	
	<i>Episyron rufipes</i>	+	+	+	+	
	<i>Evagetes crassicornis</i>	+	+	+		
	<i>Pompilus cinereus</i>	+		+	+	
	<i>Priocnemis parvula</i>	+				
	<i>Priocnemis perturbator</i>			+		
<b>Sphecidae</b>	<i>Ammophila sabulosa</i>	+	+	+	+	
	<i>Podalonia affinis</i> <sup>3</sup>	+		+	+	
	<i>Podalonia hirsuta</i> <sup>3</sup>	+	+	+	+	+
<b>Tiphiidae</b>	<i>Myrmosa atra</i>		+	+		
<b>Vespidae</b>	<i>Ancistrocerus gazella</i>				+	
	<i>Ancistrocerus scoticus</i>					+
	<i>Ancistrocerus trifasciatus</i>		+	+		
	<i>Microdynerus exilis</i>	+				
	<i>Vespula germanica</i>	+				
	<i>Vespula rufa</i>	+			+	
	<i>Vespula vulgaris</i>	+			+	

<sup>1</sup> Family classification and names follow Else, Bolton and Broad (2016).

<sup>2</sup> Includes species that were identified in the field.

<sup>3</sup> Identified by Archer (2015) as largely restricted to dunes.



*Megachile maritima*, male, Winterton. Nick Owens.



## Winterton Dunes Report

# Spiders of Winterton Dunes

### *Pip Collyer*

A total of 88 species from 17 families was recorded over an approximately 12 month period. The highlight was the recording of a new species for Britain, *Syedra myrmicarum*. As the name suggests, this small money spider is associated with ant nests and this inaccessibility may mean that it is not as rare as this first record would suggest. I am grateful to Peter Harvey and Peter Merritt of the British Arachnological Society for identifying the spider which had previously been recorded from Central Europe. It has since been found in a Bedfordshire churchyard.

As would be expected, wolf spiders (family Lycosidae) were present in good numbers, the dominant species being *Pardosa monticola*, a spider with a widespread but local distribution. *Alopecosa barbipes*, the Norfolk records of which are mainly from the Brecks, was present in small numbers as was *Arctosa perita*, a spider with an



*Alopecosa barbipes*. Andy Bloomfield.

abdominal pattern which makes it difficult to spot in sandy habitats. The ant mimic *Micaria silesiaca* (Nb), which appears to be in decline, was present in good numbers in the sparsely vegetated lichen-covered areas at Winterton. This is the only record of the species in Norfolk and apparently the most northerly record in Britain for this spider.

Records for species associated with sand dunes included *Baryphyma maritimum* (Nb), *Ceratinopsis romana* (Nb) and *Pelecopsis nemoralioides*, all from the Linyphid family. Other records of note were the six-eyed spider *Oonops pulcher* (family Oonopidae) with only two other records for the species in the County.

### Recording methodology and records

The main method of recording was pitfall traps. This was supplemented by hand searching, vacuum sampling and the by-catch from Malaise traps set by Tony Irwin. The pitfall traps were serviced jointly by Martin Collier, the county beetle recorder, and myself. Four lines (T1-T4) each consisting of five traps 10 metres apart were set between 16 May 2014 and 23 June 2014, the locations being chosen as far as possible to cover the different habitats offered by the site. Then between 17 September 2014 and



*Pardosa monticola*. Andy Bloomfield.



16 February 2015 three lines (T1a – T3a), each again containing five traps 10 metres apart, were set in a different part of the site. Details of the grid references and brief habitat descriptions are given in Table 1.

A complete list of the species recorded is given in Appendix 1.

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**Table 1. Sampling points.**

No.	Grid ref.	Habitat
T1	TG49522038	Yellow dunes (marram)
T2	TG49342046	Lichen heath
T3	TG49202046	Lichen and heather
T4	TG48982035	Dense heather
T1a	TG49342076	Yellow dunes
T2a	TG49162092	Grey dunes
T3a	TG49152081	Dense heather

## Appendix 1. Spiders recorded at Winterton Dunes.

### Dysderidae

*Dysdera crocata*

### Oonopidae

*Oonops pulcher*

### Theridiidae

*Episinus angulatns*

*Crustulina guttata*

*Steatoda phalerata*

*Steatoda albomaculata*

*Anelosimus vittatus*

*Simitidion simile*

*Neottinra bimaculata*

*Enoplognatha ovata sens. str.*

*Enoplognatha thoracica*

*Robertus lividus*

*Pholcomma gibbum*

### Linyphiidae

*Walckenaeria acuminata*

*Walckenaeria antica*

*Walckenaeria alticeps*

*Walckenaeria atrotibialis*

*Walckenaeria dysderoides*

*Hypomma bituberculatum*

*Baryphyma maritimum*

*Gonattum rubens*

*Peponocranium indicum*

*Pocadicnemis juncea*

*Oedothorax gibbosus f. tuberosus*

*Pelecopsis nemoralioides*

*Ceratinopsis romana*

*Tiso vagans*

*Araeoncus humilis*

*Erigone dentipalpis*

*Ostearius melanopygius*

*Porrhomma microphthalmum*

*Agyneta subtilis*

*Agyneta conigera*

*Microneta viaria*

*Syedra gracilis*

*Syedra myrmicarum*

*Centromerus prudens*

*Centromerus dilutus*

*Centromerita concinna*

*Bathyphantes gracilis*

*Floronia bucculenta*

*Stemonyphantes lineatus*

*Tenuiphantes tenuis*

*Tenuiphantes zimmermanni*

*Tenuiphantes cristatus*

*Pallidiphantes ericaens*

*Microlinyphia pusilla*

### Tetragnathidae

*Pachygnatha degeeri*

*Metellina segmentata sens. str.*

*Metellina mendei*

### Araneidae

*Aranens diadematus*

*Zygiella x-notata*

*Zygiella atrica*

*Argiope bruennichi*

### Lycosidae

*Pardosa monticola*

*Pardosa palustris*

*Pardosa pullata*

*Pardosa nigriceps*

*Alopecosa pulverulenta*

*Alopecosa cuneata*

*Alopecosa barbipes*

*Trochosa terricola*

*Arctosa perita*

*Pirata hygrophilus*

### Pisauridae

*Pisaura mirabilis*

### Hahniidae

*Hahnia nava*

### Dictyidae

*Argemma subnigra*

### Liocranidae

*Agroeca proxima*

*Scotina gracilipes*

### Clubionidae

*Clubiona comta*

*Clubiona diversa*

*Clubiona subtilis*

*Cheiracanthium erraticum*

### Gnaphosidae

*Drassodes cupreus*

*Haplodrassus signifer*

*Haplodrassus dalmatensis*

*Zelotes electus*

*Zelotes latreillei*

*Drassyllus pusillus*

*Micaria pulicaria*

*Micaria silesiaca*

### Zoridae

*Zora spinimana*

### Philodromidae

*Philodromus cespitum*

*Tibellus oblongus*

### Thomisidae

*Xysticus cristatus*

*Xysticus kochi*

### Salticidae

*Heliophanus flavipes*

*Euophrys frontalis*

*Talavera aequipes*



## Lichens of Winterton and Horsey Dunes

*Peter Lambley*

### Introduction

Winterton Dunes have been known as a site where lichens are an important component of the vegetation for at least sixty years. Although whilst Steers and Jensen (1952) refer to the abundance of lichens in the vegetation they then only specifically mention two species. When a report was produced under contract to the Nature Conservancy Council in 1984 (Fletcher *et al.* 1984) it was only graded at 4, that is of Regional Importance. However, in the intervening years there has been a considerable increase in our knowledge of the British lichen flora and the range of sites and habitats. Winterton Dunes were visited as part of a post-AGM excursion in January 2010 by the British Lichen Society (Lambley 2010). Neil Sanderson, who is based in Hampshire and has been studying New Forest Heaths, visited in April 2012 and added some very important new records.

If the 1984 survey and report were repeated now it is likely that the Winterton-Horsey complex would be regarded as of national significance (Grade 2), as it has the most

extensive lichen communities developed on acid sand dunes on the east coast of England. Additionally, it supports populations of a number of species rare in England, but which are more widespread in Scotland especially on the eastern side. These might be best considered as a Boreal element in the British lichen flora. Using a grading system which has recently been developed to assess heaths for their lichen communities, the CCP (*Cetraria*, *Cladonia* *Pycnothelia* index) (Sanderson 2017); Winterton with Horsey scores 21 which makes it of sufficient status to be notified as an SSSI for its lichen interest alone.

### Range of habitats

The large proportion of the site is dominated by grey dunes which are stable and either dominated by *Calluna* (H1 in the National Vegetation Classification, Rodwell 1991); or a *Carex arenaria*-*Cornicularia aculeata* (syn. *Cetraria aculeata*) dune community with *Corynephorus* and *Ammophila*, (Probably SD11 in the National Vegetation Classification, Rodwell 2000). The pebble ridges mentioned and shown



Lichen community on the landward side of the dunes at Winterton, dominated by *Cladonia arbuscula*.  
*Peter Lambley.*



**Open Heather community at Winterton with lichens including *Cladonia portentosa* and *C. floerkeana*.** Peter Lambley.



in some photographs in Steers & Jensen (1952) are no longer visible, presumably covered by blown sand. Some scrub has developed particularly in the slacks with *Populus tremula* and, especially towards the landward side of the dunes, with *Betula pubescens* and *Quercus robur*. Unusually for a British sand dune system, there is also an extensive area of *Betula-Quercus* woodland at the landward edge of the dunes. To judge by the 1946 aerial photographs, much of this woodland has developed since that date. A feature of this woodland is the stunted form of many of the oaks.

### Lichen flora of the dunes

Away from the mobile dunes which front the coast there appears to be no clear relationship between the distance from the sea and the terrestrial lichen communities. The most obvious element of the lichen flora is the extensive carpets of the bushy, richly-branched cladonias of the subgenus *Cladina*, the reindeer lichens. Extensive carpets of *Cladonia arbuscula* with smaller amounts of *C. portentosa*, *C. ciliata* var. *tenuis* and more rarely *C. ciliata* var. *ciliata* occur in the more open sandy areas where it is associated with the SD11 *Carex arenaria-Cornicularia aculeata* (syn. *Cetraria aculeata*) dune community (in particular the *Ammophila*

*arenaria* sub-community) (Rodwell 2000). Few other lichen species are associated with this mat community although *C. gracilis* can be frequent, and *C. uncialis* ssp. *biuncialis*, *Cetraria aculeata* and the rarer *Cetraria muricata* also occur. All these species are relatively fast-growing lichens and with their growth form appear able to compete with vascular plants. However, particularly nearer the car park, the mats are less extensive and Grey Hair-grass *Corynephorus canescens* more abundant. In this community *Cetraria aculeata*, *Cladonia crispata*, *C. foliacea*, *C. furcata* and *C. graciliis* become more prominent. *Cladonia foliacea* particularly favours areas where sand is partly exposed and is sometimes found fruiting in these situations. Heather *Calluna vulgaris* dominates much of the dunes on the landward side with two variants, both within what is best classified as the H1 *Calluna vulgaris-Festuca ovina* heath in the NVC. In one, the gaps between the *Calluna* bushes are filled with luxurious carpets of *Cladonia arbuscula*, and smaller amounts of *C. portentosa* and *C. ciliata* var. *tenuis*. It is perhaps in the margins of this habitat that the rare *Cladonia uncialis* ssp. *uncialis* occurs.

The other variant occurs in the south of the site where there is an area of more open



*Calluna* heath which again most closely fits the H1 community (Rodwell 1991), where the open spaces support a broken bryophyte community with a more diverse range of lichens, including the following which are frequent: *Cetraria aculeata*, *Cladonia gracilis*, *C. subulata* and the red-fruited species, *C. coccifera* s.s., *C. diversa* and *C. floerkeana*. The *Cladina* lichens, *Cladonia arbuscula* and *C. portentosa*, whilst present, do not form large clumps. Other species present include: *C. foliacea*, *C. furcata*, *C. glauca*, *C. ramulosa*, *C. subulata*, *C. uncialis* ssp. *biuncialis* and *Hypogymnia physodes*. In places *H. physodes* can be found as a terrestrial lichen, but is more common as an epiphyte on *Calluna*. Two other species grow on *Calluna* stems forming crusts, *Micarea nitschkeana* and *Scoliciosporum chlorococcum*.

### Flora of the woodland

Whilst the dune heath is the key habitat for lichens, the woodland is not without interest and contributes significantly to the overall importance of the site for lichens.

The woodland at the rear of the dunes is a mix of *Quercus robur* and *Betula pubescens* with a little *Salix cinerea* and in places *Rhododendron ponticum*, interspersed with glades dominated by *Calluna vulgaris*. Unlike the lichen flora of trees in most of Norfolk, there is little evidence of the impact of nitrogen compounds. The stunted oaks are clothed with luxurious *Evernia prunastri*, a species rarely seen in Norfolk in this condition and with *Parmelia sulcata* often dominant on the branches. In places, *Evernia* forms wreaths on the ground around the tree trunks. Other species on the oaks include abundant *Hypogymnia physodes*, *Lecanora chlarotera*, *Lepraria incana* (on the trunks), *Melanelixia glabratula*, and *M. subaurifera*. The branches, and to a lesser extent the trunks, also support large thalli of *Flavoparmelia caperata* and the following: *Lecanora expallens*, *L. symmicta*, *Opegrapha herbarum*, *Ramalina farinacea*, *R. fastigiata* and occasionally *Usnea subfloridana*.

*Hypotrachyna afrorevoluta* is also present on *Salix*. Oaks in slightly more exposed situations support *Lecidella elaeochroma* and *Xanthoria parietina*, which are probably a response to the maritime influence.

The birch has a more impoverished flora as is usual in Norfolk but the following were recorded on it: *Evernia prunastri*, *Lecanora carpinea*, *L. chlarotera*, *L. conizaeoides*, *L. symmicta*, *Melanelixia subaurifera*, *Physcia tenella* and *Xanthoria parietina*.

A grove of *Populus tremula* in a dune slack supported a lichen flora with *Diploica canescens*, *Evernia prunastri*, *Lecanora chlarotera*, *L. expallens*, *Parmelia sulcata*, *Physcia tenella*, *Punctelia subrudecta* and *Xanthoria parietina*.

### Artificial habitats (concrete)

A number of concrete manhole covers linked to the undersea telephone cable and also old wartime concrete anti-tank defences in the middle of the site support a limited but typical flora of this habitat with *Aspicilia contorta*, *Caloplaca holocarpa* s.l., *Candelariella aurella* f. *aurella*, *Catillaria chalybeia* var. *chalybeia*, *Diplotomma alboatrum*, *Lecania erysibe*, *Lecanora dispersa*, *L. albescens*, *L. campestris*, *Lecidella stigmatea*, *Protoblastenia rupestris*, *Verrucaria nigrescens* f. *nigrescens* and *Xanthoria parietina*.

### Taxonomic problems

There are a number of taxa where there are taxonomic uncertainties or there is a new understanding of the species.

***Cladonia foliacea*** Some of the *Cladonia foliacea* which is frequent at Horsey and Winterton forms large squamules of up to 2 cm which is within the range of another British species, *Cladonia convoluta*. However, in Britain this is generally considered to be a species of chalk and limestone in the south (Smith *et al.* 2009). Moreover Ahti *et al.* (2013) in the Nordic Lichen Flora consider that the two species are indistinguishable





*Cladonia* species at Winterton Dunes. Peter Lambley.

and cite recent phylogenetic analysis by Pino-Bodis *et al.* (2010), which supports this view. Sanderson has seen similar material with large squamules on other dune systems and believes that this material is best considered as *Cladonia foliacea* unless new information comes to light. Consequently, for the present, the large material at Winterton-Horsey is considered to be *C. foliacea*.

*Cladonia grayi* s.l. Previously, the cup lichen with coarse soredia at Winterton was considered to be *Cladonia chlorophaea*. It is now considered that this is a species of mesotrophic habitats and the taxon occurring on acid heaths, at least in lowland Britain, is *Cladonia grayi* s.l.. It is distinguished from *C. chlorophaea* by its brownish colouration and appearing ice-blue under ultraviolet light. There is a number of similar brownish species in this group.

### Species of special interest

*Cladonia mitis* Considered by some authorities to be a variety of *Cladonia arbuscula*, it is difficult to distinguish from *C. arbuscula*, though it has a different reaction when tested with the chemical paraphenylenediamine (reacts negatively, rarely red, whilst *C. arbuscula* has a yellow reaction) and generally has the tips of the branches bending less in one direction. The specimen was later shown to be the usnic acid chemo-type which is described in the Nordic Lichen Flora. This was again recorded by Sanderson in April 2012. The other England record is from Dungeness The Winterton record which was at about TG494201. See map.

*Cladonia phyllophora* This lichen has been considered a northern species until Sanderson recorded it in the New Forest. The record for Winterton Dunes



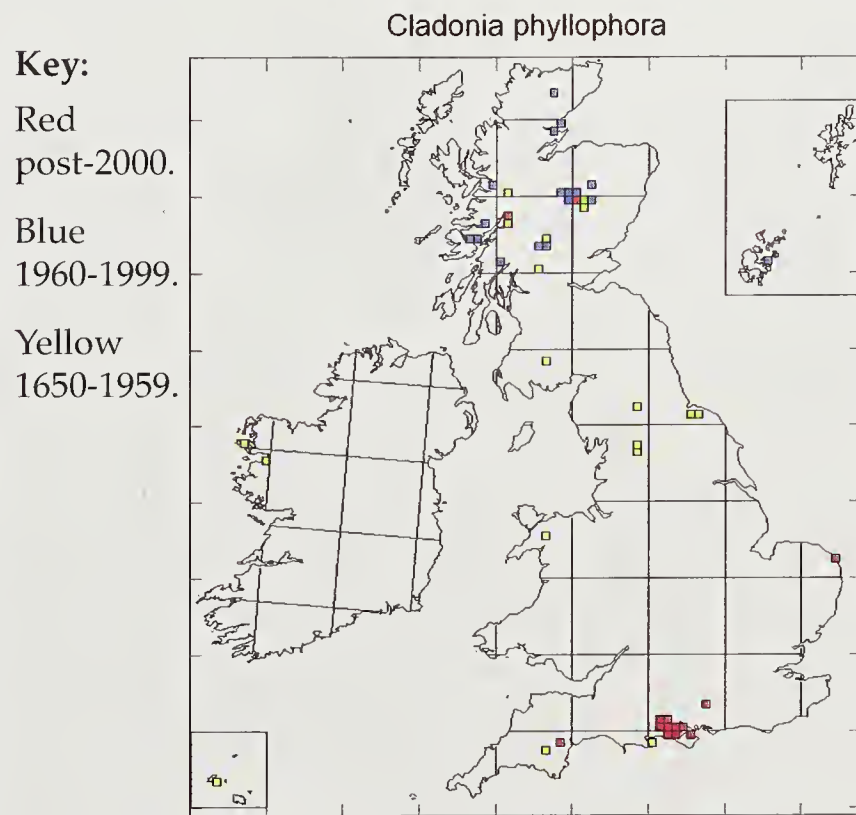
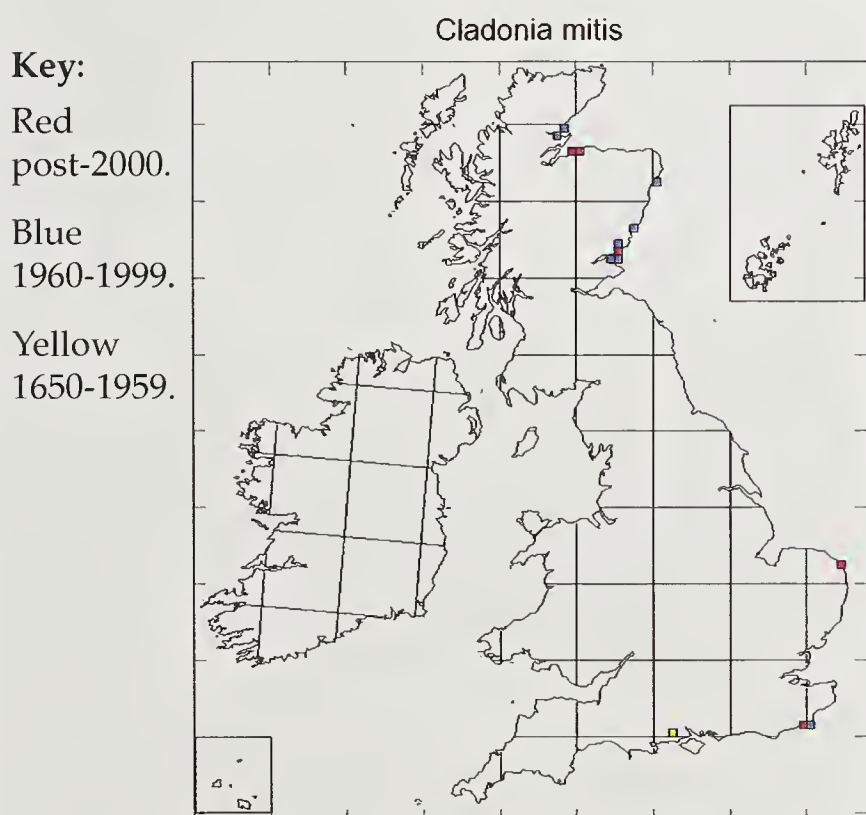


General view of *Cladonia rangiferina* (purplish) with some *Cladonia ciliata*. Pill box in background. Peter Lambley.

is perhaps not totally unexpected as it is not uncommon in the Netherlands. Sanderson found it growing at the back of the grey dunes on a steep dune face at about TG49622012 in April 2012. See map

*Cladonia rangiferina* This is a very surprising addition to the Norfolk lichen flora, as it is normally an upland or montane species in the British Isles. This is the true Reindeer Lichen and was discovered by Neil Sanderson in April 2012 (Hitch 2012). The small colony occurs just south of Horsey Gap where it grows on a north-facing slope in the dunes with *Cladonia ciliata* var. *tenuis* and a little *Peltigera hymenina*. The patch,

which consists of a series of separate clumps, occurs within an area of about two metres by one metre with one small clump about a metre away. It has a distinctive purplish colouration which makes it stand out from other *Cladonia* lichens and on closer inspection a felted appearance of the podetia. This is the only lowland record for England and there are few other coastal records on the east coast until the Sands of Forvie near Aberdeen and Culbin Forest east of Inverness. The nature of the colony which appears to be restricted to this one small area suggests a fairly recent origin. This upland species was recorded in a similar habitat from the Netherlands in the 1980s, but is now listed as extinct in the Netherlands Red list. There are parallels with the distribution of flowering plants with the montane Crowberry *Empetrum nigrum* being found at Winterton in the early 1970s and on the cliffs of Overstrand at about that time. This is a species which produces berries, so it may have been brought by migrating birds. In the case of the bushy cladonias, birds do turn them over, sometimes on a large scale. This was observed following a major fall of migrants on Blakeney Point (R. Porter pers. comm.), and it is conceivable that the lichen arrived on a bird as a result of this behaviour, though this must remain





as speculation. See map.

*Cladonia uncialis* ssp. *uncialis* This distinctive subspecies was found in 2016 by Lambley at a number of different locations within Winterton Dunes on the more stable landward part of the system. Known elsewhere from East Anglia from a heath at Brandon where it has been found in 2017. It does also occur on heathland at Sandy in Bedfordshire. It differs from the more frequent *C. uncialis* ssp. *biuncialis* in being much more erect and often forming hedgehog-like tufts. The tips of the branches are in fours or fives compared with the other subspecies which is more prostrate and the tips of the podetia are in twos or threes.

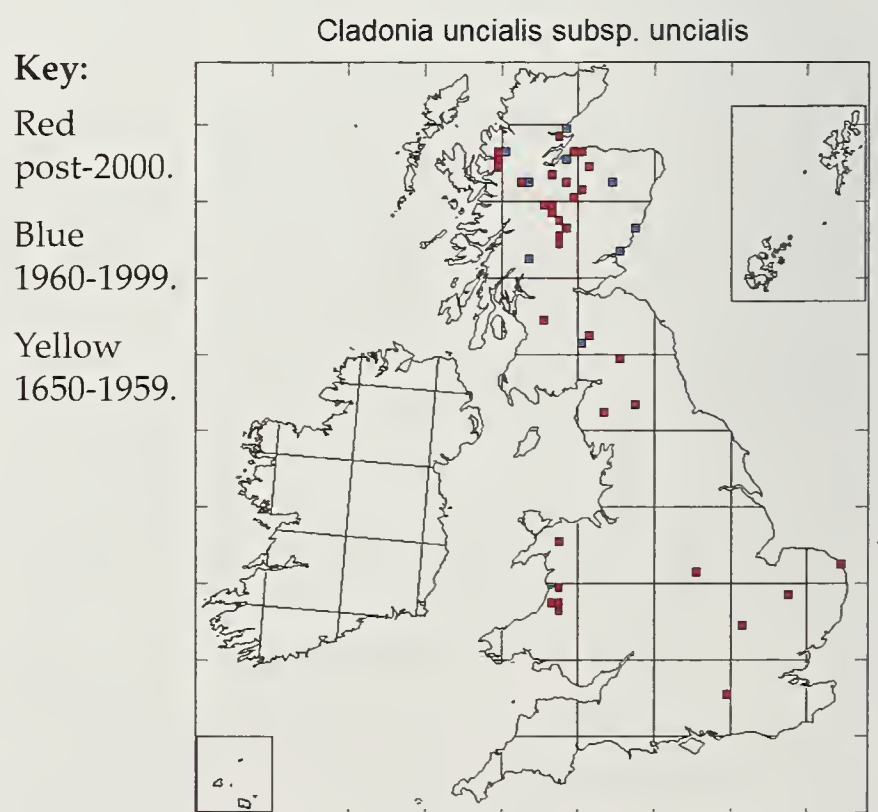
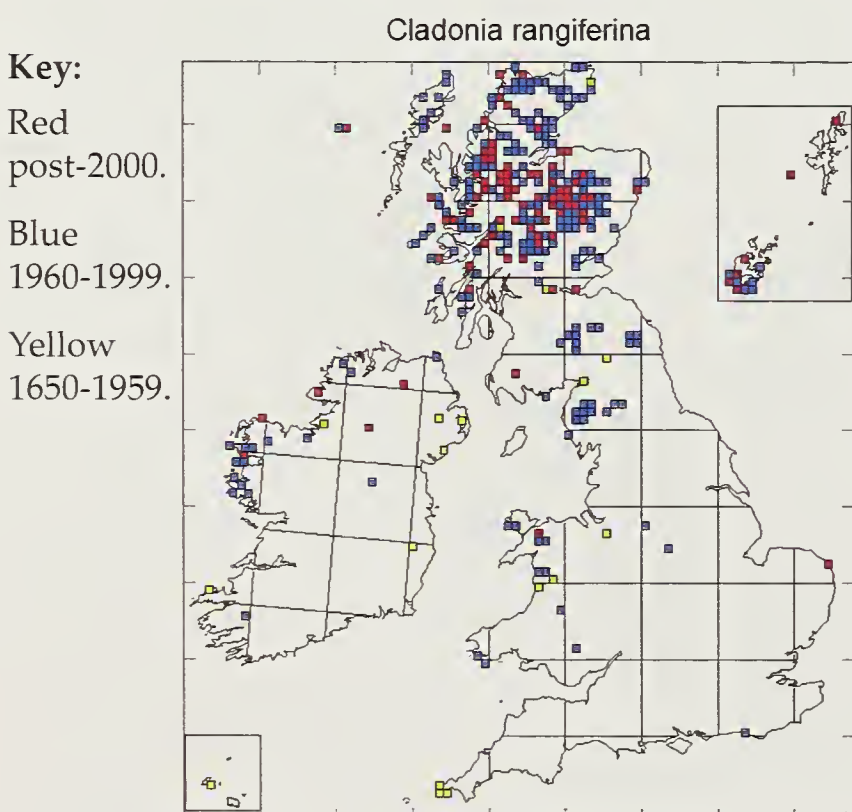
### Differences from other Norfolk dune systems

As previously stated, Winterton–Horsey is notable for the *Cladonia* species both in diversity and abundance. The lichen flora of Blakeney Point has a resemblance to the vegetation where *Cladina* lichens are important, but there the stable shingle and Shrubby Seablite *Sueda vera* are important habitats. Blakeney Point also has only very limited woodland habitat. Elsewhere the dunes between Wells and Burnham Overy and Holme are more calcareous with *Leptogium* and *Collema* species occurring; both absent from Winterton. Also,

Burnham Overy dunes are notable for their population of *Usnea articulata*, which is associated with *Polytrichum piliferum*. Three possible species which might appear are *Cetraria islandica* which is now extinct in the County but was known from Ling Heath near north Wootton, the habitat particularly in the birch woodland looks possible, another is *Bryoria fuscescens* which grows with the moss *Polytrichum piliferum* at Blakeney Point. As it can be very small, it could be missed amongst the small area of *Polytrichum* which occurs at Winterton. The other species which may occur is *Cladonia zopfii* which is not uncommon on the Dutch dunes and in north-east Scotland. It resembles *Cladonia uncialis*.

### Conservation

The whole site is subject to high public pressure throughout the year especially from dog-walkers and at Horsey dunes from visitors to see the Grey Seal *Halichoerus grypus* colony in the winter months. However, this is a double edged sword as trampling ensures some instability in places which can encourage some early colonisers such as *Cladonia fimbriata*, *C. grayi* and *C. foliacea*. At present, rabbit grazing appears to be sufficient to maintain the lichen interest, though occasional disturbance over about a 10 year cycle may well improve diversity. This could be linked to opening





up the occasional new pool for Natterjack Toads *Epidalea calamita*. In the Netherlands, *Carex arenaria* has come to dominate large areas of the dunes and is considered a sign of increased nitrogen levels (Sparrius pers. comm.). This has not yet been observed at Winterton. Rhododendron control has been undertaken in the past and large areas cleared successfully. A possible future concern is a grove of Sea Buckthorn *Hippophaea rhamnoides* north of the car park. Usually considered native on the east coast, it has certainly been planted at a number of sites including Caister Golf course and at Thornham Point. This colony appears to be relatively recent and is showing signs of spreading and should be monitored at the very least as it has the capacity to develop into dense groves, as at Holme, and therefore eliminate the lichen communities.

The vulnerability of the very small population of *Cladonia rangiferina* is perhaps the most concerning conservation issue as it is confined to such a small area and is therefore potentially vulnerable to grass fires. It is also within the area which is subjected to very high visitor pressure especially during the Grey Seal breeding season from October to February, though fortunately most people appear to stay on the paths.

### Acknowledgements

I am very grateful to Neil Sanderson for making his records and notes available to me from his visit in April 2012 and also for his help advising on the current thinking on the taxonomic status of a number of species.

Thanks are also due to Janet Simkin, the Data Manager for the British Lichen Society, for providing updated distribution maps and in a form suitable for publication. The maps are reproduced courtesy of the British Lichen Society mapping scheme.

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## Fungi of Winterton Dunes

*Tony Leech & Yvonne Mynett*

The Norfolk Fungus Study Group (NFSG) visited the southern part of Winterton Dunes NNR in November 2014, November 2015 and April 2016. During the 2015 visit some recording was also carried out in the woods belonging to the Burnley Hall estate along the south-west margin of the dunes which are also part of the National Nature Reserve. A total of 113 species were recorded (Appendix 1) but this will represent only a fraction of those present. An additional 65 species that had been recorded on the Norfolk Fungus Database between 1936 and 2007 are also included in the table.

### Species of interest

Surprisingly, some fungi occur only on bare sand between clumps of Marram Grass *Ammophila arenaria* and three of these specialist dune species have been recorded at Winterton: Dune Stinkhorn *Phallus hadriani*, Dune Cavalier *Melanoleuca cinereifolia* and *Conocybe dunensis* (recorded in 1994). The first resembles the familiar woodland Stinkhorn *Phallus impudicus* but has only a weak smell and 'hatches' from a pink-flushed 'egg'. The Dune Cavalier is similar to a good-sized mushroom but lacks a ring on the stem and has grey gills.

Rather more species are characteristic of fixed dunes, especially areas of short



**Tiny Earthstar *Geastrum marginatum* (formerly *G. minimum*).** Horsey Dunes. *Stephen Pinnington*.

turf grazed by rabbits. Representatives of all four of the CHEG groups, used to assess the quality of grassland, were present, including six waxcaps (H), two earthtongues (G), one pinkgill (E) and one clavarioid fungus (C). The latter was Moor Club *Clavaria argillacea*, known from other Norfolk sites but abundant at Winterton. Also in this habitat was the small brown agaric, *Psilocybe subviscida*, recorded for the first time in Norfolk.

A particularly exciting find, by Yvonne Mynett and Stephen Pinnington, in 2016, was of a colony of the Tiny Earthstar *Geastrum marginatum* on the dunes at Horsey. The first authenticated British record of this earthstar (formerly known as *G. minimum*) was at Holkham in 1958 where a number of colonies have since been found. Apart from a 1994 record from the Isle of Man, this remained the only British site until 2013 when it was found on the Cumbrian coast and 2014 when it was identified on the Suffolk coast. Over 100 individuals were found at Horsey, south of the car park, within the Site of Special Scientific Interest but outside the NNR.

The wet areas surrounding the small pools at the north end of the NNR were not



**Dune Cavalier *Melanoleuca cinereifolia*.** *Anne Crotty*.





**Moor Club**  
*Clavaria argillacea*.  
Winterton. James  
Emerson.

thoroughly investigated during the present study but the small copper-coloured Marsh Webcap *Cortinarius uliginosus* was found there. This is also the likely location for the only Norfolk record of for Bog Bell *Galerina paludosa*, a small brown agaric found in 1994.

The majority of species recorded were associated with trees, either on the fixed dunes grading into heathland or in the private woods at the south end. Most of these species are widespread in Norfolk but *Mycena polyadelpa*, a tiny white agaric growing on dead oak leaves was a new county record, as was Crimped Gill *Plicatura crispa*, a small bracket-like fungus with rudimentary gills.

The historic records include a number of scarce microfungi recorded by Ted Ellis. *Chitonospora ammophila* has been recorded fewer than a dozen times in Britain on dead Marram leaves, where it appears as small black spots, but at Winterton it was found on Purple Marram  $\times$  *Calammophila baltica* in 1958. This grass is a natural hybrid between Wood Small-reed *Calamagrostis epigejos* and Marram, long known from these dunes. Purple Marram was also the host for the only slightly more widespread *Psammia bommeriae* recorded by him two years earlier. *Periconia funerea*, seen without magnification as a fine fuzz on dead sedge and rush leaves, has an apparently even more restricted distribution in Britain; all 15 British records are from Norfolk by Ted Ellis except one from Suffolk by his brother Martin. Ted Ellis appears to have been the first person to record *Mycosphaerella ligustri* in Britain (at Winterton in 1936). This black spot on living leaves of privet *Ligustrum* spp. has been recorded only seven times since elsewhere in Britain.

Our thanks are due to members of the Norfolk Fungus Study Group and those who allowed use of their photographs.

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**Butter Waxcap** *Hygrocybe ceracea*. One of six species of waxcap recorded. Mark Joy.



**Dune Stinkhorn** *Phallus hadriani*. Stephen Pinnington.



**Appendix 1. Fungi recorded from Winterton Dunes SSSI.** Historic records are identified by the recorder's initials and date. Other species were recorded by the authors (together with Paul Batchelor, Anne Crotty, Neil Mahler and Stephen Pinnington) during the present study. Records of species found in the private woodland part of the NNR are indicated 'Wood' and those from the Winterton-Horsey SSSI, and not also found within the NNR, are indicated 'Horsey'.

Species	English name	Group	Recent place or recorder and date
<i>Agaricus campestris</i>	Field Mushroom	Aga	ALB 2002
<i>Agaricus xanthodermus</i>	Yellow Stainer	Aga	
<i>Agrocybe arvalis</i>		Aga	REE 1989
<i>Amanita fulva</i>	Tawny Grisette	Aga	Wood
<i>Amarenomyces animophilae</i>		Asc	EAE 1934
<i>Ampulloclitocybe clavipes</i>	Club Foot	Aga	REE 1994
<i>Annulohyphoxylon multiforme</i>	Birch Woodward	Asc	Wood
<i>Ascocoryne sarcoides</i>	Purple Jellydisc	Asc	Wood
<i>Auricularia auricula-judae</i>	Jelly Ear	Jel	Wood
<i>Bjerkandera adusta</i>	Smoky Bracket	Bkt	Wood
<i>Bolbitius titubans</i>	Yellow Fieldcap	Aga	Wood
<i>Bovista nigrescens</i>	Brown Puffball	Puf	ALB 2002
<i>Byssomerulius corium</i>	Netted Crust	Cst	
<i>Cantharellus cibarius</i>	Chanterelle	Cha	REE 1982
<i>Cheilymenia finicola</i>		Asc	
<i>Chitonospora ammophila</i>		Asc	EAE 1958
<i>Chlorociboris aeruginescens</i>	Green Elfcup	Asc	
<i>Chondrostereum purpureum</i>	Silverleaf Fungus	Cst	Wood
<i>Clavaria argillacea</i>	Moor Club	Spi	
<i>Claviceps purpurea</i>	Ergot	Asc	EAE 1954; ARL 2002
<i>Clavulina coralloides</i>	Crested Coral	Spi	ARL 2002
<i>Clitocybe gibba</i>	Common Funnel	Aga	Horsey
<i>Clitocybe metachroa</i>	Twotone Funnel	Aga	REE 1994
<i>Clitocybe vibecina</i>	Mealy Funnel	Aga	REE 1994, 2002
<i>Collybia cookei</i>	Splitpea Toughshank	Aga	REE 1982
<i>Gymnopus (Collybia) dryophilus</i>	Russet Toughshank	Aga	REE 1982; ALB 2002
<i>Conocybe dunensis</i>		Aga	REE 1994
<i>Conocybe tenera</i>	Common Conecap	Aga	REE 1994
<i>Coprinopsis atramentaria</i>	Common Inkcap	Aga	REE 1982
<i>Coprinopsis stercorea</i>		Aga	
<i>Coprinus comatus</i>	Shaggy Inkcap	Aga	REE 1982
<i>Cortinarius cinnamomeus</i>	Cinnamon Webcap	Aga	REE 1994
<i>Cortinarius croceus</i>	Saffron Webcap	Aga	ARL 2002
<i>Cortinarius semisanguineus</i>	Surprise Webcap	Aga	REE 1994
<i>Cortinarius uliginosus</i>	Marsh Webcap	Aga	
<i>Crepidotus variabilis</i>	Variable Oysterling	Aga	Wood
<i>Crinipellis scabella</i>	Hairy Parachute	Aga	
<i>Cystoderma amianthinum</i>	Earthy Powdercap	Aga	
<i>Cystoderma carcharias</i>	Pearly Powdercap	Aga	
<i>Dacromyces stillatus</i>	Common Jellyspot	Jel	
<i>Daedaleopsis confragosa</i>	Blushing Bracket	Bkt	
<i>Diatrypella favacea</i>	Birch Blackhead	Asc	REE 1989



Species	English name	Group	Recent place or recorder and date
<i>Diatrypella quercina</i>	Oak Blackhead	Asc	Wood
<i>Entoloma rhodopolium</i>	Wood Pinkgill	Aga	REE 1982
<i>Entoloma sericeum</i>	Silky Pinkgill	Aga	
<i>Erysiphe (Microsphaera) alphitoides</i>	Oak Mildew	Asc	Wood
<i>Exidia glandulosa</i>	Witches' Butter	Jel	
<i>Exidia nucleata</i>	Crystal Brain	Jel	
<i>Exidia thuretiana</i>	White Brain	Jel	
<i>Flammulina velutipes</i>	Velvet Shank	Aga	Wood
<i>Fomitopsis (Piptoporus) betulina</i>	Birch Polypore	Bkt	
<i>Galerina hypnorum</i>	Moss Bell	Aga	
<i>Galerina laevis</i>		Aga	ALB 2002
<i>Galerina paludosa</i>	Bog Bell	Aga	REE 1994
<i>Galerina pumila</i>	Dwarf Bell	Aga	
<i>Galerina vittiformis</i>	Hairy Leg Bell	Aga	REE 1994
<i>Ganoderma australe</i>	Southern Bracket	Bkt	Wood
<i>Geastrum marginatum (= minimum)</i>	Tiny Earthstar	Puf	Horsey
<i>Geoglossum fallax</i>		Asc	
<i>Geoglossum umbratile</i>	Plain Earthtongue	Asc	
<i>Gloniopsis praelonga</i>		Asc	
<i>Gymnopilus penetrans</i>	Common Rustgill	Aga	Wood
<i>Gymnopus (Collybia) erythropus</i>	Redleg Toughshank	Aga	
<i>Gymnopus (Marasmius) androsaceus</i>	Horsehair Parachute	Aga	
<i>Hygrocybe ceracea</i>	Butter Waxcap	Aga	
<i>Hygrocybe conica</i>	Blackening Waxcap	Aga	
<i>Hygrocybe insipida</i>	Spangle Waxcap	Aga	KR 2007
<i>Hygrocybe miniata</i>	Vermilion Waxcap	Aga	
<i>Hygrocybe virginea</i>	Snowy Waxcap	Aga	
<i>Hygrocybe vitellina</i>		Aga	Horsey
<i>Hygrophoropsis aurantiaca</i>	False Chanterelle	Aga	
<i>Hypholoma elongatum</i>	Sphagnum Brownie	Aga	
<i>Hypholoma ericaeoides</i>		Aga	REE 1994
<i>Hypomyces chrysospermus</i>	Bolete Mould	Asc	Wood
<i>Hypoxylon multifforme</i>	Beech Woodwart	Asc	
<i>Inocybe rimosa</i>	Split Fibrecap	Aga	
<i>Iodophanus carneus</i>		Asc	
<i>Laccaria amethystina</i>	Amethyst Deceiver	Aga	Wood
<i>Laccaria laccata</i>	Deceiver	Aga	REE 1982; ALB 2002; KR 2007
<i>Laccaria proxima</i>	Scurfy Deceiver	Aga	Wood
<i>Laccaria purpureobadia</i>		Aga	REE 1982
<i>Lachnum virgineum</i>	Snowy Disco	Asc	Wood
<i>Lactarius quietus</i>	Oakbug Milkcap	Aga	Wood
<i>Lactarius rufus</i>	Rufous Milkcap	Aga	Wood
<i>Lactarius spinosulus</i>	Lilacscale Milkcap	Aga	REE 1982
<i>Lactarius subdulcis</i>	Mild Milkcap	Aga	REE 1994
<i>Leccinum holopus</i>	Ghost Bolete	Aga	REE 1982
<i>Leccinum variicolor</i>	Mottled Bolete	Aga	Wood
<i>Lepiota clypeolaria</i>	Shield Dapperling	Aga	ALB 2002
<i>Lepiota erminea</i>	Dune Dapperling	Aga	Horsey



Species	English name	Group	Recent place or recorder and date
<i>Lepista nuda</i>	Wood Blewit	Aga	
<i>Lepista saeva</i>	Field Blewit	Aga	
<i>Lepista sordida</i>		Aga	ALB 2002
<i>Lycoperdon dermoxanthum</i>		Puf	REE 1989
<i>Lycoperdon lividum</i>	Grassland Puffball	Puf	
<i>Lycoperdon nigrescens</i>	Dusky Puffball	Puf	
<i>Lycoperdon perlatum</i>	Common Puffball	Puf	ALB 2002
<i>Lycoperdon pratense</i>	Meadow Puffball	Puf	
<i>Lycoperdon pyriforme</i>	Stump Puffball	Puf	ALB 2002
<i>Lycoperdon utriforme</i>	Mosaic Puffball	Puf	
<i>Macrolepiota procera</i>	Parasol	Aga	ALB 2002
<i>Marasmius oreades</i>	Fairy Ring Champignon	Aga	
<i>Melampsora epitea</i>		Rst	AA 2002
<i>Melanoleuca cinereifolia</i>	Dune Cavalier	Aga	
<i>Melanoleuca poliolenca</i>	Common Cavalier	Aga	
<i>Mollisia cinerella</i>		Asc	REE 1989
<i>Mycena adscendens</i>	Frosty Bonnet	Aga	
<i>Mycena aetites</i>	Drab Bonnet	Aga	ALB 2002
<i>Mycena chlorantha</i>		Aga	
<i>Mycena cinerella</i>	Mealy Bonnet	Aga	Wood
<i>Mycena epipterygia</i>	Yellowleg Bonnet	Aga	Wood
<i>Mycena filopes</i>	Iodine Bonnet	Aga	Wood
<i>Mycena galericulata</i>	Common Bonnet	Aga	Wood
<i>Mycena galopus</i> var. <i>galopus</i>	Milking Bonnet	Aga	Wood
<i>Mycena galopus</i> var. <i>nigra</i>	Black Milking Bonnet	Aga	
<i>Mycena leptcephala</i>	Nitrous Bonnet	Aga	Horsey
<i>Mycena olivaceomarginata</i>	Brownedge Bonnet	Aga	
<i>Mycena polyadelpa</i>		Aga	Wood
<i>Mycena pura</i>	Lilac Bonnet	Aga	
<i>Mycena sanguinolenta</i>	Bleeding Bonnet	Aga	REE 1982
<i>Mycena speirea</i>	Bark Bonnet	Aga	Wood
<i>Mycena vulgaris</i>		Aga	REE 1982
<i>Mycosphaerella ligustri</i>		Asc	EAE 1936
<i>Mycosphaerella lineolata</i>		Asc	EAE 1958
<i>Neottiella rutilis</i>		Asc	
<i>Paecilomyces farinosus</i>		Asc	
<i>Panaeolina foenicicii</i>	Brown Mottlegill	Aga	
<i>Panellus serotinus</i>		Aga	Wood
<i>Paxillus involutus</i>	Brown Rollrim	Aga	Wood
<i>Peniophora cinerea</i>		Cst	REE 1989
<i>Peniophora incarnata</i>	Rosy Crust	Cst	REE 1989
<i>Periconia funerea</i>		Asc	EAE 1956
<i>Phallus hadriani</i>	Dune Stinkhorn	Puf	
<i>Phanerochaete velutina</i>		Cst	REE 1989
<i>Phlebia radiata</i>	Wrinkled Crust	Cst	Wood
<i>Phlebia tremellosa</i>	Jelly Rot	Cst	Wood
<i>Pilobolus kleinii</i>		Phy	
<i>Plicatura crispa</i>	Crimped Gill	Bkt	Wood
<i>Postia subcaesia</i>	Blueing Bracket	Bkt	Wood



Species	English name	Group	Recent place or recorder and date
<i>Psauuina bomneriae</i>		Asc	EAE 1956
<i>Psilocybe inquilina</i>		Aga	
<i>Psilocybe montana</i>	Mountain Brownie	Aga	REE 1982, 1994
<i>Psilocybe subviscida</i>		Aga	
<i>Puccinia elymi</i>		Rst	EAE 1958
<i>Puccinia hydrocotyles</i>		Rst	EAE 1935
<i>Puccinia pygmaea</i> var. <i>auuophilina</i>		Rst	EAE 1954
<i>Rhodocollybia</i> ( <i>Collybia</i> ) <i>butyracea</i>	Butter Cap	Aga	
<i>Rickenella fibula</i>	Orange Moss-cap	Aga	Wood
<i>Rickenella swartzii</i>	Collared Moss-cap	Aga	Wood
<i>Rugosomyces carnea</i>	Pink Domecap	Aga	KR 2007
<i>Russula atropurpurea</i>	Purple Brittlegill	Aga	
<i>Russula betularum</i>	Birch Brittlegill	Aga	Wood
<i>Russula caerulea</i>	Humpback Brittlegill	Aga	REE 1994
<i>Russula gracillima</i>	Slender Brittlegill	Aga	REE 1994
<i>Russula nigricans</i>	Blackening Brittlegill	Aga	
<i>Russula ochroleuca</i>	Ochre Brittlegill	Aga	Wood
<i>Russula sardonica</i>	Primrose Brittlegill	Aga	REE 1994
<i>Russula versicolor</i>	Variable Brittlegill	Aga	Wood
<i>Schizopora paradoxa</i>	Split Porecrust	Cst	
<i>Scleroderma citrinum</i>	Common Earthball	Puf	Wood
<i>Skeletocutis nivea</i>	Hazel Bracket	Cst	
<i>Stereum gausapatum</i>	Bleeding Oak Crust	Cst	Wood
<i>Stereum hirsutum</i>	Hairy Curtain Crust	Cst	Wood
<i>Stropharia inuncta</i>	Smoky Roundhead	Aga	ALB 2002
<i>Stropharia semiglobata</i>	Dung Roundhead	Aga	REE 1994
<i>Stropharia squamosa</i>		Aga	REE 1994
<i>Taphriua betulina</i>	Birch Besom	Asc	Wood
<i>Tephroclype anthracophila</i>		Aga	REE 1994
<i>Thecaphora seminis-couvolouli</i>		Smt	EAE 1961
<i>Thelephora terrestris</i>	Earthfan	Spi	
<i>Trametes ochracea</i>	Oche Bracket	Bkt	Wood
<i>Trametes versicolor</i>	Turkeytail	Bkt	Wood
<i>Tricholoma argyraceum</i>		Aga	REE 1994
<i>Trochila ilicis</i>	Holly Speckle	Asc	Wood
<i>Tyromyces chioneus</i>		Bkt	
<i>Volvariella gloiocephala</i>	Stubble Rosegill	Aga	
<i>Xylaria hypoxylon</i>	Candlesnuff Fungus	Asc	Wood

**Key to groups:** Aga, agaric; Asc, ascomycete; Bkt, bracket; Cst, crust; Jel, jelly; Puf, puffball; Rst, rust; Smt, smut; Spi, spindle. **Recorders:** AA Anne Andrews; ALB Alec Bull; ARL Tony Leech; EAE Ted Ellis; KR Kerry Robinson; REE Reg & Lil Evans



# Weather Report 2016

## Norman Brooks

Observations made with approved Meteorological Office instrumentation, and in accordance with standard Meteorological Office practice, at Old Costessey, Norfolk. Monthly summary figures are presented in Table 1.

**January 2016** A mild and wet month with scarcely any 'winter' weather, although a few flakes of snow fell on the 14<sup>th</sup>, 15<sup>th</sup> and 17<sup>th</sup>.

Signs of a premature spring were abundant, with a continuation of grass growth, swelling buds on bushes, ornamental trees in bloom and daffodils and snowdrops in full flower.

Jan. wind	N	NE	E	SE	S	SW	W	NW	Calm
Days	0	0	2	3	2	5	8	4	7

**February 2016** A continuation of the bland nature of January, but winter managed to

make brief appearances from the 11<sup>th</sup>-19<sup>th</sup> and during the final week. Slight snow fell on five days and lay briefly on the 15<sup>th</sup>.

Nacreous, or mother-of-pearl, clouds, a rare phenomenon, were widely observed early in the month.

Feb. wind	N	NE	E	SE	S	SW	W	NW	Calm
Days	2	1	2	2	2	5	6	5	4

**March 2016** A wet month. Ground frosts on sixteen nights slowed the premature growth of January. Slight snow and sleet fell on four days during the first week, and there was a thin snow cover on the 7<sup>th</sup>. Together with the 15<sup>th</sup> February these were the only days when our area was under snow. Hail was noted on five days.

Mar. wind	N	NE	E	SE	S	SW	W	NW	Calm
Days	5	6	1	3	1	4	7	3	1

Table 1. Monthly summaries for 2016.

Month	Total rainfall (mm)	Percentage of mean rainfall	Days air frost	Days ground frost	Monthly mean temperature (°C)	Deviation from mean (°C)	Mean soil temp. 10 cm depth
January	84.6	146	7	14	5.3	+ 1.3	5.1
February	37.6	87	12	18	5.1	+ 1.3	4.2
March	89.5	192	5	16	6.2	+ 0.3	4.9
April	71.6	146	3	17	7.9	+ 0.3	7.1
May	52.6	116	1	4	12.8	+ 1.4	12.3
June	97.8	183	0	0	15.6	+ 1.3	14.9
July	37.6	67	0	0	18.2	+ 1.7	16.7
August	24.1	47	0	0	18.3	+ 1.9	16.2
September	54.2	100	0	0	17.5	+ 3.2	15.7
October	59.0	102	0	0	11.1	+ 0.1	10.1
November	77.2	110	4	15	6.0	- 0.7	6.3
December	21.4	35	10	15	5.7	+0.9	5.3
ANNUAL	707.2	111	42	99	10.8	+ 1.1	9.9



**April 2016** Initially the month was mild, but a cold final fortnight caused the mean temperature to be an extraordinary 2°C lower than the preceding December. Slight snow fell on three days and hail on five.

Seventeen ground frosts reduced the soil temperature enough to slow spring growth.

Apr. wind	N	NE	E	SE	S	SW	W	NW	Calm
Days	3	2	1	5	2	2	8	6	1

**May 2016** An uneventful month but slightly warmer than usual. Very cool conditions prevailed on the 30<sup>th</sup> and 31<sup>st</sup> when maxima were lower than the previous Christmas and Boxing Days. With only a single air frost, on the 1<sup>st</sup>, there was no check to spring growth. The maximum of 25.5°C on the 8<sup>th</sup> was an early foretaste of summer.

Most of the month was dry but heavy thundery rain on the 30<sup>th</sup>-31<sup>st</sup> brought the total close to average.

May. wind	N	NE	E	SE	S	SW	W	NW	Calm
Days	4	0	4	4	0	8	2	8	1

**June 2016** The warmest for ten years; in spite of the absence of hot days, 25°C was exceeded only once. The cold experienced on the final days of May continued on the 1<sup>st</sup> and 2<sup>nd</sup>, both again colder than the temperatures over the 2015 Christmas period.

Thunder was heard on seven days and despite the period 1<sup>st</sup>-10<sup>th</sup> inclusive being completely dry, the rainfall total was excessive and encouraged lush early summer growth.

Jun. wind	N	NE	E	SE	S	SW	W	NW	Calm
Days	5	1	0	2	2	9	5	2	4

**July 2016** Generally dry and warm with a brief hot and very humid spell from the 18<sup>th</sup>-20<sup>th</sup> with the temperature peaking at 30°C on the 19<sup>th</sup>. Although fairly dry in many areas, localised heavy thundery rain produced some high daily totals, most notably on the 12<sup>th</sup> with 40.0 mm at Ashby St. Mary, and 43.7 mm at Lingwood, with local flooding.

Jul. wind	N	NE	E	SE	S	SW	W	NW	Calm
Days	0	0	0	3	3	10	12	3	0

**August 2016.** A dry month with above-normal temperatures which, taken together with June and July, gave us a good summer in spite of the wet June.

There was a total absence of thunder. On the 24<sup>th</sup> the temperature at Costessy reached 30.4°C and there were reports that some places in Britain recorded 34°C.

Aug. wind	N	NE	E	SE	S	SW	W	NW	Calm
Days	0	1	1	3	4	7	10	3	2

**September 2016** Unusually the peak of 'summer' arrived in early autumn with a spell of very high maxima: 12<sup>th</sup> 26.9°C; 13<sup>th</sup> 28.9°C; 14<sup>th</sup> 31.3°C and 15<sup>th</sup> 29.7°C. The 14<sup>th</sup> was the hottest day of the year and the hottest day at Costessey since 1<sup>st</sup> July 2015. The average monthly temperature was identical to that of September 2006, making it the equal warmest September since 1949.

A thunderstorm on the 16<sup>th</sup> produced the heaviest daily rainfall of the year with 37.4 mm measured.

Sep. wind	N	NE	E	SE	S	SW	W	NW	Calm
Days	2	0	0	3	5	7	7	1	5

**October 2016** The month was dominated by winds from the north and east with anticyclonic conditions prevailing. These winds passing over a still warm North Sea allowed coastal localities to measure high rainfall totals; Cley, with 121 mm received nearly four times the total recorded at some inland stations.

Oct. wind	N	NE	E	SE	S	SW	W	NW	Calm
Days	3	5	6	0	4	2	1	3	7

**November 2016** A dull and quiet month but devoid of any significant fog.

The screen minimum of -5.1°C on the 24<sup>th</sup> was the lowest temperature recorded in 2016. Ground frost formed on 15 nights, and rainfall over the county was very variable with a total of 101.0 mm at Walsingham but

Nov. wind	N	NE	E	SE	S	SW	W	NW	Calm
Days	1	2	2	0	1	3	9	3	9



only 42.0 mm at Snettisham. The month was snow-free.

**December 2016** The driest since 1988 and nearly 1°C warmer than usual - a rare combination for December. Fog shrouded eight days and there were ten air frosts and fifteen ground frosts but no snow or sleet. The maximum of 13.6°C on Christmas Day, together with the 14.6°C on 25<sup>th</sup> December 2015, were the highest recorded for that date for at least 170 years.

Dec. wind	N	NE	E	SE	S	SW	W	NW	Calm
Days	0	0	1	2	2	7	5	1	13

### Annual summary 2016

Total rainfall	707.2 mm
	111% of average
Days with rain recorded	183
Days with sleet or snow	12
Days with snow lying	2
Highest maximum temperature	31.3 °C
	14 Sep
Lowest maximum temperature	3.0 °C
	14 Jan
Highest minimum temperature	19.4 °C
	7 Sep
Lowest minimum temperature	-5.1 °C
	29 Nov
Lowest grass min. temperature	-7.1 °C
	29 Nov
Air frosts	42
Ground frosts	99
Days with gales	2
	8 Feb
	28 Mar
Days with hail	12
Days with thunder	18
Days with fog (0900 hrs)	16
Longest period with no measurable rain:	
	10 days (1-10 June; 22 Nov-1 Dec)
Mean cloud cover at 09.00 hrs	67%
Wind direction at 09.00 hrs (days):	
North	25
North-east	18
East	20
South-east	30
South	28

South-west	69
West	80
North-west	42
Calm	54
Annual mean maximum temp.	14.9°C
Annual mean minimum temp.	-6.7°C
Annual mean temperature	10.8°C
	(identical to 2015)

### Norfolk average rainfall totals 2016

Month	Rainfall mm
January	86.5
February	31.1
March	79.7
April	65.1
May	52.5
June	117.2
July	35.6
August	31.8
September	52.7
October	62.9
November	73.0
December	23.1

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## Beetles

*Martin J. Collier*

This report reviews records from 2015 and 2016. Also included are a few earlier records, which were either unavailable or overlooked during preparation of the last report, for the 2015 Transactions (Collier 2016).

The selection of species for the current report has proved much more difficult than usual because no computer data entry of records has taken place since November 2015. Up until this date beetle records were entered into Version 3 of Recorder, a biological recording software package, but this version had become very much out of date in terms of nomenclature and was no longer supported by JNCC. A copy of the data was given to NBIS in November 2015, to be imported into the current version of the software – Recorder 6 – by JNCC staff. This process took far longer than expected and I am currently waiting for NBIS to provide further training before full data entry operations can resume and a start can be made on the two-year backlog. At the time of the final data entries into Recorder 3, well over 90,000 records had been entered for more than 2,600 beetle species. To put this into context, the British beetle fauna currently stands at approximately 4,130 species, so about two thirds of British beetles have records in the Norfolk database. The true proportion of the British fauna recorded from Norfolk is probably closer to three-quarters as records for many species not currently in the Norfolk database still need to be entered, although these are mainly old or ancient records so it is possible that at least some of these species no longer occur here. To get closer to this 75% figure it helps if more ‘new to Norfolk’ species are found each year than there are ‘new to Britain’ species (from

other counties) – which can sometimes be difficult!

Eighteen species were added to the Norfolk list in 2015 and ten were added in 2016. Many other species were recorded for the first time in either East or West Norfolk (VC27 or 28), or for the first time in the county for many decades or even a century or more (see Table 1). Most of the regular beetle recording in Norfolk was, for many years, carried out by myself and a small number of resident coleopterists, in particular Bryan Sage, although this was often supplemented by extensive but more sporadic recording and formal surveys by visiting coleopterists. In more recent years we have been joined by several other resident recorders whose enthusiasm and expertise have resulted in what must now be the most productive period ever for beetle recording in the county. Special mention has already been made of Steve Lane’s tremendous productivity (Collier 2016), which continues unabated, and Tim Hodge has also had several remarkable finds, particularly in his home area of Horsey Corner. Tim’s best find to date must be *Amara majuscula*, a ground beetle previously unrecorded in Britain (Hodge *et al.* 2016). In the current review we actually have two ‘new to Britain’ species for which Norfolk was one of the first counties in which they were discovered, along with the first British record for thirty years of a species which has yet to be found outside of the county. A full list of the most important records is provided in Table 1 and individual accounts of the species of particular interest are given below. More detailed accounts for many of the records are also given in Collier & Lane (2016, 2017).



Table 1. New county and other significant beetle records, mainly from 2015 and 2016.

Species	Locality	Grid ref	Date	Recorder	Norfolk status
<b>Alexiidae</b>					
<i>Sphaerosoma pilosum</i>	Ashwellthorpe Lower Wood	TM1497	12.vi.2016	MJC	1st EN; 2nd county
<b>Anthribidae</b>					
<i>Pseudeuparius sepicola</i>	Buxton Heath	TG1721	18.xi.2016	SAL	1st county
<b>Carabidae</b>					
<i>Acupalpus exiguus</i>	Upton Broad	TG4013	14.iii.2015	PMH	1st since c. 1909; 1st EN
<i>Amara majuscula</i>	Horsey Corner	TG4523	18-19.viii.2015	TNH	1st county
	East Winch	TF6916	16, 19, 26.vii.2016	SAL/MGT	1st WN
	Dersingham	TF6929	20.vii.2016	AD	
<i>Dromius angustus</i>	Bayfield Hall estate	TG0440	13.iv.2016	MJC	1st EN
<i>Harpalus froelichii</i>	Horsey Corner	TG4523	21.vii.2015	TNH	1st EN
<i>Ocys quinquestriatus</i>	Hunstanton	TF6841	17.x.2016	SAL	1st since c. 1893
	3 other WN and 2 EN sites	Various	x-xi.2016	SAL/MJC	
<i>Ophonus ardosiacus</i>	Horsey Corner	TG4523	21.viii.2015	TNH	1st since 1938
	Breydon Water	TG4706	27.ix.2015		
<i>Stenolophus skrimshiranius</i>	Horsey Dunes	TG4723	5.vi.2015	TNH	1st EN
	Sutton Fen	TG3623	21.vii.2016	MGT	
<b>Cerambycidae</b>					
<i>Gracilia minuta</i>	South Wootton	TF6322	21.vi.2016	SAL	1st since early 1900s
			Several subsequent dates in 2016	Various recorders	
<i>Leiopus limnei</i>	South Wootton	TF6322	21.vi.2016	SAL	1st county <sup>1</sup>
			14.vii.2016	MJC	
<b>Chrysomelidae</b>					
<i>Batophila aerata</i>	Holme-next-the-sea	TF7043	4.v.2015	SAL	1st since 1940
			8.v.2015	MJC+SAL	
<i>Chaetocnema picipes</i>	Hunstanton	TF6842	9.vii.2015	SAL	
	Shotesham Park	TM2298	22.v.2015	MJC	1st county <sup>2</sup>
<i>Cryptocephalus parvulus</i>	Wells-next-the-Sea chalk-pit	TF9242	20.iv-24.v.2016		1st WN; 2nd county
	Buxton Heath	TG1721	21.v.2016	TNH	1st EN; 2nd since c. 1909
<i>Donacia bicolora</i>	Burnham Norton	TF8244	19.vi.2016	SAL	1st since 1800s; 1st WN
			23.vi.2016	BLS	
			24.vi.2016	MJC	
<i>Donacia crassipes</i>	Strumpshaw Fen	TG3306	25.vii.2012	AS	1st modern
			4.vii.2016	SAL	
	Wheatfen Broad	TG3205	4.vii.2016	SAL/AB	
<i>Hydrothassa glabra</i>	Roydon Common NR	TF6922	22.v.2016	SAL	1st since early 1800s; 2nd county
<b>Ciidae</b>					
<i>Cis punctulatus</i>	Felbrigg Park	TG1839	16.vi-9.vii.2015	MJC	1st EN



Species	Locality	Grid ref	Date	Recorder	Norfolk status
<b>Coccinellidae</b>					
<i>Scymnus limbatus</i>	Southery	TL6593	19.vi.2015	SAL	1st WN
<b>Curculionidae</b>					
<i>Anoplus roboris</i>	Ashwellthorpe Lower Wood	TM1497	12.vi.2016	MJC	2nd site
<i>Ceutorhynchus inaeffectatus</i>	Shotesham Park	TM2198	22.v.2015	MJC	1st county
<i>Ceutorhynchus pervicax</i>	Wheatfen Broad	TG3205	6.v.2015	AM (det. MJC)	1st county
<i>Hylastes attenuatus</i>	Felbrigg Park	TG1939	16.vi.2015	MJC	1st EN
<i>Kissophagus vicinus</i>	Hockwold Lodge Stud	TL7287	12.vii.2015	SAL	1st WN; 2nd county
<i>Orthochaetes insignis</i>	Blackborough End quarry	TF6715	25.x-8.xi.2014	SAL	1st county
<i>Otiorhynchus aurifer</i>	Wymondham	TG1001	15.vii.2015	PMH	1st county
<i>Otiorhynchus porcatus</i>	Gayton lime-kiln quarry	TF7219	31.iii-17.iv.2015	SAL	1st county
<i>Sitona puncticollis</i>	Massingham Heath	TF7820	22.xi-3.xii.2015	SAL	1st since 1970
<i>Tomicus piniperda</i>	Bayfield Hall estate	TG0440	13.iv.2016	MJC	1st EN
<i>Trachyphloeus alternans</i>	Wells-next-the-Sea chalk-pit	TF9242	14.iii-20.iv.2016	MJC	1st county
<i>Trachyphloeus digitalis</i>	Wells-next-the-Sea Wells-next-the-Sea chalk-pit	TF9243	10.iv-8.v.2015 14.iii-20.iv.2016	MJC	1st county
<i>Tychius pusillus</i>	Beeston Common	TG1642	21.vii.2015	SAL	1st EN; 2nd county
<b>Elateridae</b>					
<i>Ampedus rufipennis</i>	Stanford Training Area	TL8795	17.v.2015	BLS	1st county? <sup>3</sup> 1st WN
<i>Calambus bipustulatus</i>	Shotesham Park	TM2198	22.v.2015	MJC	1st since 1800s
<b>Helophoridae</b>					
<i>Helophorus porculus</i>	Gayton lime-kiln quarry	TF7219	6.ii-2.iii.2015	SAL	1st since early 1900s
<b>Hydrophilidae</b>					
<i>Paracymus scutellaris</i>	Lopham Fen	TM0579	9.viii.2013	AC	1st county
<b>Leiodidae</b>					
<i>Choleva elongata</i>	Derby/Leziate Fen	TF7020	9.xii.2016	SAL	1st WN; 1st since 1985
<i>Colon zebei</i>	Wheatfen Broad	TG3205	3.vi.2015	SAL (det. MJC)	1st EN
<i>Leiodes badia</i>	Wells-next-the-Sea chalk-pit	TF9242	20.iv-24.v.2016	MJC (det. <i>teste</i> JC)	1st WN; 2nd county
<b>Monotomidae</b>					
<i>Rhizophagus picipes</i>	Stanford Training Area	TL8301	21-29.vii.2010	MJC (det. SAL)	1st county
<b>Nitidulidae</b>					
<i>Glischrochilus quadripunctatus</i>	Cranwich Heath	TL7693	7.iii.2015	SAL	1st since early 1800s



Species	Locality	Grid ref	Date	Recorder	Norfolk status
<b>Orsodacnidae</b>					
<i>Orsodacne cerasi</i>	Shotesham Park	TM2298	22.v.2015	MJC	1st county
	Lynford Arboretum	TL8293	24.iv.2016	SAL	1st WN; 2nd county
<b>Ptiliidae</b>					
<i>Acrotrichis sanctaehelenae</i>	Holkham estate	TF84	8.viii.2015	MJC/PL (det. RGB)	1st county
<i>Acrotrichis thoracica</i>	Holkham estate	TF84	29.vi & 8.viii.2015	MJC/PL (det. RGB)	1st since 1879
<i>Baranowskiella ehnstromi</i>	University of East Anglia, Norwich	TG1807	12.viii.2015 19.viii.2015	AGD/NBM MJC/AGD/ AJA	1st county
	Whitlingham Marsh	TG2808	23.viii.2015	JE	
<i>Ptilium exaratum</i>	Holkham estate	TF84	29.vi.2015	MJC/PL (det. RGB)	1st WN
<i>Ptilium horioni</i>	Holkham estate	TF84	29.vi.2015	MJC/PL (det. RGB)	1st WN
<b>Ptinidae</b>					
<i>Dorcatoma dresdensis</i>	Moorgate Carrs, Blickling	TG1730	15.iii.2016 (as larva – adult later in year)	SAL/MJC	1st EN; 2nd county
<i>Ptinus palliatus</i>	Buxton Heath	TG1721	9.vi.2016	MJC	2nd since 1800s
<b>Salpingidae</b>					
<i>Lissodema cursor</i>	Horsey Corner Redwell Marsh	TG4523	6.vii.2015	TNH	1st since 1912
		TF7043	11.vii.2016	SAL	
<i>Rabocerus gabrieli</i>	Sandringham	TF6929	17.xii.2016	TNH	1st county
<b>Scarabaeidae</b>					
<i>Aphodius lividus</i>	Hockwold Lodge Stud	TL7287	12.vii.2015	DJM	1st since early 1900s; 1st WN
			6.ix.2016	SAL	
<i>Aphodius sordidus</i>	Hockwold Lodge Stud	TL7287	12.vii.2015 12.viii.2015	DJM+SAL MJC+SAL	1st WN/ county? <sup>4</sup>
<i>Euheptaulacus sus</i>	Hockwold Lodge Stud	TL7287	12.vii.2015 12.viii.2015	DJM MJC+SAL	1st since 1800s; 1st WN
<i>Oxythyrea funesta</i>	Old Costessey	TG1512	18.vii.2015	AM	1st county
			30.vii.2016	MJC	
<b>Staphylinidae</b>					
<i>Aleochara tristis</i>	Cranwich	TL7694	26.v.2015	SAL	1st county
<i>Anotylus hammondi</i>	Cranwich	TL7694	26.v.2015	SAL	1st county
	Leziate Heath	TF6819			
<i>Bibloporus minutus</i>	Felbrigg Park	TG1839	16.vi-9.vii.2015	MJC	1st EN; 2nd county
<i>Bryoporus cernuus</i>	Sutton Fen	TG3623	27.iv.2016	MGT	2nd county
<i>Dimetrota laevana</i>	Wolterton Hall	TG1631	3.x.2016	PMH	1st county
<i>Euplectus mutator</i>	Bilney Warren	TF6913	31.iii.2016	SAL	1st WN; 2nd county
<i>Euplectus tholini</i>	East Winch Common	TF7015	4.ix.2015	MJC (det. teste RGB)	1st county
<i>Gyrophypnus wagneri</i>	Hassingham Broad	TG3605	15.iii.2015	PMH	2nd county



Species	Locality	Grid ref	Date	Recorder	Norfolk status
<i>Haploglossa picipennis</i>	Holkham estate Sculthorpe Moor	TF84 TF9029	29.vi.2015 8.viii.2015 16.viii.2015	MJC/PL (det. RGB)	1st county
<i>Lathrobium pallidipenne</i>	Cromer cliffs	TG2341	22.v.2016	SAL	2nd county <sup>5</sup>
<i>Mycetoporus angularis</i>	Brettenham Heath NR	TL9386	2-9.viii.2015	RH (det. SAL)	1st since early 1900s
<i>Omalius septentrionis</i>	Ringstead	TF7039	27.vi.2016	SAL	1st/2nd county? <sup>6</sup>
<i>Oxytelus migrator</i>	Hockwold Lodge Stud	TL7287	12.viii.2015	SAL	1st WN; 2nd county
<i>Philonthus mannerheimi</i>	Stoke Ferry	TL7199	12.ii.2016 Several subsequ- ent dates in 2016	SAL Various recorders	1st since 1876; 1st WN
<i>Phloeocharis subtilissima</i>	Buxton Heath	TG1721	18.xi.2016	MJC/SAL	1st county
<i>Phloeopora scribae</i>	Buxton Heath	TG1721	18.xi.2016	SAL (det. RGB)	1st county
<i>Platystethus alutaceus</i>	Holkham NNR Redwell Marsh Scolt Head NR	TF8745 TF7043 TF8046	24.iv.2015 16.v.2015 20.vii.2015	SAL	1st county
<i>Quedius invreae</i>	Massingham Heath  Sandringham	TF7920 TF7820 TF6929	25.x-1.xi.2015  17.xii.2016	SAL  TNH	1st WN; 2nd county
<i>Schistoglossa aubei</i>	Sutton Fen	TG3723	29.iv.2016	MGT	1st EN since 1800s
<i>Sepedophilus bipunctatus</i>	Sutton Fen	TG3622	25.v.2016	MGT	1st EN
<i>Tachyporus formosus</i>	Stoke Ferry	TL7199	12.ii.2016 Several subsequ- ent dates in 2016	SAL Various recorders	1st WN/ county? <sup>7</sup>
<b>Tenebrionidae</b>					
<i>Corticeus linearis</i>	Buxton Heath	TG1722	9.vi.2016	MJC	1st EN
<i>Corticeus unicolor</i>	Westbriggs Wood, Wormegay Dersingham Bog/ Sandringham warren	TF6510 TF6728	12.iv.2016 21.x.2016	SAL AD	1st county

<sup>1</sup> Earlier specimens almost certainly exist as this species has only recently been separated from *L. nebulosus* (Wallin *et al.* 2009).

<sup>2</sup> Earlier specimens almost certainly exist as this species has only recently been separated from *C. coucinna* (Booth & Owen 1997).

<sup>3</sup> An ancient record for Norwich is considered to be a specimen labelling error (see Sage 2015).

<sup>4</sup> The only previous county record, for Norwich in 1889 (Edwards 1893), may be incorrect (see Collier & Lane 2016).

<sup>5</sup> 1<sup>st</sup> county record was from River Waveney flood refuse at Homersfield, TM2885, 1.i.1987 (MJC - unpublished).

<sup>6</sup> A record for Snettisham, TF63, 18.vii.2005, by Jon

Webb would, if correct, be the 1<sup>st</sup> record but the specimen is not available for checking.

<sup>7</sup> Two previous old records for EN require confirmation as this species is often misidentified.

Species in Table 1 are listed in alphabetical order by family and species using nomenclature in Duff (2012). Initials represent the following recorders and determiners: AB = Andy Brown; AC = Adrian Chalkley; AD = Allan Drewitt; AGD = Andrew Duff; AJA = Tony Allen; AM = Andy Musgrove; AS = Andrew Skinner; BLS = Bryan Sage; DJM = Darren Mann; JC = Jon Cooter; JE = James Emerson; MGT = Mark Telfer; MJC = Martin Collier; NBM = Neil Mahler; PMH = Peter Hammond; PL = Phil Littler; RGB = Roger Booth; RH = Rob Hawkes; SAL = Steve Lane; TNH = Tim Hodge. EN and WN for Norfolk status = East and West Norfolk (VC27 & 28) respectively.



*Amara majuscula* Much credit is due to Tim Hodge for the discovery of this ground beetle in Britain (Hodge *et al.* 2016). *Amara majuscula* bears a close superficial resemblance to a common species, *Amara apricaria*, but there are a number of small and somewhat comparative differences. Tim found a beetle in his garden moth trap at Horsey Corner on 19.viii.2015 that didn't quite key out to *apricaria* and, rather than assuming that it was a slightly atypical example of a common species, as many recorders might have done, he kept the specimen and sought advice from Mark Telfer, the national carabid recorder. Mark quickly identified it as *Amara majuscula*, a species Lindroth (1972) predicted might arrive here, and that Mark had therefore been on the look-out for in Britain for over 20 years. There have been no further records at Horsey Corner but several specimens of *majuscula* were attracted to light in Steve Lane's garden in East Winch in 2016 and a single specimen was seen in Allan Drewitt's garden in Dersingham in the same year, so the beetle has been found in both vice-counties. Whilst the authors were finalising their account of this discovery (Hodge *et al.* 2016), another specimen was found that had been collected in Worcestershire on 4.ix.2014, so pre-dating the Norfolk specimens.

*Ceutorhynchus inaeffectatus* This weevil was first found in Britain in 2012, in Sussex (Hodge 2013). It had not been recorded outside of this county until I found a thriving colony feeding on Dame's Violet *Hesperis matronalis*, the only known foodplant, in Shotesham Park in 2015. The Dame's Violet plants here were growing on the east bank of the River Tas and were particularly large and vigorous. It would seem unlikely that this is the only site in Norfolk so readers are encouraged to check any Dame's Violet plants they come across for small (2.5-3.0 mm) black weevils. I will be

pleased to check specimens or close-up photographs.

*Choleva elongata* Beetles in the genus *Choleva* are often associated with the nests and tunnels of small mammals. *C. elongata* had only been recorded twice in Britain, in Norfolk on both occasions: from river flood litter in 1984 and a mole's nest in 1985 (Collier 1986). Several searches for this species in the same areas during the subsequent 30 years have been unsuccessful but Steve Lane found a male example in the soil of a mole fortress in wet grazing pasture at Derby/Leziate Fen on 9.xii.2016.

*Baranowskiella ehnstromi* A lot of beetles are quite small, some beetles are very small, and then there is the diminutive feather-wing beetle called *Baranowskiella ehnstromi* which, at just 0.5 mm long and less than 0.2 mm wide, is the smallest beetle in Europe (Fig. 1). This barely visible beetle breeds exclusively in *Phellinus conchatus*, a widespread but scarce bracket fungus occurring on willows *Salix* spp.. Whilst browsing websites for taxonomic changes affecting the British checklist, Andrew Duff spotted a paper reporting the recent discovery of this beetle in central Europe and further searches revealed that it had also been found in Denmark, in brackets of *P. conchatus* in all



Figure 1. *Baranowskiella ehnstromi* on *Phellinus conchatus*. Neil Mahler.



cases. With the help of Neil Mahler and Tony Leech (Suffolk and Norfolk fungus recorders respectively) brackets of this fungus were examined, in August 2015, at a site in Suffolk and in the grounds of the University of East Anglia, Norwich; *B. ehnstromi* was present in good numbers at both sites. James Emerson then found the beetle on *P. conchatus* at Whitlingham Marsh, near Norwich, later in the same month (Duff *et al.* 2015). This beetle is likely to be widespread in East Anglia, with its distribution being limited only by that of the fungus.



Figure 2. *Oxythyrea funesta*. Howard Mendel.

Norwich, by Fowler (1890), but the source and details of this record are unknown.

*Oxythyrea funesta* This attractive day-flying chafer (Fig. 2) is a common sight in much of Europe, where large numbers can be seen on many different types of flowers on rural roadside verges etc. Breeding populations only became established in southern Britain quite recently (Barclay & Notton 2015; Harrison 2016) so its discovery at a garden centre just outside Norwich, by Andy Musgrove in 2015, was a complete surprise. The beetle's continued presence there in 2016 indicates that a breeding population exists and I would welcome news of sightings from other areas of the county.

*Haploglossa picipennis* There are five British species in the genus *Haploglossa* and all are associated to some extent with birds' nests. The rarest of these, *H. picipennis*, is associated with the nests of raptors, especially buzzards. In 2015, after the young had fledged, material was collected from three marsh harrier nests in West Norfolk. This material was found to be very rich in beetles and *H. picipennis* was present in considerable numbers in all three nests. There are no previous Norfolk records for this species and these may be the first British records showing an association with a ground-nesting raptor.

*Aphodius sordidus* Many species of dung beetles have declined in recent decades, in both range and abundance, mainly due to changes in land management and the toxicity of endectosides, now used extensively to control internal and external parasites in livestock (Lane & Mann 2016). To add a dung beetle to the Norfolk list, or rediscover one that has not been seen for over 100 years, is therefore a noteworthy event. Darren Mann and Steve Lane found several examples of *A. sordidus* in horse dung at Hockwold in July 2015. The only previous Norfolk record for *sordidus* was in 1889, when one was recorded flying to light in Norwich (Edwards 1893), although this record must be open to doubt because *A. rufus* is attracted to light much more frequently than *sordidus* and these two species are often misidentified (D.J. Mann pers. comm.).

*Euheptaulacus sus* The Hockwold site where *Aphodius sordidus* was found also produced two examples of *Euheptaulacus sus*, another Nationally Rare dung beetle, the first being found by Darren Mann and the second by Steve Lane and myself. The only previous county record was given as



## Correction

The Norfolk status for *Cantharis fusca* in Table 1 of records for 2013 & 2014 (Collier 2016) should read 1<sup>st</sup> modern, not 1<sup>st</sup> county. A full account is given in Nobes (2015).

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## Dragonflies

*Pam Taylor*

Norfolk suffered a long cool spring and early summer in 2016 which depressed dragonfly numbers considerably until July. Once the season finally got underway however, most species began to appear in reasonable numbers. Further spells of wet weather later in the summer were quite prolonged and this again took its toll on the overall abundance of many dragonflies.

**Willow Emerald Damselfly** *Chalcolestes viridis* was recorded from over thirty different sites in 2016 with a third of these reporting breeding behaviour of some kind. Particularly good numbers were observed at RSPB Sutton Fen, NWT Thorpe Marshes, Beeston Common and Alderfen Broad. Over one hundred individuals were seen at the latter site with a count of over twenty pairs, many of which were ovipositing together.



**Willow Emerald Damselfly** *Chalcolestes viridis*.  
*Mark Clements.*

**Southern Emerald Damselfly** *Lestes barbarus* was only reported once this year, as a single male located by Phil Heath at Winterton Dunes in mid-August. We still seek evidence that this site holds a

breeding colony of this species, but with numbers apparently falling, this may prove impossible.

**Scarce Emerald Damselfly** *Lestes dryas* was recorded at five locations. The main



**Scarce Emerald Damselfly** *Lestes dryas*. *Mark Clements.*

site for this species remains the pools at NWT Thompson Common, but low numbers were also seen at East Winch Common, Sculthorpe Common and Hempton Common. A single individual was also found at Roydon Quarry.

**Beautiful Demoiselle** *Calopteryx virgo*  
The record of a single male at North Walsham on 18 July was accepted as a presumed migrant. There were a number of migrant moths arriving in Norfolk at that time.

**Small Red Damselfly** *Ceriagrion tenellum* was once again seen in reasonably good numbers at Scarning Fen during July. The maximum count of at least seventeen males and five females came on 7 July, then at the end of that month six pairs plus five separate males were found by another observer. There were sadly no repeat sightings from Roydon



Common where a single male had been photographed the previous year.

**Scarce Blue-tailed Damselfly** *Ischnura pumilio* continued to maintain a small colony on pools near the east coast of Norfolk at Hempstead Marshes. The species was reported to have had a good year, with several orange *aurantiaca* females seen in both May and June.

**Norfolk Hawker** *Aeshna isosceles* was seen in good numbers at all its usual broadland haunts including NWT Thorpe Marshes and the RSPB reserves at Sutton Fen and Strumpshaw Fen. Further afield the species was once again reported from Thompson Common in the Brecks.

**Vagrant Emperor** *Anax ephippiger* A female was photographed in the dunes at Gun Hill by Robin Chittenden on 25 October. At the time Robin was looking for a Desert Wheatear and although his attention was distracted briefly by the dragonfly, at first glance he assumed it to be a strange-looking Migrant Hawker. Only when he examined the photograph more closely later did he realise the insect's true identity.



**Vagrant Emperor** *Anax ephippiger*. Photo: [www.robinchittenden.co.uk](http://www.robinchittenden.co.uk).

**Lesser Emperor** *Anax parthenope* was seen at Filby Broad on 23 and 24 July with other unconfirmed reports from the 22 July. Most sightings referred to a single male, while other observers were less specific. This was at least the third year in a row that the species has been seen at this

location, suggestive of a small breeding colony. One seen and photographed in Gorleston on 3 July was likely to have been a fresh migrant.

**Keeled Skimmer** *Orthetrum coerulescens* was reported in good numbers from its colonies at Dersingham Bog, NWT Holt Lowes and the Roydon Common and Grimston Warren reserve, also managed by the Norfolk Wildlife Trust. At Dersingham Bog it was seen from 6 June through to 23 September when only one survivor could still be found. The peak count at Holt Lowes from 17 July included at least eighteen males, three females (one ovipositing) and a mating pair. At Roydon Common on 18 July at least eighty-two individuals were counted. Only one or two were apparently seen at Buxton Heath during June and July 2016. Three wanderers were also reported from Winterton Dunes in mid-August.

**Red-veined Darter** *Sympetrum fonscolombii* apparently had a quiet year in the county with reports coming from three sites; Beeston Common, Kelling Water Meadows and Titchwell Marshes. Most reports were of single individuals between late June and late July, but two were seen together at Kelling Water Meadows on 23 July.

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## Hoverflies

**Stuart Paston**

A total of 122 hoverfly species featured in records received for 2016, with 32 recorders submitting data. The highlight of the year was an individual of *Meligramma guttatum* found in woodland at Wymondham College. Fuller details are given below in the selected species accounts.

The hard-to-miss hornet-mimicking *Volucella zonaria* seemed to enjoy a very good year with some recorders encountering it for the first time in their gardens, even in Norwich where it has been established since 2007. There were some records of this species in late October with the author finding a female on St James Hill, Mousehold Heath, Norwich TG242092 on 31 October.

### Nationally scarce species

*Meligramma guttatum* A female of this elusive species was discovered at Wymondham College TM075985 on 25 July by Andy Gardiner. It was determined by Tracy Money. This is the first Norfolk record since Phil Withers found the species at Wheatfen Broad in 1986. An earlier 1952 record by Ken Durrant relates to a female in the Norwich Castle Museum Collection that was taken at an unknown locality in "East Dereham" assigned TF9711.

This is a woodland species with a wide distribution in the UK but it is sparsely recorded in southern England. There is a known association with aphids on Sycamore *Acer pseudoplatanus* (Stubbs & Falk 2002) which often features at sites where it is found. This was the case with this discovery which occurred in an enclosed garden, where Sycamore was present within 100 metres and predominant in some of the surrounding woodland. This is an intriguing find that

suggests that this species is likely to await further discovery in *Acer*-dominated woodland throughout Norfolk at sites that have received little or no attention from dipterists.

*Xylota abiens* A female was recorded from Boatyard Marsh at Sutton Fen TG372241 on 20 July (MA).

### Other noteworthy records

*Brachyopa scutellaris* The only record received of this infrequently recorded sap run species came from Ashwellthorpe Lower Wood where one was taken in hazel *Corylus avellana* coppice with ash *Fraxinus excelsior* TM139981 on 12 June (AI).

*Brachypalpoides lentus* An individual of this conspicuous species was photographed at Sheringham Common TG163423 on 28 May (FF).

*Cheilosis albipila* The only record of this species was of an individual netted at Reffley Wood, Kings Lynn TF6521 on 12 May (IP).

*Cheilisia antiqua* Recorded at Lynford TL8293 on 24 April (TH).

*Cheilisia griseiventris* Two records of this species were received from widely separated parts of the county (NO) with a male reported from Neep Bridge in the Fens TF552005 on 12 May and a female discovered at How Hill TG3719 on 15 May.

*Cheilisia grossa* An individual of this early flying species was netted at Springwood, Kings Lynn TF6420 on 5 April (IP).

*Cheilisia latifrons* Spring sightings of this species were made at Mundford churchyard TL800937 on 23 April (SF/





*Melangyna umbellatarum*.  
Bodham Woods. Nick  
Owens.

TH) and at Magdalen Bridge in the Fens TF577120 on 12 May (NO). A later record of a female was from a garden in Weybourne TG110426 on 4 October (NO).

*Cheilisia urbana* A male of this species was taken at a water trap in the newly-created meadow at Sheringham Park TG138413 on 30 April (NO).

*Cheilisia vulpina* A female was reported from Stiffkey TF966453 on 15 August (NO).

*Chrysogaster virescens* This is the most localised of the three *Chrysogaster* species on the British list although it is widespread in the UK. There has been a significant decline from most parts of Britain over the last 25 years, in keeping with many species, but with some evidence of an increase in upland areas (Ball *et al.* 2011).

In Norfolk it is mostly recorded in the north of the county where acidic wetland sites provide suitable habitat and a record of a female from Grimes Fen at Sutton Fen TG371237 on 20 July (MA) was the first the author has received.

*Epistrophe diaphana* Observations made in 2016 were the first reports of this species from the Norwich area. The first was made on 21 July by the author who found a female at Hogweed *Heracleum sphondylium* at Ketts Heights TG242090.

This sighting was followed by another by the author at Earlham Cemetery TG213089 on 30 June, again at Hogweed. A further record was of a female found at Whitlingham C.P TG2507 on 5 July (JE) which was determined from a photograph.

*Lejogaster tarsata* This species is less frequently recorded in the county than the similar *L. metallina* but based on recent (post 1999) records it is well established at wetland sites near the coast. Records received were of a female from Martham Broad East on 30 June (TH) and both sexes were reported on several dates in May and June at Sutton Fen (MA).

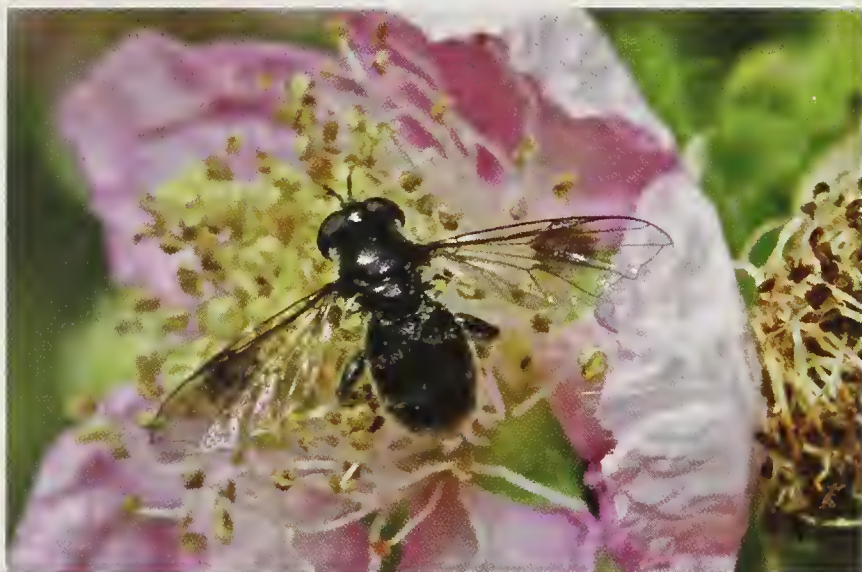
*Melangyna umbellatarum* This species was a surprise addition to the Earlham Cemetery hoverfly site list when a female was discovered by the author at flowers of Spindle *Euonymus europaea* TG213091 on 4 June. This was almost certainly a stray brought in by a strong westerly wind rather than a member of an overlooked resident population as the site is well monitored for hoverflies by the author and others. It is a fairly frequently recorded species in Norfolk usually found in wetland areas.

*Orthonevra brevicornis* A male was recorded on 23 May from Grimes Fen at Sutton Fen TG371237 (MA).



*Orthonevra geniculata* A female was recorded at Fishley TG4012 on 8 April (TH).

*Pipiza austriaca* An interesting record of this infrequently recorded species came from a lavender field at Stow Bardolf TF624057 on 30 June (NO).



*Pipiza austriaca*. Stow Bardolf. Nick Owens.

*Pipiza notata* A male of this small pipizine was taken at Ridlington TG356306 on 15 May (MA). There have been a few records in recent years, mainly from wetland sites.

*Scaeva selenitica* Two widely spaced records of this infrequently reported species were received with a female discovered in a Hellesdon garden TG2113 on 15 June (PW) and another female found at Martham Broad East TG4620 on 30 June (TH).

*Sericomyia superbiens* This attractive species was reported to be present in



*Sericomyia superbiens*. Swanton Novers Great Wood. Nick Owens.

the Edgefield Wood area TG0836 in late August and early September when it was seen at flowers of Common Knapweed *Centaurea nigra* and Devil's-bit Scabious *Succisa pratensis* (PW).

*Volucella inflata* This species is now widespread in the county and the following records represent newly reported locations. A male was observed at Roydon Common TF679228 on 22 June (DB) and on 30 June the species was seen at Stow Bardolf TG624057 (NO). A sighting on 5 July came from a Wiveton garden TG028415 (MW) and it was followed by a report of two observed at Whitlingham Woods TG267077 on 4 August (JE) and a sighting at Muckleburgh Hill TG1042 on 18 August (NO).

*Xanthandrus comtus* There were two reports from North East Norfolk of this infrequently recorded migrant with a male at Sutton Fen TG372233 on 27 August (MA) and a female at Horsey Corner TG4523 on 7 September (TH).

#### Recorders

Mick A'Court (MA). Dave Brice (DB). James Emerson (JE). Steven Falk (SF). Francis Farrow (FF). Andy Gardiner (AG). Tim Hodge (TH). Tony Irwin (AI). Tracy Money (TM). Nick Owens (NO). Ian Pritchard (IP). Paul Wells (PW). Martin Woodcock (MW).

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### Butterflies

**Andy Brazil**

*The numbers in parentheses are the comparable figures for 2015, while the initials in square brackets are those of the recorder. Refer to the list of recorders for full names.*

We received 18,486 records (17,514) covering 722 tetrads (707) and representing 6,328 site reports (6,353). A number of records arrived late last year, and I received a quantity of historic records. The numbers shown for 2015 are the final figures, and so are different from those in the previous year's report. As usual I have not included the data from the Big Butterfly Count in these totals, as it would prevent results being comparable to previous years. However this year does include the records from the on-line Garden Butterfly Survey (Web 1) which appears to have attracted more participation than the paper survey it replaced, together with Migrant Watch (Web 2). Use of the mobile phone app 'iRecord Butterflies' also increased this year (although some submissions were quite imaginative and were disregarded). I have also included some details from the preliminary analysis of the national results. I have decided to no longer report highest counts for most species because these figures mostly reflect the area surveyed: the longer you walk the more you see. I've retained them for some less common butterflies where the area surveyed is mostly static.

In total 100 tetrads were visited for the first time this year, bringing surveyed tetrads to 1,164 (leaving just 263 unsurveyed tetrads remaining for the 2011-19 period).

Whilst globally it was the warmest year ever recorded, 2016 was a poor year for most British butterflies: the spring was wetter and colder than average, June produced twice

average rainfall, with the rest of the summer only gradually improving towards August. The warmer autumn was too late for most species to see much benefit, although it did extend some species' flight periods and produce second broods in some spring species. September was 2.7° C warmer than the 1981 to 2010 average. A recent paper (Long et al. 2016) links warm, wet winters to low population numbers in butterflies, and the winter of 2015-16 was indeed abnormally warm (warmest ever recorded in England) and wet (second wettest ever recorded. See Web 3). This produced some early records before the rain returned, resulting in some early first sighting dates in an overall late spring. Nationally it was the fourth worst butterfly year on record (in fact if you disregard the migratory Red Admiral, Clouded Yellow and Painted Lady it was the second worst year!).

Although the spring was generally cold, it started warm, tempting some individuals out early, only to fall back into wintry conditions. This resulted in a stutter in emergence of some early species, where initial reports were followed by a gap before the main flight began.

#### Species reports

**Grizzled Skipper** *Pyrgus malvae* Nationally this species declined by 24% from last year. Recorded from 5 tetrads (6), representing just two sites: Foulde Common and the Cut-Off Channel. A visit to Leziate failed to find any individuals but we do now have a new and sympathetic owner here. Highest count was 16 (13) at Foulde Common on 8 May, seen between 4 May [MG] (22 April) and 28 May with a single late sighting 6 June [SG] (10 June). This remains the rarest butterfly in Norfolk, and the one most



at risk of disappearing. (The situation is similar in Cambridgeshire, while Suffolk has already lost them). It may however, still exist at some of its historic sites: indeed with only a single visit to Leziate, it cannot be ruled out there.

I am struck by how many historic sites are close to defunct railways such as the Dereham to King's Lynn line, and I would speculate that at one time these would have acted as highways for the dispersal of the species. If undiscovered colonies remain in Norfolk, the remains of such lines are probably the best locations to start searching.

**Dingy Skipper *Erynnis tages*** Recorded from 13 tetrads (16), but three were new to this decade (but all had been recorded there in previous periods). This species appears to be doing better than its Grizzled cousin, with sightings from Leziate, STANTA, Cold Harbour Wood, Narborough, Cranwich, and Lynford as well as the Cut-Off channel and Foulden. Earliest sighting 4 May [PD] (1 May), last 10 June [CG] (11 June). Highest count 20 (12).

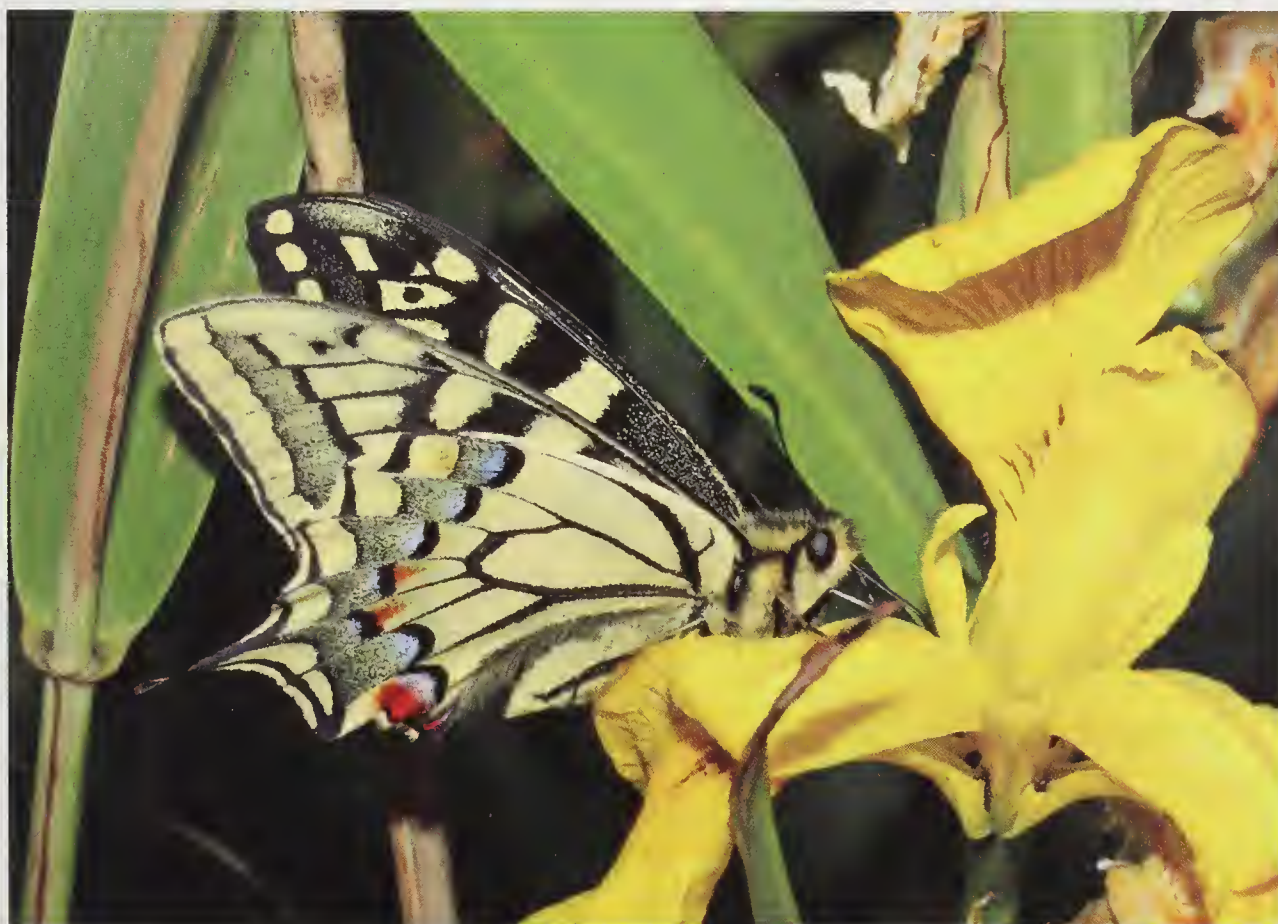
**Large Skipper *Ochlodes sylvanus*** First seen on 29 May [IW], but then not until 9 June (4 June) then constant until 16

August, then 5 sightings from 28 August until 10 September [SW] (21 August). Recorded from 132 tetrads (113), of which 36 were new.

**Small Skipper *Thymelicus sylvestris*** Recorded from 142 Tetrads (134), of which 47 were new. First sighting 23 May [PM] (23 May) was an outlier, next seen 15 June (7 June), then regular till 27 August (28 August). There were then two sightings: 15 September and 18 October.

**Essex Skipper *Thymelicus lineola*** Recorded from 58 Tetrads (75), 26 new. First sighting 17 June [RS] (24 June), but then not recorded until 29 June. Then regular until 21 August [SP] (22 August).

My impression is that all the golden skippers had a poor year. In total there were 656 records for the three species in this year, as against 703 last year, which had far fewer butterfly records overall. Nationally they all declined against the previous year: Large Skipper -38%, Small Skipper -46%, Essex Skipper -52%; and last year was itself very poor. While they are still widespread, with at least one species being reported from just under half of all surveyed tetrads, they are no longer quite as common as they once were.



Swallowtail. Hickling. Nick Owens.



**Swallowtail *Papilio machaon*** A strange Facebook report (with photo) from a garden in Wisbech in very early May might have emerged from Norfolk thatch on a nearby house or might have been bred indoors. Similarly a report of ten in a woodland glade in Hindolveston in July is baffling, as the site is well away from the Broads. Again I doubt the occurrence was natural.

Of more conventional reports it was first seen 20 May [TS] (13 May), then regularly until 20 July. There were then just five reports between 4 August and 23 August [DC] (15 August). A very poor second brood might just reflect a later start, and more individuals opting to over-winter. Certainly a report from Hethersett on 21 August and Bradwell on 23 August show that some individuals were searching for a mate over considerable distances in this period. Recorded from 23 tetrads (17), of which five were new.

**Brimstone *Gonepteryx rhamni*** First seen 31 January [PJH] (17 February), but that was an outlier, main emergence being 13 March. Last was 25 December [AB, CGr] (17 December). Recorded from 256 tetrads (219). This is becoming an all year butterfly: February was the only month in which it was not seen flying. Although national numbers were slightly down from last year, that had been a very good year and so was to be expected. This species seems better able to resist the temptation to come out of emergence early than the other adult hibernators: in the last two years there have been eight Small Tortoiseshell, 16 Peacock and nine Red Admiral sightings before March to only three Brimstone. This might suggest that this species will be more resilient to the warm, wet winters that seem to be becoming the norm.

**Large White *Pieris brassicae*** First seen on 2 April [AW] (10 March), but then not again until 12 April. Last on 1 November

[AK] (1 November), recorded from 374 tetrads (289), 101 new. No records of major summer migration this year, and nationally it did poorly, possibly as a result. I received 10% fewer sightings this year than last, while transect counts fell by 32%.

**Small White *Pieris rapae*** First seen 22 March [KH, SP] (24 March) until 29 October then a very late 13 Nov [JC] (9 October). Recorded from 368 tetrads (251), 113 new. Sightings were up 35%, while transects were essentially static, suggesting that the decline in the Large White was largely the lack of migration, since any 'home-grown' problems would probably have affected both species equally. The Small White historically has seen much smaller migrations, and thus would show a smaller affect from their lack.

**Green-veined White *Pieris napi*** 298 (205) tetrads, 83 new. The first on 2 April (9 April) then regular until 6 October [MPF] (9 October). Sightings in this non-migratory species again up 40% (transects +32%).

**Orangetip *Anocharis cardamines*** First reported on 25 March (21 March), it was then regular until 2 July (21 June). But then 12 reports from 18 July to 6 September [MR] showing a significant second brood. I have to go back to 1998 to find a similar number of records of a second brood. Recorded from 256 tetrads (212), 72 new.

**Small Copper *Lycaena phlaeas*** Recorded from 130 tetrads (95), 46 new. First 10 Feb [JL] is another exceptionally early sighting, as was one on 5 March (LB), not seen then until 10 April (AT) (17 April). The last was 31 October [AB & MC] (26 November). Interestingly, a few other counties are now beginning to see anomalously early sightings, so it is no longer just Norfolk. Sightings increased by 28%, transects by 17% so it seems like



a better year, although I still found them scarce, and since 2015 was their worst year ever, the increases were from a very low baseline.

**Common Blue *Polyommatus icarus*** First 4 May [ABu] (22 April), last 11 Oct [AB & MC] (3 October) which was an outlier, 27 September the previous sighting. Recorded from 136 tetrads (148), 33 were new. Sightings declined 16%, transects 20%: a very poor year. A recent paper (Feest et al. 2014) links declines in some species to plant community changes driven by nitrogen pollution, and it is tempting to speculate that this may be a factor in the long term decline in both the Common Blue and Small Copper.

**Holly Blue *Celastrina argiolus*** Recorded from 229 tetrads (166) of which 75 were new. First 31 Mar [JMJ] (13 March) was late by recent standards. Last seen 17 October [DL] (6 October). Population growth may have peaked, but it remains the most ubiquitous blue in the countryside.

**Chalkhill Blue *Polyommatus coridon*** Recorded from three tetrads (3) This represents the two sites: Warham, and Ringstead Downs; plus a single sighting from Hainford on 19 July. There had been recent planting of wild flowers at the site (Woodland Burial Park) so this might have been inadvertently imported as a larva on a plant. First seen 7 July [KSC] but this was an outlier, not seen again at Warham until 19 July (15 July), last 1 September [NO] (22 August). The BC annual count at Warham this year was 247, a dramatic drop from last year's 2,239. This was a bad year nationally, with some sites further south also recording falls, but of around 50%, not nearly 90%. However, as the most northerly colony we might reasonably expect it to be more affected by climate; it is also possible however, that specific site conditions may have played a part in the decline.

**Silver-studded Blue *Plebejus argus*** First reported 19 June (12 June), last 6 August [MGI] (9 August). It still hangs on at Cawston, where five were seen, but the three main colonies are Buxton Heath, East Ruston Common and Kelling Heath. All three saw peak counts improve on last year, and overall they were 33% higher than 2015. There was also pleasing evidence of spread within sites. One slight cloud on the horizon is the current plan to run the cables for the Hornsea Three wind farm project through Kelling Heath. Hopefully this should not be a problem.

**Brown Argus *Aricia agestis*** Nationally a 27% decline, 29% decline on Norfolk transects: it seems clear this was caused by the weather. First seen 6 May [SP] (10 April), then regular to 21 June (7 June). Second brood 18 July to 21 September (27 June-10 September), there was only one third brood sighting this year 4 October [AB & MC] (8 October-1 November). Clearly having got off to a late start it could not recover, but ironically, if third broods are wasted broods (as they seem to be in Wall Brown for instance), then we might see an improvement next year. Recorded from 41 tetrads (41), of which 10 were new.

**Green Hairstreak *Callophrys rubi*** The first sighting was 20 April [SA] (17 April) then regular until 15 June (15 June). Then seen 25 June and last 6 July [i] (3 July). Highest count seven (10). Recorded from 32 tetrads (28); six were new.

**Purple Hairstreak *Favonius quercus*** Recorded from 32 Tetrads (30) of which 10 were new. First 6 July [i] (9 July), last 7 September [KL] (3 September). It seems to have settled on this flight period for the moment, possibly a result of similarly cold springs in both 2015 and 16. Still very under-recorded, it has been reported from 14% of surveyed tetrads.



**White-letter Hairstreak *Satyrrium w-album***

Recorded from 14 tetrads (20) of which three were new. First seen 6 July [DR] (3 July) last 12 August [SP,WS] (10 August). Nationally down 42% from 2015 (and that was a poor year). This species has declined 97% since 1976, so it cannot really afford too many poor years. Beeston Common produced a number of sightings, while a new colony on the slopes at Burgh Castle is hopeful, so there are two new sites for those seeking a sighting. Meanwhile one actually turned up at County Hall this year right in front of the District Ecologist! Given that in previous years they have turned up in the NWT car park and on a BC field trip you have to say that they are doing their bit to not be under-recorded!

**White Admiral *Limenitis camilla***

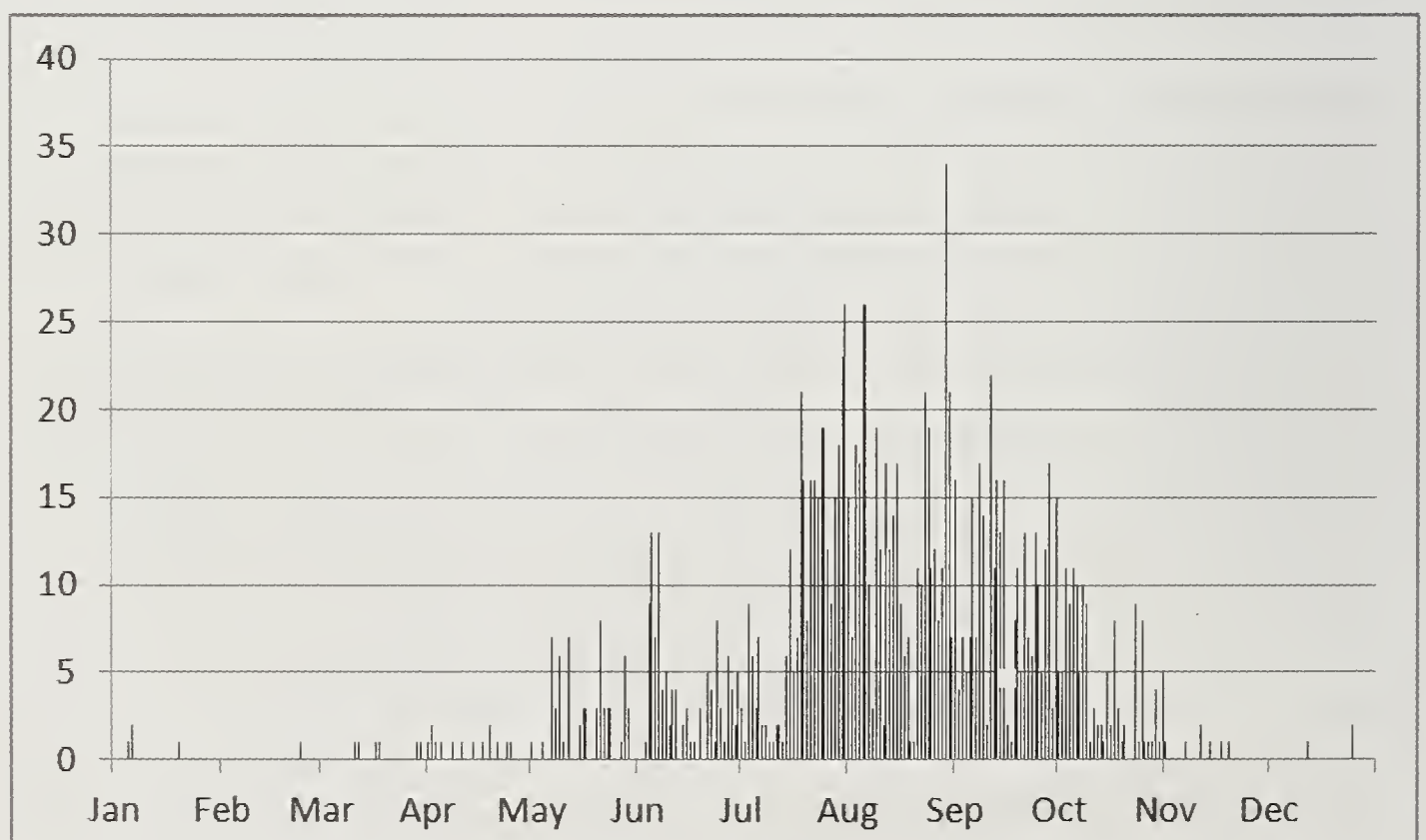
Recorded from 39 tetrads (51) of which 9 were new. First 1 July [SP] (26/6), last 29 August [PC] (17 August). Highest count (40). No second brood, despite the warm autumn, perhaps a result of the late start. In years with a second brood the flight season usually starts in late June. I have no records for this species between Dereham, Watton and Attleborough, but I refuse to believe there is nothing in this particular triangle given populations in Ashwellorpe, Hockering and Cockley Cley.

**Red Admiral *Vanessa atalanta*** Recorded from 374 Tetrads (321) 84 were new. First seen 5 January [i] (9 January), but that and others on 6, 20 January, 24 February were anomalies: it was not until 11 March that it began to be seen regularly. Again the last sightings on 25 December [R], DT] (29 December) were a reflection of that day's weather. Regular sightings however continued to 19 November. A plot of the number of sightings is informative (Figure 1).

It is clear that numbers shot up in August and again in September. (The numbers reported bear this out; no one saw more than ten until 31 July, then no more than 30 until 13 September when counts of 'hundreds' and 50+ were reported.) A similar pattern was reported elsewhere in the country, suggesting that immigration is the major source of UK individuals initially, with home-grown emergence not playing a major part until the autumn, and over-wintering individuals not having a significant impact. We shall have to hope that Brexit doesn't scare them away.

**Small Tortoiseshell *Aglais urticae*** First 27 January [i] (9 February) was an extreme outlier; not then seen until 3 March. Similarly the last on 27 December [FF] (7 December) was extreme. Sightings were

Figure 1. Sightings of Red Admiral in 2016.





continuous from 3 March to 31 October. Then 28 November, 4 December. Plotting the number of reports shows a significant increase in sightings immediately following the BC press release reporting their national decline. This was in some part a response to the publicity; I got a considerable number of emails telling me we were wrong (Cunningham's Law: The best way to get the right answer on the Internet is not to ask the question, but rather to post the wrong answer). But there was a genuine increase; no-one reported more than 30 until the 24 August but from then until the 1 September I had at least one such count almost daily. However the national decline is real; 47% down on the previous year, a fact I attribute to a wave of decline moving through the country. Our own poor years were not mirrored elsewhere at the time, but as we recover other counties are now falling. It does look very like something spreading through the country moving east to west and I suspect some new sort of egg parasite. As to the late August boom, it might have been local emergence, but in previous years I have seen a lot more caterpillars prior to such a boom, and high counts did slightly tend to cluster in coastal or near coastal localities, so I am inclined to tentatively adopt migration as a working hypothesis. (I would feel happier if anyone had seen any flying in though). In any case a welcome recovery and one that gives some hope to the rest of the country. Recorded from 328 tetrads (273) of which 105 were new.

**Peacock *Aglais io*** First 4 January [AB & MC] (4 January), last 25 December [KS] (29 December). Nationally it recorded a 46% fall from 2015, which was itself a 45% fall from 2014. However, again not mirrored here, where transects only fell 10% and sightings 12%. So not a great year but not as bad as elsewhere. Unlike Small Tortoiseshell, I received a number of sightings of larvae in late June early

July, with high counts of adults in August which slowly declined until the end of October, suggesting a home-grown second brood and no significant influx. Recorded from 343 Tetrads (311) of which 82 were new.

**Painted Lady *Vanessa cardui*** The first sighting was a late 3 May [RB] (13 April), last an exceptional 4 December [LC] (1 November). Recorded from 254 Tetrads (230). There was an exceptional surge in reports from 4 to 7 June with nearly a quarter of all reports coming in those four days. However Blakeney Point reported only 140 for the 4th, suggesting a widespread but not large movement. August again brought a surge of reports, but with most being of singletons I am inclined to ascribe this to local emergence.

**Comma (*Polygonia c-album*)** Reported from 262 tetrads (211), of which 65 new. First 10 March [BP] (4 March). Hibernators were over by 17 May (20 May), first brood 24 June (26 June) blended into second brood with no clear separation, sightings continuous until 9 October (14 October) with irregular sightings then roughly until 30 October. Then nothing until a last 25 December [AB & MC] (16 December). Sightings and transects were broadly as last year.

**Dark Green Fritillary *Argynnis aglaja*** Recorded from 11 tetrads (12) but 2 were new and inland, both again in TF62. First seen 23 June [PT] (22 June), Last 24 August [PT] (9 August). Highest count of 44(61) on 17 July at Horsey [PT]. Numbers on the north coast remain low, only one report from there got into double figures, while eight from Horsey were in this category. Contrary to many reports however, one recorder reported his "best day ever" for this species on 22 July, seeing 'hundreds' between Horsey and Winterton. I received only 36 sightings in all, while transect counts fell 19%.



Given the recent storm surge in January 2017 north coast populations are likely to fall even lower this year I fear. However, I note that historically results were even worse in 2000-2002 and yet 2003 was a bumper year.

**Silver-washed Fritillary *Argynnis paphia***

Recorded from 32 Tetrads (25) of which 16 were new to this decade. The species continues to spread, with first records from five 10 km squares. (TG00, TG23, TF80, TF72 and T52). Its strongholds remain Holt, Foxley and Swanton Novers, but there must be many woods as yet unrecorded. First seen 2 July [CG] (29 July), last seen 31 August [BP] (30 August). Numbers were down in year but it still produced several *valesina* at Holt CP.

**Speckled Wood *Pararge aegeria***

Recorded from 285 tetrads (226), 65 new. First sighting 30 March [KHu] (13 March), Last 31 October [AB & MC] (26 October). It had a good autumn, with some reports of abundance, but otherwise people mostly saw ones or twos. So an improvement on last year but a species that still has some recovering to do after a poor couple of years.

**Wall Brown *Lasiommata megera***

Recorded from 47 tetrads (52), 10 new. First seen 8 May [Many] (4 May): that brood ended 17 June (16 June). Second 17 July (31 July) to 7 September, (6 September), then possibly a third 21 September until 6 October and a final late 25 October [AS]. Last year I had hopes for a better year this year, but with a 26% decline in transect counts in Norfolk, 31% nationally (the worst year recorded) clearly my hopes were in vain.

**Grayling *Hipparchia semele***

First 3 July [RP] (1 July) Last 24 September [PT] (10 September). Recorded from 27 tetrads (20), 4 new, of which one was at Grimston Warren, a long way from any other record. A good year for its species. Transects were up 54%, while many



Wall Browns mating. Muckleburgh. Nick Owens.

recorders reported higher numbers than last year, particularly at Winterton.

**Gatekeeper *Pyronia tithonus***

First 23 May [BO] then not again till 9 June and then not seen until 1 July (16 June). Subsequently seen regularly until 13 Sept (16 September), and then a final sighting 8 October [JL]. Transect counts were fairly stable, as were the number of records but it felt like there were fewer of these around; possibly an affect caused by their late start. Recorded from 290 tetrads (243), 81 new.

**Meadow Brown *Maniola jurtina***

First 21 May [BYA] (30 May), but then not until 9 June. Regular until 11 September (12 September) but then two 4 October and 8 October [JL] (4 October). Recorded from 384 tetrads (289), 102 new. A strange symmetry in dates between Gatekeeper and this species, probably due to weather conditions. I suspect rain deterring recorders rather than a genuine absence in the missing fortnight at the start of their flight periods.

**Ringlet *Aphantopus hyperantus***

First 6 June [EH] (15 June) Last 8 October [JL] (1 September) was an outlier, otherwise sightings ended 1 September (23 August). Recorded from 315 tetrads (229), 107 new. Again I thought there were far fewer than



the figures show, reports were actually up 25% (and transects up 32%) while I was stumping around wondering where they all were. (Not where I was, clearly). It just shows the benefits of actually counting rather than relying on impressions (and makes me wonder about all those historic population assessments in Victorian journals).

#### **Small Heath *Coenonympha pamphilus***

First reports 6 May [SP](10 May) until 15 September [PT] (8 October). Recorded from 53 tetrads (55), 15 new. Interestingly the new tetrads were from all over the place, suggesting that it may have been a better year than the transect figures suggest. I have never been able to decide if this is a species that can remain at a site at a density that makes it near invisible (and so only appears in the record in good years) or if it actually exists as a meta-population, with local extinctions and recolonizations going on all the time. The effect is the same, in that it seems to pop up at sites and then disappear, only to turn up again some years later.

#### **Incidentals and migrants**

**Clouded Yellow *Colias croceus*** I received 25 reports (17) covering 23 tetrads (15) so a slightly larger influx. Interestingly, 15 sightings were between 21 August and 31 August and were mainly in the west of the county between Kings Lynn and Ringstead. Nearly all those outside that period were in the east, mostly around the Broads. The first was 7 July [MRi] (14 April), last 4 October [AB & MC] (13 September).

**Purple Emperor *Apatura iris*** Two sightings in Sheringham Park this year of what might have been the same insect. 31 July [RC] in the park, and 17 August photographed from the gazebo [RCo]. With the nearest Suffolk colony now only 15 km south of the Norfolk border it seems inevitable that we will have a breeding colony soon. However,

I don't believe we have one yet, and the source of the Sheringham insects remains mysterious.

**Marbled White *Melanargia galathea*** Two sightings this year: 23 June at Dersingham Bog [JB] fits the pattern in other years of sightings in the north-west of the county. The second 9 August at Salthouse is unusual in being so close to the Emperor in space and time. Did they arrive together I wonder? A visit to the Devil's Dyke at Newmarket I made this year had this as the most abundant butterfly (just outnumbering Meadow Brown) and with its current expansion into Suffolk and Cambridge I would expect more sightings in the future.

**Large Tortoiseshell *Nymphalis polychloros*** A single sighting 9 June [FF] at Beeston Common. Clearly an insect that had had a hard life by the time it was photographed. This was at the same time as the major invasion of Diamond-back moths (*Plutella xylostella*), which prompted alarmist headlines about the destruction of crops.

**Camberwell Beauty *Nymphalis antiopa*** A single sighting reported. Houghton Hall 24 August [SPa] was somewhat early by historical standards and its provenance must be at least slightly suspect. I wonder if they had had a wedding?

**Common Eggfly *Hypolimnas bolina jacina*** No doubt about this one's provenance! Photographed at Rockland St Peter, 28 September [via IT] this must have escaped from a breeder. Interestingly, Essex also had two sightings this year; must have been a sale on!

And that was 2016, yet another poor year: we must be due a good one soon. We can only hope. It just remains for me to thank all the recorders who submitted data this year. Their records will now go forward to the national database, to be used in research, conservation and the production of the next national atlas in 2020. Without



their time and effort none of this would be possible.

Incidentally, one trend I notice is at where grid references were supplied, and the site description was precise enough for me to check (such as a churchyard or school), in a number of cases from a number of users the grid reference supplied was displaced by c100 m to the east of the actual location. This is consistent with the use of a GPS system with an incorrect geodesic setting: without getting technical it should be set to OSGB 36 and not WGS 84. In most cases this did not matter as the reference was still in the same 1km square, but I recommend calibrating your device by getting a readout at a specific location and then checking it at Web 4 to see how accurate it is (of course if you use your phone set to OSGB then Google Maps will show you c100 m to the west of where you actually are – the joys of technology).

## Recorders

B & Y Anderson [BYA], S Anderson [SA], J Barrett [JB], A Brown [AB], R Brunton [RB], A Burkin [ABu], M Casey [MC], R Clarke [RC], L Clayden [LC], P Coleman [PC], R Coleman [RCo], D Crosby [DC], J Cummings [JC], P Dolton [PD], F Farrow [FF], M & P Fogden [MPF], C & E Gambrill [CG], S Gantlett [SG], M & P Gluth [MGI], C Green [CGr], M Greenland [MG], P J Heath [PJH], K Henry [KH], E Hibberd [EH], K Husband [KHu], R Jones [RJ], A Kerr [AK], K Limb [KL], J Lines [JL], D Longe [DL], P Mathews [PM], J Metcalf [JM], B Osborne [BO], N Owens [NO], S Page [SPa], B Palmer [BP], S Pennell [SP], R Porter [RP], M Riches [MRi], D Richmond [DR], M Rooney [MR], K Saul [KS], R Smith [RS], A Steele [AS], W Stewart [WS], T Strudwick [TS], K Stuart-Clarke [KSC], I Tart [IT], D Taylor [DT], P Taylor [PT], A Tegala [AT], I White [IW], A Whittaker [AW], S Witham [SW], internet forums [i].

## References

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## Websites

**Web 1** [www.gardenbutterflysurvey.org](http://www.gardenbutterflysurvey.org)

**Web 2** <http://butterfly-conservation.org/612/migrant-watch.html>

**Web 3** <http://www.metoffice.gov.uk/climate/uk/summaries/2016/winter> (Retrieved 26/3/2017.)

**Web 4** [www.bnhs.co.uk/focuson/grabagridref/html/](http://www.bnhs.co.uk/focuson/grabagridref/html/)

Andy Brazil 47, Cavell Road, Lakenham, Norwich NR1 2LL.

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## Moths

*Jim Wheeler*

Listed below (Table 1) is a selection of notable records taken from data received for the year 2016. The list includes 12 species new for Norfolk plus one new for vice-county 28 (West Norfolk) and four new for vice-county 27 (East Norfolk). The list also includes several species recorded this year that were last listed by C.G. Barrett in Victorian publications.

### New Norfolk records

\*denotes macro-moth

**Pine Cone Tortrix *Gravitarmata margarotana*** Three specimens were trapped at Cranwich Heath VC28 on 20 May 2016 by D. Appleton and D. Norgate. Found throughout Europe, the first British specimen was recorded at Clowes Wood in East Kent, netted in the afternoon of the 1 May 2011. Further records from Leicestershire in 2013 and Suffolk in 2014.

**Southern Dwarf *Elachista stabilella*** Several adults seen at Castle Acre Castle on 10 June by B. Heckford and S. Beavan.

**\*Herb Emerald *Microloxia herbaria*** New adventive for UK. Recorded at a garden moth trap in Costessey on 23 July 2016 by M. Casey. Originally thought to be a migrant, however this species has no known history of migration. It is now thought to have originated from an adjacent garden centre in a shipment of plants from Italy the same weekend. The larvae feed on variety of herbs and shrubs including Thyme *Thymus capitatus*, Apple Mint *Mentha suaveolens*, Curry Plant *Helichrysum* sp., and Germander *Teucrium polium*.

**Cereal Stem-moth *Ochsenheimeria vaccul-ella*** New for Norfolk on 24 July 2016, recorded by day at Walsey Hills NOA by



a. Herb Emerald *Microloxia herbaria*. Mathew Casey.

b. Yellow Peach Moth *Conogethes punctiferalis*. Allison Carroll.

D. Bratt. A relatively scarce species, occurring in a scattered distribution across parts of England.

**\*Gypsy Moth *Lymantria dispar*** The only modern-day Norfolk record. A male was trapped at North Creake on 17 August 2016 by A. Culshaw.

**Vagrant Twitcher *Tebenna micalis*** New for Norfolk on 22 August 2016, seen by day at Queen's Hills, Costessey by M. Casey.

**\*Beautiful Marbled *Eublemma purpurina*** Very rare migrant. New for Norfolk on 25 August 2016, trapped at Filby by D. Hipperson.

**Yellow Peach Moth *Conogethes punctiferalis*** An adult moth flew in to a conservatory at Aylsham and was photographed by Allison Carroll, late morning, on 22 May 2016. Adventive species found in India and Pakistan through south-east Asia to Australia. Likely to have arrived as larvae in imported fruit.

**Florida Pink Scavenger *Anatrachyntis badia*** Another adventive species for Norfolk, recorded at a garden light trap in Costessey by M. Casey on 1 September 2016. An American species, with a number of records now emerging from Europe. First UK record in 2001 of larvae found feeding on imported pomegranates from



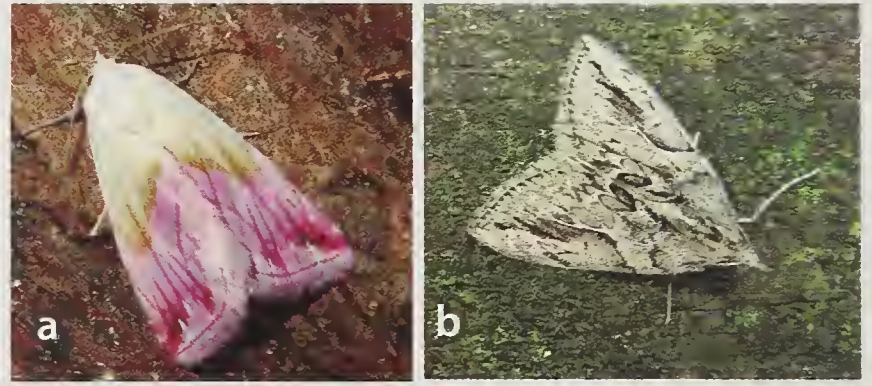
Spain in a supermarket in Plymouth, Devon.

**Citrus Leaf-miner *Phyllocnistis citrella*** Adventive. Tenanted mines were found on lemon plants at a garden centre in Rollesby by S. Wright on the 14 September 2016. A pest species of Citrus trees in Europe, mines have been detected at port of entry to the UK by the Plant Health and Seed Inspectorate (PHSE) on many occasions.

**False Codling Moth *Thaumatotibia leucotreta*** Adventive Afrotropical species, recorded infrequently in the UK through accidental importation in citrus and other fruit, usually oranges. First Norfolk record of an adult male moth from a garden trap in Costessey by J. Lowan on 13 September 2016 (Gen. det. J. Clifton.)

**Citrus Ermel *Prays citri*** Another adventive pest species found at a garden centre in Norfolk. Several open network cocoons with exuviae (including one dead moth attached) on the underside of two lime plants found at Bressingham garden centre by B. Heckford and S. Beavan on 2 October 2016.

**\*Cypress Carpet *Thera cupressata*** Trapped on the north Norfolk coast at Sheringham by Giles & Judy Dunmore on 15 October 2016. Resident and suspected migrant species, first recorded at Walberton, West Sussex in November 1984. This species



a. Beautiful Marbled *Eublemma purpurina*. David Hipperson. b. Cypress Carpet *Thera cupressata*. Giles Dunmore.

has since become increasingly common in parts of southern England. Recorded at Bradwell, (VC25 Suffolk) in 2011 by Keith Knights.

**Strawberry Pigmy *Ectoedemia arcuatella*** and **Yellow-barred Dwarf *Elachista gangabella*** First confirmed Norfolk record of *Ectoedemia arcuatella*, the only *Ectoedemia* sp. to mine Strawberry, and the only modern-day VC28 occurrence of *Elachista gangabella* were both recorded as leaf-mines at Narborough Railway NWT during a meeting of the Norfolk Moth Survey group with John Langmaid and Brian Elliot on 15 October 2016.

Full details and photos of these and all other records can be found on the Norfolk Moths Website, along with various methods to submit your own records. [www.norfolkmoths.co.uk](http://www.norfolkmoths.co.uk)

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**Table 1. Notable Norfolk records 2016 (listed by date recorded).**

Date	Species	No.	VC	Locality	Recorder	Stage	Comment
02/05/2016	<i>Cydia strobilella</i>	1	28	Mundford	Graham Geen (ex <i>Picea abies</i> cones)	Adult	Post-Vic Norfolk
08/05/2016	<i>Cydia strobilella</i>	1	27	Costessey	Matt Casey	Adult	New VC27
19/05/2016	<i>Hysterophora maculosana</i>	1	28	Bittering	Dave Appleton, Dave Norgate	Adult	Post-Vic VC28
20/05/2016	<i>Gravitarmata margarotana</i>	3	28	Cranwich Heath	Dave Appleton, Dave Norgate	Adult	New Norfolk
22/05/2016	<b>Yellow Peach Moth</b> <i>Conogethes punctiferalis</i>	1	27	Aylsham	Allison Carroll	Adult	New Norfolk (Adventive)



Date	Species	No.	VC	Locality	Recorder	Stage	Comment
10/06/2016	<i>Elachista stabilella</i>	3	28	Castle Acre	Bob Heckford, Stella Beavan	Adult	New Norfolk
30/06/2016	<i>Cnephasia pasiuana</i>	1	28	Holkham	Greg Bond	Adult	Post-Vic Norfolk
03/07/2016	<i>Coleophora saturatella</i>	2	28	St. Helens (Brecks)	Graham Geen	Case	Post-Vic VC28
07/07/2016	<i>Paratalanta pandalis</i>	1	28	Methwold	Graham Geen	Adult	Post-Vic Norfolk
08/07/2016	<i>Elachista subocellea</i>	1	28	Methwold	Graham Geen	Adult	Post-Vic Norfolk
19/07/2016	<b>Royal Mantle</b> <i>Catarhoe cuculata</i>	1	27	North Tuddenham	Barry Pummell	Adult	New VC27
23/07/2016	<b>Herb Emerald*</b> <i>Microloxia herbaria</i>	1	27	Costessey	Matthew Casey	Adult	New UK (Adventive)
24/07/2016	<i>Ochsenheimeria vacculella</i>	1	27	Walsey Hills	David Bratt	Adult	New Norfolk
24/07/2016	<b>Box Moth</b> <i>Cydalima perspectalis</i>	1	28	Dersingham	Dick Jones	Adult	New VC28 (Adventive)
27/07/2016	<b>Chervil Flat-body</b> <i>Depressaria sordidatella</i>	1	28	North Elm- ham	Dave Appleton	Adult	Post-Vic Norfolk
30/07/2016	<i>Aristotelia brizella</i>	1	27	Sheringham	Rob Lee	Adult	New VC27
17/08/2016	<b>Gypsy Moth</b> <i>Lymantria dispar</i>	1	28	North Creake	Andrew Culshaw	Adult	Post-Vic Norfolk (New VC28)
22/08/2016	<i>Tebenna micalis</i>	1	27	Costessey	Matthew Casey	Adult	New Norfolk
25/08/2016	<b>Beautiful Marbled</b> <i>Eublemma purpurina</i>	1	27	Filby	Dave Hipper- son	Adult	New Norfolk
01/09/2016	<b>Florida Pink Scavenge</b> <i>Anatrachyntis badia</i>	1	27	Costessey	Matthew Casey	Adult	New Norfolk (Adventive)
13/09/2016	<b>False Codling Moth</b> <i>Thaumatotibia lencotreta</i>	1	27	Costessey	James Lowan (det. J. Clifton)	Adult	New Norfolk (Adventive)
14/09/2016	<b>Citrus Leaf Miner</b> <i>Phyllocnistis citrella</i>	1	27	Rollesby	Stewart Wright	Mine	New Norfolk (Adventive)
02/10/2016	<b>Citrus Flower Moth</b> <i>Prays citri</i>	15	27	Bressingham	Bob Heckford, Stella Beavan	Cocoons	New Norfolk (Adventive)
15/10/2016	<i>Ectoedemia arcuatella</i>	1	28	Narborough	Norfolk Moth Survey	Mine	New Norfolk (?)
15/10/2016	<i>Elachista gangabella</i>	1	28	Narborough	Norfolk Moth Survey	Mine	Post-Vic VC28
15/10/2016	<b>Cypress Carpet</b> <i>Thera cupressata</i>	1	27	Sheringham	Giles & Judy Dunmore	Adult	New Norfolk
24/10/2016	<i>Tischeria dodonaea</i>	1	27	Hoveton Hall	Stewart Wright	Mine	New VC27



## Lacewings and allies

*Paul Cobb*



Dave Appleton has added the waxfly *Coniopteryx esbenpeterseni* to the county list, from North Elmham (TF92) on 1 June 2017, and the second county record of *C. tineiformis* from the same site on 13 August 2016, both confirmed on male genitalia.

Allan Drewitt found the snakefly *Phaeostigma notata* at Narborough Railway Embankment (TF71) on 31 May 2014, and Ash Murray had the rare privilege of a snakefly, *Xanthostigma xanthostigma*, entering his house at Dersingham (TF62) on the very early date of 16 March 2016.

Otherwise there are a number of new square records for commoner species, notably three for *Micromus paganus*, and the 'white hole' of TF72 now has some species recorded.

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*Phaeostigma notata* at Narborough. A. Drewitt.



## Orthoptera

*David Richmond*

It is almost 30 years since the author began keeping records on the distribution of grasshoppers and crickets in Norfolk. The first half of that period presented a picture of geographic stability, but the turn of the century brought sudden change.

The colonisation of the county by Roesel's Bush-cricket *Metrioptera roeselii* and Long-winged Conehead *Conocephalus discolor* has been well documented in previous years' reports, but perhaps less well known are the range expansions of Lesser Marsh Grasshopper *Chorthippus albomarginatus* and Stripe-winged Grasshopper *Stenobothrus lineatus*. The former was previously known as a fenland and coastal species (including the Broads) but has spread across the whole county in the 21<sup>st</sup> century; while Stripe-winged Grasshopper, which was previously known only from the Brecks, suddenly expanded its range into the north-west of the county and to a number of widely scattered sites across mid and east Norfolk.

In 2016, after many years of trying, the author was pleased to secure his first record of Stripe-winged Grasshopper on the chalk grassland at Warham Camp, in North Norfolk. He was also able to confirm its continued presence at Abel Heath, near Aylsham (first recorded 2015) and at Cawston Heath restoration area (first recorded 2011).

Increasing age means the author is no longer able to hear grasshopper and bush-cricket stridulations without the aid of a bat detector, but even that is now becoming difficult because of the proliferation of Roesel's Bush-Cricket and Long-winged Coneheads, whose intense stridulations across a wide frequency

band block out the underlying sounds of the quieter grasshoppers. One wonders if this background blur of continuous noise pollution from the crickets is having an adverse impact on the reproductive success of grasshoppers, just as some song birds are said to suffer in the vicinity of motorway noise.

The 2015 report referred to the possible presence of Great Green Bush-cricket *Tettigonia viridissima* at Mautby, where stridulation patterns attributed to this species had been recorded as a by-product of Norfolk Bat Survey research. Martin Greenland visited the site on two evenings in late summer 2016 but was unable to confirm their presence, though his visit to the species' stronghold at Reedham was successful.

Norfolk Bat Survey research had also pointed to the possibility of Dark Bush-crickets *Pholidoptera griseoaptera* at Welney, and in 2016 the author was able to confirm their presence in all four tetrads of the Wildfowl and Wetland Trust reserve. These are the most westerly records for the county.

Up-to-date distribution maps of all species can be found in the Species Guide to the Grasshoppers of Norfolk under the publications tab on the Society's website.

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## Solitary bees and aculeate wasps

*Tim Strudwick*

In the previous Wildlife Report covering the three years to 2014 (Strudwick 2015) I listed ten additions to the county list and predicted that this rate would not be sustained. If anything, the pace has quickened during 2015 and 2016 and another seven species new to Norfolk are reported below. Some of these are the result of a well documented range expansion, but most reflect the increase in recording activity and proficiency in the county. In 2005-2006, around 20 recorders provided about 700 records of solitary bees and wasps, and ten years later over 100 recorders have submitted over 4500 records for 2015-16. The publication of Steven Falk's *Field Guide to Bees* (Falk 2015) and his workshops in 2016 have certainly provided a great stimulus, and Nick Owens' *The Bees of Norfolk* (Owens 2017) will encourage recorders to fill the gaps in the maps for many years to come.

A spate of work on the taxonomy of jewel wasps (Chrysididae) has recently resulted in the recognition of four new British species, two of which have been added to the Norfolk list, and provided new identification literature (Paukkunen *et al.* 2015) that will make this tricky group just a little bit easier. Records can be submitted directly to me, ideally by email, via NBIS or online via iRecord and other linked schemes; all records are very welcome.

Families are presented in alphabetical order (bees first, then wasps) and species are presented alphabetically within each family. Species names and family classification follow Else *et al.* (2016).

### Recorders

AG Andy Gardiner  
AGI Tony Irwin

AJM Andy Musgrove  
ARM Ash Murray  
DB David Brice  
EY Eric Yeomans  
GN Geoff Nobes  
IB Iain Barr  
J&VB Jeremy and Vanna Bartlett  
NO Nick Owens  
SF Steven Falk  
TH Tim Hodge  
TM Tracy Money  
TS Tim Strudwick  
TW Tom Wood

### Solitary Bees

#### Andrenidae

*Andrena alfkenella* Three records of this tiny scarce bee of calcareous grassland were from three new sites: Foulden Common TL7599 on 2 August 2015 (TS), Warham Camp TF9441 on 19 June 2016 and Houghton TF773314 on 29 July 2016 (both NO).

*Andrena angustior* A female of this small and elusive *Andrena* was found in a water trap at Queens Hills TG155118 on 3 June 2015 (TS). This is the third Norfolk site after Mousehold Heath in the 1870s and Kelling Heath in 2012.



*Andrena argentata*. Roydon Common. Nick Owens.



*Andrena argentata* This heather pollen specialist is one of the few bees that will nest in very loose sand and has three historic records in NW Norfolk, the most recent in 1997 at Roydon Common. Several were found nesting at Roydon Common TF679222 on 26 August 2016 (NO). Elsewhere it is found in the Suffolk Sandlings and further south.



*Anthophora quadrimaculata*, female. Cambridge Botanic Garden. Nick Owens.

*Andrena lapponica* New to Norfolk. A bee known to specialise on Bilberry *Vaccinium myrtillus* pollen in a county without any Bilberry must be the least likely addition to the county list, yet Ash Murray collected a male *Andrena lapponica* at Dersingham Bog TF66402873 on 7 May 2016 (confirmed SF). Derbyshire is the nearest known locality and vagrancy seems unlikely, so the possibility of a relict population using an alternative pollen source (possibly Cranberry *Vaccinium oxycoccus*) is raised.

*Andrena nigriceps* Records of females from two new sites at Mundesley Cliffs TG3136 on 3 August 2015 (TS) and Kelling Heath TG099422 on 17 July 2016 (NO) are the fifth and sixth post-2000 Norfolk records, all of which come from NE Norfolk between Kelling and Mundesley.

*Andrena trimmerana* After the first Norfolk records of this large *Andrena* at Brundall in 2014, three more have followed, all females: at Cranwich Heath TL774932 on 2 August 2015, Mundesley TG3136 on 3 August 2015 and again at Brundall TG313084 on 21 August 2015 (all TS).

*Andrena varians* Two females at Holt Hall TG081396 on 17 May 2015 (NO) were the second modern Norfolk record of this scarce bee that is often associated with Blackthorn.

## Apidae

*Anthophora quadrimaculata* Previously on the Norfolk list based on a female collected in 1982 in W Norwich (AGI), it was reassuring to find one entering a nest hole in cliffs at Gorleston TG531017 on 7 July 2015 (TS), and even better to hear that males and females have been visiting a garden in W Norwich TG206082 in each year from 2013-2016 (J&VB), just 800m from the 1982 record. This is a south-eastern species with few records north of Cambridge.

*Nomada argentata* Records from Cranwich Heath TL774934 on 17 July 2016 (TS, TH) and Middle Harling Heath TL980832 on 1 August 2016 (TS) have doubled the number of post-2000 sites for this rare cleptoparasite of *Andrena marginata*.

*Nomada baccata* New to Norfolk. Whilst rediscovering *Andrena argentata* at Roydon Common TF679222 on 30 August 2016, Nick Owens also found its cleptoparasite, this small, very orange nomad bee. The nearest records are from the Suffolk coast.

*Nomada ferruginata* More new sites of this once rare cleptoparasite of *Andrena praecox*: North Creake TF8538 on 23 April



2015 (DB), Wymondham TG110009 on 4 May 2015 (AG), Southery TL626960 and Ten Mile Bank TL973602 on 11 April 2016 (NO), and Ashwellthorpe Lower Wood TM142978 on 19 April 2016 (TS).

## Colletidae

*Colletes cunicularius* New to Norfolk. On 14 April 2015 Geoff Nobes collected some large bees at Lyndford Water TL8294 which he later identified as *Colletes cunicularius*, and returning on 4 May 2015 he found a large nesting colony (Nobes, 2015). On 28 April 2015, Nick Owens and Ted Benton also found a nesting aggregation at Stoke Ferry TL695989. Historically this large bee has been a very scarce species, confined to the coasts of Wales and NW England, but in the past 20 years has steadily spread inland, often nesting in sandy quarries. *C. cunicularius* collects pollen mainly from willows and should find plenty of sites to its liking in Norfolk.

*Colletes hederæ* The 'Ivy Bee' has colonised Norfolk with impressive speed and in 2016, just three years after the first record, was widespread in the county. Table 1 summarises the records from the last four years, most of which were submitted to the BWARS 'hotline' or iRecord. Nesting conspicuously in aggregations close to habitation and at a time of year when few bees are active, *Colletes hederæ* seems set to become a very familiar bee throughout Norfolk, except possibly on the heavier

Table 1. Occurrence of *Colletes hederæ* 2013-2016.

Year	No. locatons	Region
2013	1	Hunstanton
2014	4	N Coast
2015	14	N Coast, Brecks, Great Yarmouth
2016	23	Widespread W and N Norfolk, scattered in E including Norwich area

clay soils.

*Colletes marginatus* Stoke Ferry TL695989 on 16 July 2015 (NO) was a new location and the first in Norfolk away from the coast and Brecks for this scarce bee.

## Halictidae

*Lasioglossum nitidiusculum* A female of this much-declined small bee found at California Cliffs TG519144 on 4 July 2015 (TS) was the seventh county record and a new site.

*Lasioglossum sexnotatum* A female of this large *Lasioglossum*, found at Mundford Church TL800938 on 16 July 2016 (TH, SF) was the big surprise of Steven Falk's summer bee workshop. There are just two previous Norfolk records of this enigmatic species, both in the Brecks, in 1913 and 1985. Most of the 30 or so British records have been in Suffolk where there has been a spate of recent records in the Ipswich area and a couple in the Suffolk Brecks.

## Megachilidae

*Heriades truncorum* This recent colonist, known from Middle Harling Heath since 2012, continues to spread in the Brecks with new records from Cranwich Camp TL774934 on 2 August 2015 and Santon Warren TL817882 on 11 September 2015 (both TS).

## Melittidae

*Melitta haemorrhoidalis* Records from Swanton Novers Great Wood TG014307



*Melitta tricincta*. Beeston Common. Nick Owens.



on 16 August 2015 and Flitcham TF7427 on 30 August 2015 (both NO) are the first outside the Brecks since 2000.

*Melitta tricincta* Records of the 'Red Bartsia Bee' came from three new sites, Cranwich Heath TL774934 on 2 August 2015 and on 1 August 2016 and Brundall TG313084 on 21 August 2015 (all TS), and Flitcham (TF7426, TF7427) on 30 August 2016 (NO). These are only the sixth to ninth county records, and suggest that this nationally scarce species is on the increase. Oligolectic bees (species using a single species or genus of plants for pollen) like *Melitta* have generally declined to a far greater extent than polylectic species, so any evidence of an increase is encouraging.

## Aculeate wasps

### Chrysididae - jewel wasps

*Chrysis vanlithi* A *Chrysis ignita* agg. specimen collected at Weybourne Camp TG1043 on 12 September 2014 (NO) was determined as *Chrysis rutiliventris* by Tom Wood. Now Else *et al.* (2016) have adopted the name *C. vanlithi* (Linsenmaier 1959) to replace *C. rutiliventris* (Abeille 1879) in line with the latest taxonomic work on N European *Chrysis* species. This is the first record for VC27 and the second for Norfolk. The host of this species is reported as *Ancistrocerus oviventris*, of which there are no recent Norfolk records, but it may also use other species.

*Chrysis terminata* New to Norfolk. A recent molecular study has largely settled decades of debate over how many species exist in the *Chrysis ignita* aggregate in Europe (Soon *et al.* 2014). The study included some old specimens from Oxfordshire, and as a result three new *Chrysis* species have been added to the British list. Of the three, only *C. terminata* can be identified with relative ease, by the presence of four evenly-spaced teeth on the brow carina. A male *Chrysis ignita* agg. specimen I collected from Weeting Gravelpit Wood

TL748885 on 28 August 2012 has thus been identified as this species (confirmed TW). Its host, *Ancistrocerus nigricornis*, is widely distributed in wooded habitats in Norfolk, so this parasitoid is likely to be found more widely in the county.

*Chrysis viridula* A male photographed at Holme Dunes TF7144 on 15 July 2016 (EY) was the first record for VC28 and fifth for Norfolk. It was a long way from the nearest known populations of its host *Odynerus spinipes* in E Norfolk.

*Cleptes semiauratus* This rarely recorded parasitoid of the Common Currant Sawfly *Nematus ribesii*, was found in a malaise trap at Winterton TG485215 on 5 July 2015 (AGI). This was the second post-2000 record from Norfolk.

*Hedychridium cupreum* This parasitoid of the digger wasp *Dryudella pinguis* was found at Winterton Ness TG485217 on 27 June 2015. This is the first record for VC27 and fourth for Norfolk.

*Hedychrum nobile* New to Norfolk. Only recently recognised as a British species (Baldock & Hawkins 2016), *H. nobile* appears to be a recent colonist with the oldest specimens from Surrey in 1998. *H. nobile* is a parasitoid of the digger wasp *Cerceris arenaria* and differs from the widespread *H. niemelai* (which parasitises *C. quinquefasciata* and *C. ruficornis*)



*Hedychrum nobile* female at *Cerceris arenaria* nest hole. Stoke Ferry, July 2015. Nick Owens.



most obviously in its larger size, but microscopic examination of the female sternites or male mid-tibia is necessary to confirm identity. The first Norfolk record was of a female collected from Thorpe St. Andrew on 4 August 2014 (TS). Additional records have since come from Thetford Warren TL840841 on 2 August 2015 and Middle Harling Heath TL9883 on 1 August 2016 (TS), Stoke Ferry TL695989 on 16 July 2015, Cranwich TL784936 on 6 July 2016, Kelling Heath TG102415 on 6 August 2016 and Muckleburgh TG1042 on 18 August 2016 (NO), and UEA TG191073 on 19 July 2016 (IB). In view of the distribution of its host, it is possible that *H. nobile* will quickly become more widespread than *H. niemelai*.

***Omalus aeneus*** New to Norfolk. In 2015, I reviewed two metallic blue chrysid specimens from Strumpshaw Fen I collected at TG338063 on 10 July 2008 and one bred from a trapnest at TG343059 in autumn 2009. Both were originally determined as *Pseudomalus violaceus*, but turned out to be *Omalus aeneus*. In the same year, two new records came from Shotesham TM245995 on 21 June 2015 (AJM) and Wymondham College TM075985 on 1 August 2015 (TM). *O. aeneus* is a parasitoid of various common *Passaloecus* or *Pemphredon* wasps that nest in deadwood and is probably just hard to find rather than rare or scarce.

#### Crabronidae - digger wasps

***Argogorytes fargeii*** Two new sites: Tilney All Saints TF5319 on 8 June 2016 and Warham Camp TF9440 on 19 June 2016 (NO) further extend the range of this nationally scarce species in VC28. Norfolk accounts for around half the 10 km squares in UK with post-2000 records.

***Cerceris quinquefasciata*** The 'Five-banded Weevil Wasp' also has a large proportion of recent UK records in Norfolk, and records from new sites at



*Cerceris quinquefasciata*. Nick Owens.

Brundall TG313084 on 22 August 2015, Gorleston TG531017 on 7 July 2015 and Happisburgh TG3830 on 4 July 2015 (all TS), Stoke Ferry TL695989 on 16 July 2015 and Sedgeford TF721372 on 29 July 2016 (both NO) and UEA TG191073 on 19 July 2016 and Cringleford TG185073 on 16 August 2016 (both IB) further extend its range. This species occurs in a wide range of habitats including soft-cliffs, arable margins, quarries, sandy and chalky grasslands, parks and allotments, brownfield land and modern industrial landscapes.

***Crossoscerus capitosus*** This small, black, deadwood-nesting wasp that is rarely encountered was found at Ashwellthorpe Lower Wood TM1497 on 5 June 2016 (TS) and in a malaise trap at UEA TG191069 on 1 July 2015 (IB, det. NO), increasing the number of post-2000 Norfolk sites from one to three.

***Ectemnius dives*** One at Brundall TG3108 on 18 July 2016 was only the second record for VC27. This species may be a recent colonist since the 11 previous Norfolk records, mainly from the Brecks, have all been since 2003.

***Mimesa bicolor*** This small, slender black and red wasp was found at Warham TF947412 on 1 September 2016 (NO).



This is its fourth Norfolk site and seventh record.

*Nysson interruptus* This nationally rare parasite of *Argogorytes fargeii* was found at Stoke Ferry TL699986 on 23 June 2016 (NO). This is the fifth Norfolk site and the first record for VC28.

*Oxybelus mandibularis* Another good find from Steven Falk's summer bee workshop was the 7th county record of the rarest of the three British *Oxybelus* species at Cranwich Camp TL7794 on 17 July 2016 (TH).

*Passaloecus eremita* This tiny, slim wasp was found entering beetle holes in a pine tree at Thompson Common TL936965 on 1 August 2015. This is the third county record and the first post 2000.

*Pemphredon morio* A female, found nesting in a fallen tree trunk at Queens Hills TG155118 on 18 July 2015 (TS) was the first record for VC 27 and the second for Norfolk.

*Psenulus schenki* New to Norfolk. This small, slender black wasp was collected UEA TG191069 on 7 July 2016 by Iain Barr in a malaise trap (det.NO).

#### **Pompilidae - spider-hunting wasps**

*Auplopus carbonarius* The third and fourth county records of this recent colonist were from Strumpshaw Fen TG341065 on 9 September 2015 and Rosary Cemetery Norwich TG242084 on 10 September 2015. All records so far are from VC27.

#### **Sapygidae - club-horned wasps**

*Monosapyga clavicornis* A male of this parasitoid of *Chelostoma florissomne* photographed at Queens Hills TG155118 on 3 June 2015 (TS) was the first record for VC27 and the second for Norfolk.

#### **Vespidae - social, potter and mason wasps**

*Vespula rufa* A male at Swanton Novers Great Wood TG014307 on 2 August 2015

(NO) was only the second county record in the past five years. Though always fairly scarce in Norfolk, it seems unlikely this species is as rare as recent records suggest so further records would be very welcome.

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## Bumblebees

*Nick Owens*

**Barbut's Cuckoo Bumblebee** *Bombus barbutellus* (main host: Garden Bumblebee) Recorded at eight sites across the county including some in the Fens. Nectar sources included thistles, Red Bartsia, Bramble and Field Scabious reflecting the preference of cuckoo bumblebees for massed flowers where they can crawl or fly short distances from flower to flower. This species is widespread in the county and probably somewhat overlooked or mistaken for *B. hortorum*.

**Gypsy Cuckoo Bumblebee** *Bombus bohemicus* (main host: White-tailed Bumblebee) Reports came from Buxton Great Wood (DIR) and Anmer (NO). It remains scarce despite the abundance of its host.

**Field Cuckoo Bumblebee** *Bombus campestris* (main host: Common Carder Bumblebee) One report of this species from Sparham (PW). This is another scarce cuckoo with an abundant host.

**Red-tailed (or Hill) Cuckoo Bumblebee** *Bombus rupestris* (main host: Red-tailed Bumblebee) Recorded at Hindolveston (MN), Barrow Common (JK) and a chalk pit near Little Massingham where there were 2 females and 30 males on 30 July, mostly feeding on Field Scabious (NO).

**Forest Cuckoo Bumblebee** *Bombus sylvestris* (main host: Early Bumblebee) Recorded at a bird box at South Wooton, presumably parasitising a nest of Early Bumblebee (JB). Males were recorded at Fordham Bridge and Muckleburgh Hill (NO). The species was also seen at Sparham (PW) and The Lizard CWS near Wymondham (AR). This is the second most commonly recorded cuckoo bumblebee in Norfolk.

**Vestal Cuckoo Bumblebee** *Bombus vestalis* (main host: Buff-tailed Bumblebee) Recorded from 29 sites. This is the commonest of the cuckoo bumblebees in the county. It has a southerly distribution in the British Isles and has only recently been recorded in Scotland. Its host has also been moving northwards and has recently been recorded in the Shetlands with one or two even turning up on Fair Isle.

**Garden Bumblebee** *Bombus hortorum* Thirty eight records received. This long-tongued species lives up to its name, being frequently seen in gardens where it uses flowers with a deep corolla. Spring queens in the Fens were recorded on Ground Ivy, male willows and White Dead-nettle (NO), whereas workers in August at Sedgeford were recorded on Marjoram, Field Bindweed, Vervain, Petunia, Lavender and scabious species (JK).

**Tree Bumblebee** *Bombus hypnorum* Twenty records were received from widespread sites. This new coloniser was first reported in the county in 2008 at Earlham Cemetery and is now very well established and abundant across the whole county, often nesting under eaves or in bird nesting boxes. Bumblebee scientists in Andrew Bourke's group at UEA have compared the habitats used by Tree Bumblebees and six other bumblebee species in south-east Norfolk (Crowther *et al.* 2014). The Tree Bumblebee was unique in being associated with urban and woodland landscape elements, being especially associated with Hawthorne and Blackthorn but avoiding oilseed rape, Ground Ivy and White Dead-nettle. The authors conclude that Tree Bumblebees



are exploiting habitats which are under-utilised by other bumblebee species, suggesting that they can co-exist without much competition with long-established bumblebee species. This bumblebee can have two broods in a year and a queen was seen with a pollen load from Bramble at Flitcham in mid-July (NO).

**Heath Bumblebee *Bombus jonellus*** Many of the post-2000 records come from near the coast so it was good to have records from Buxton Heath and Buxton Great Wood (DIR) and a queen from Peddars Way near Sedgeford (NO). Despite its name, the species is not confined to heathland, though it does often visit *Calluna vulgaris*, *Erica cinerea*, *E. tetralix* and garden heather flowers when these are available.

**Red-tailed Bumblebee *Bombus lapidarius*** This is among the commonest and most easily recognised bumblebee species. Fifty seven records were received. Queens are generally a bit later emerging in the spring than *B. terrestris* and *B. pratorum* with 2016 records starting from the second or third week of April. New queens appear from July but an extremely late queen was seen at Reepham on 19 December (DIR).

**White-tailed bumblebee *Bombus lucorum*** A common and widespread species with records from 21 sites. It seems to be slightly less common than *B. terrestris*, though it is difficult to distinguish the workers of these two species. Queens were recorded from the second week of April on Blackthorn, willow, and Ground Ivy. This last plant species has a deep corolla, but queens of short-tongued bumblebees are able to use it. Workers in summer were recorded on Red Bartsia, Bramble and also Hogweed, which seems to be a particular favourite.

**Moss Carder Bumblebee *Bombus muscorum*** This beautiful bee seems to be declining and is perhaps in danger of

extinction in the county. There was one record: a queen photographed on Gun Hill near Burnham Overy on 1 May (MN). All recent records come from the north coast between the Wash and Weybourne.

**Common Carder Bumblebee *Bombus pascuorum*** This bumblebee can look very similar to a Moss Carder, but always has some black hairs, for example on the head or the legs, though some individuals look very pale with almost entirely yellow abdomens. Another distinguishing feature is that the hairs on the thorax are uneven in length, giving a fluffy appearance, whereas the Moss Carder has even, short hair. There were 64 records with queens appearing from about mid April. Common Carders have a long tongue and often use Boraginaceae, Fabaceae and Lamiaceae as a food source. Plant species reported in 2016 included Viper's Bugloss, Kidney Vetch, White Clover, White Dead-nettle and comfrey as well as Field Sowthistle (Asteraceae). It has been suggested by Norfolk's bumblebee pioneer, Chris Plowright, that this species is out-competing the Moss Carder as a result of climate change (Plowright & Plowright 2008).

**Early Bumblebee *Bombus pratorum*** Twenty-one records were received. New queens and males were first recorded on 19 and 22 June respectively, this being one of the earliest species to begin nesting in the spring. There can be a second brood later in the season.

**Large Garden (or Ruderal) Bumblebee *Bombus ruderatus*** Reports of this bumblebee have been slowly increasing with records from ten sites in 2016, records coming from as far east as Weybourne (NO), Norwich (LC) and Ashwellthorpe Woods (TS) as well as from its traditional stronghold in the Fens (DIR, NO). This species looks very similar to the (small) Garden Bumblebee and it is not always possible to give a confident identification



from a photograph. The amount of yellow can be reduced and some males are entirely black. In yellow forms the band on the back of the 'thorax' is semi-circular in shape with a straight front edge, rather than crescent shaped. Males have ginger hairs on the mandibles, sometimes visible in images. Queens of this bumblebee are very large with a very long tongue and seem especially to seek Lamiaceae in the spring.

**Red-shanked Carder Bumblebee *Bombus ruderarius*** No records were received for 2016.

**Buff-tailed Bumblebee *Bombus terrestris***

Queens patrolling the hedge-banks are one of the iconic signs of early spring. Queens were recorded from 29 February on bumblebee transects near King's Lynn (IP). Fifty-seven records were received reflecting its abundance in the county. It has a short tongue and shares with White-tailed the habit of nectar robbing flowers with a deep corolla. Holes are bitten in the base of a flower and used to reach nectar which is otherwise inaccessible in species such as Yellow Toadflax. *B. terrestris* is very versatile and can often be seen far out on the dunes feeding on Sea Holly, as at Holme on 30 August (JK). Some of these may be migrating (or dispersing) along the coast: many were seen heading into a westerly headwind along Weybourne beach on 8 August (NO).

With thanks to the following recorders: Julian Bull [JB], Bure Valley Conservation Group, L Crowther [LC], James Emerson, Jean Kelly [JK], Ash Murray [AM], M Nash [MN], Nick Owens [NO], Ian Prichard [IP], David Richmond [DIR], Anne Roberts [AR], Lisa Rowley, Tim Strudwick [TS], P Wells [PW], Sarah and Phil Yerbury.

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## Bryophytes

*Mary Ghullam & Robin Stevenson*

Another couple of years in which, although there were few additions to the flora, steady recording has discovered new sites for a significant number of 'rare' species. Some of these may be spreading, either as a result of climate change or as a reaction to changes in other environmental conditions, but other populations may be stable and 'increases' purely down to increased recording activity.

Additions to the county are prefixed by two asterisks \*\*; new vice county records are preceded by a single asterisk.

Nomenclature follows Hill *et al.* 2008

*Aphanorrhegma patens* This small species, aptly called Spreading Earth-moss in English, is usually found on damp bare earth, almost always when fruiting. In this case it formed an extensive lawn on mud at the edge of a scrape at the Waveney River Trust, at Earsham (TM3157188266), 18 July 2015, RF.

*Antitrichia curtispindula* Declared probably extinct by Petch & Swann (1968) this plant was re-discovered in a pear orchard just outside Wisbech in 2012. Two much larger colonies have since been found, both growing on young oak trees; Swanton Novers Great Wood (TG01213179), 28 April 2015, JM & CRS, & Wootton Woods (TF65132405), 18 September 2016, CRS.

\*\**Dialytrichia mucronata* The classic habitat for this species is on rocks and tree bases in the flood zone of rivers; this plant, however, was growing epiphytically on the branch of an oak tree a long way from the nearest river. Feltwell (TF738920), 29 November 2015, CRS & LS.

*Dicranum polysetum* A sixth record for VC28, on the floor in wet woodland.



*Antitrichia curtispindula*. Wootton Woods. Robin Stevenson.

Ingoldisthorpe Common (TF68103177), 5 February 2015, CRS & KR.

*Didymodon nicholsonii* This rather scruffy little moss, which is probably being much



*Dialytrichia mucronata*. Feltwell Landfill Site. Robin Stevenson.



overlooked, has produced second records for both vice-counties. In both instances they were growing by the side of tracks: Castle Rising (TF666252), 25 January 2015, CRS; Banham (TM05928758), 15 October 2015, CRS.

*Diplophyllum albicans* This acidophile liverwort seems to be curiously rare in VC28, despite the abundance of suitable habitat. Here it was growing on the side of a drainage dyke through damp woodland, King's Lynn Golf Club (TF65382314), 3 November 2015, CRS.

*Entosthodon fascicularis* Only the third record for the county, a single fruiting specimen was found growing in an area about to be turned into allotments in Brundall Gardens Country Park (TG31300833), 22 March 2015, MG.

*Eucladium verticillatum* This species is known for growing in damp calcareous habitats, however, to be found growing inside a church, is distinctly more unusual. Damp stonework on the north side of the chancel. Wiggenhall St Mary Magdalen Parish church (TF598113), 20 September 2016, CRS.

*Eurhynchium striatum* This is a common species across the county, however, it is rarely found in fruit - as here. In damp woodland, Mow Fen (TF6610), 27 November 2016, CRS.

*Fissidens gracilifolius* One of the smaller and less conspicuous members of the genus, this was found on the chalky banks of the Cut-off Channel (TL6988) 17 March 2015, CRS & LS.

*Fossombronia pusilla* Species in the liverwort genus *Fossombronia* appear to be much commoner in east Norfolk than in the west. This is almost certainly due to Mary Ghullam's enthusiasm for the genus. They are all small and impossible to identify unless fruiting. This species was encountered amongst mainly vascular vegetation in Swanton Novers

Great Wood (TG00773175), 15 April 2015, JM & CRS.

*Frullania tamarisci* A pollution sensitive species which Swann (1982) noted as being "rare in short calcareous grassland". This species appears to be making a slow recovery, though recent records have, as here, all been as an epiphyte. On birch, Thetford Forest (TL82309043), 13 November 2016, CRS.

*Grimmia trichophylla* Almost all of the members of this genus, apart from the near ubiquitous *Grimmia pulvinata*, are confined to acid rocky substrates. These are generally in short supply in Norfolk. However, suitable gravestones do occur occasionally, as here, in South Wootton Parish church (TF64052277), 26 April 2016, AB & CRS.

*Gyroweisia tenuis* Small and inconspicuous this plant is probably somewhat under-recorded. On damp brickwork by the side of the lake at Narborough Hall (TF7413), 23 October 2016, SY.

*Henediella heimii* This is normally a coastal taxon which, like various vascular species, has been spreading inland along salted road margins, as by the side of A148 at Gorse Moor (TF694244), 22 February 2015, CRS and by the side of the A17 near King's Lynn (TF61701817), 20 February 2016, CRS. So far it has not been found along roads in VC 27, but it was found near the Quags at Kelling in its more usual habitat at the edge of the saltmarsh and shingle bank on the coastal path (TG092440 and TG094439), 14 May 2016, MG.

*Leiocolea turbinata* This very rare (only three records) calcicolous liverwort is very small, making it difficult to spot. It was growing on bare chalk exposed on the banks of the Cut-off Channel near Feltwell (TL6989), 17 March 2015, LS & CRS.

*Leptobarbula berica* Superficially rather similar to *Gyroweisia tenuis*, these are only



the third and fourth recent records of this species in the county. It was found both on damp brickwork at Bolwick Hall, in Marsham (TG19912447), 14 November 2015, NFG and then again on the north side of the parish church in South Wootton (TF64052277), 26 April 2016, AB & CRS.

*Leucobryum glaucum* A not uncommon woodland taxon in the county it is very rarely found fruiting, either locally or nationally. The only previous county record of it found doing so was just across the road in Wootton Woods (February 2005). Damp woodland, King's Lynn Golf Club (TF654234), 2 November 2015, CRS.

\* *Leucobryum juniperinum* Found by Mary Ghullam in VC27, as a new county record in 2014, we were pleased to add it to VC28. Dry woodland, Swanton Novers Great Wood (TG01503148), 27 April 2015, JM & CRS.

*Lophozia excisa* Only the sixth record for the county of this liverwort. On damp sand by the side of a lake in an old flooded sandpit. Leziate (TF68441901), 25 August 2015, AB, KR & CRS.

*Microbryum curvicolle* A tiny calcicole moss with only three records in the county, all from VC28. NWT Ringstead Downs (TF6940), 28 February 2015, NBG.

*Moerkia flotoviana* This rare liverwort was found on Gooderstone Fen (TF75140003), a second record for VC28 and a fourth for the county. Ros Tratt, a visiting wetland ecologist had sent the specimen to a national referee for checking, and he passed it on to us. Date unknown.

*Nowellia curvifolia* This dark red liverwort of rotting timber had been recorded in nearby Suffolk, so it was good to find it in the Thetford Forest, at Frost's Common (TL94439336), 11 April 2016, JM & CRS.

*Orthotrichum obtusifolium* Yet another species that is recovering from air

pollution, this is only the second record from the county, the previous one having been made in 1990 by the late Alec Smith. It was found as an epiphyte on *Acer campestre* planted on a cutting beside the A17 near King's Lynn (TF61671817), 20 February 2016, CRS.

*Orthotrichum speciosum* So far apparently confined to VC28 this is the sixth record for another species recovering from air pollution. Found as an epiphyte on a young oak in Mundford Forest (TF7992), 21 February 2016, CRS.

*Orthotrichum tenellum* Although this species seems to be much less common in VC27 than in VC28, it was found twice in January 2015, once at Gresham Castle on a willow (TG166380), 7 January 2015, CRS, and then on an oak in Earlham Cemetery (TG213090), 31 January 2015, NBG.

\* *Phascum cuspidatum* var. *papillosum* A new VC27 record, this variety is probably under recorded, as it can only be confirmed microscopically. Kelling Heath Holiday Park (TG1041), 12 November 2015, MG.

*Ricciocarpos natans* This is the first record of this intriguing heart-shaped liverwort for VC27 since Beckett & Bull's Flora. Found in mid-summer, (it sinks to the bottom of water bodies in winter), at East Carleton, it dominated the surface of a farm pond. (TG181012), 21 June 2016, MG.

*Sanionia uncinata* This species appears to be getting much commoner, however, this - the 10th record - still seems worthy of note. It was found by the side of a pool in Bradmoor Plantation, Narborough (TF74971413), 15 March 2015, NBG.

*Sphagnum molle* This is a pioneer species which was not recorded in Norfolk until 1966 (Petch & Swann, 1968); it was then known from only two sites, however, it has now been found to be more widespread, although apparently still



restricted to a fairly small area in west Norfolk. On the side of a major drain cutting across a fairway, King's Lynn Golf Club (TF654236), 2 November 2015, AM., and on the side of a drain in Wootton Woods (TF64922396), 18 September 2016, CRS.

*Tortula schimperi* Recently raised to species level, these are only the third records for VC27 & 28. Found on the edge of Gayton Thorpe Wood (TF738186), 18 January 2015, RF., and on a steep bank at the edge of Sheringham Park NT on Lodge Hill, Upper Sheringham (TG140411), 10 March 2015, MG.

*Weissia longifolia* Another tiny calcicole moss, with only a couple of records in the county, one from each vice-county. NWT Ringstead Downs (TF6940), 28 February 2015, NBG.

### Acknowledgements

As ever, members of the Norfolk Bryology Group and the various individuals listed below are grateful to those who have allowed them to record on their sites.

**Recorders:** AB - Anne Blackham; AM - Ash Murray; CRS - Robin Stevenson; JM - Julia Masson; KR - Keith Redhead; LS - Lewis Saunders; MG - Mary Ghullam; NBG - Norfolk Bryology Group; RF - Richard Fisk; SY - Sharon Yardy.

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## Fungi

**Tony Leech**

### More teeth at St Faith's

In 2011, Anne Crotty found Bitter Tooth *Sarcodon scabrosus*, at St Faith's Common (TG1817), north of Norwich (Leech 2012). The tooth fungi bear their spores on spines rather than gills below the cap. There are relatively few species and most are much commoner in the Highlands of Scotland. Indeed, the disjunct distribution of *S. scabrosus* (in the highlands under pine and, rarely, in southern England under Sweet Chestnut *Castanea sativa*) suggests that more than one species is involved. Martyn Ainsworth at Kew (pers. comm.) has shown that this is the case but the new species has not yet been described.

Remarkably, in September 2016 Anne found another stipitate (stalked) tooth fungus new to Norfolk at St Faith's Common, close to where she found *S. scabrosus* and also under Sweet Chestnut. Again Martyn Ainsworth was able to confirm her identification, this time as Black Tooth *Phellodon niger*, and again he pointed out that two different species recorded in Britain have erroneously been united with this name and that resolution is underway through DNA sequencing.



**Black Tooth *Phellodon niger*.** St. Faith's Common. Inset shows 'teeth' beneath cap. Anne Crotty.

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Two other tooth fungi, both corky in texture and occurring on soil, have been recorded occasionally in Norfolk: Zoned Tooth *Hydnellum concrescens* and Velvet Tooth *H. spongiosipes*. The former is also present at St Faith's Common making the site a real hotspot for these fungi. The latter was recorded by Reg Evans at Felthorpe Woods, only a few kilometres away, on a number of occasions between 1981 and 1984. *H. concrescens* is also known from Wheatfen but the 2005 record from there of *Phellodon confluens* is considered suspect.

### Waxcap developments

After finding the Bog Waxcap *Hygrocybe coccineocrenata* for the first time in Norfolk at Catfield Fen in 2015, Yvonne Mynett has subsequently found it at Holt Lowes (TG0937; August 2016) and at Ugate Common (TG1418; August 2017). Two new waxcap varieties, not recognised as separate species, were recorded for the first time in Norfolk in 2016; Glutinous Waxcap *H. glutinipes* var. *rubra* at Flordon Common (September 2016) and Meadow Waxcap *H. pratensis* var. *pallida* at Little Plumstead Woods (TG3110; November 2016), both by Tony Leech. The latter necessitates the removal of the record for *Hygrophorus penarius* at this site which was wrongly identified (by Tony) in 2013. The genus *Hygrocybe* has now been split into six genera as a result of molecular studies so that *H. pratensis* is now correctly known as *Cuphophyllus pratensis*.

### Lost and found in Norfolk

In 2016, the five-year Lost and Found Fungus Project was launched to target one hundred species of fungus for which there were historical British records but no recent reports. This citizen science project has





a. *Puccinia cladii*. Swangey Fen. James Emerson.

b. Brian Douglas, Paul Cannon and Martyn Ainsworth searching for fungi at Wheatfen. Tony Leech.

been funded by the Esmée Fairbairn Trust and has involved the appointment of Brian Douglas, based at Kew, as coordinator. In July 2016, three Kew mycologists (Martyn Ainsworth, Paul Cannon and Brian Douglas) spent several days in Norfolk on the hunt. Their primary targets were *Puccinia cladii* (a rust fungus on Great-fen Sedge *Cladium mariscus*); *Puccinia cicutae* (a rust fungus on Cowbane *Cicuta virosa*) and *Anthracoidea pulicaris* (a smut fungus on the anthers of Flea Sedge *Carex pulicaris*). The first task was to locate host plants, and members of the Norfolk Fungus Study Group (NFSG) prepared an itinerary in advance and accompanied the professionals.

*Puccinia cladii* had been recorded extensively in the Broads by E.A.Ellis between 1935 and 1958 but since then only from

Glamorgan and at Royden Fen near Diss (by M. Yeo in 2014, a record unknown to us at the time). The group found the rust on all populations of Great Fen-sedge examined (Wheatfen, Upton Fen, Sutton Fen and Catfield). *Anthracoidea pulicaris* had been found at West Caister by E.A.Ellis in 1932 but the only recent records have been from Scotland. The host plant was examined at Upton Fen and at Southrepps Common but there were no signs of black 'smut' in the flowers. Neither did the Cowbane plants examined at Sutton Fen, Wheatfen (where it was known 1934-1940) or Catfield bear the fungus (although it had been recorded at Woodbastwick in 2014). Further details of the LAFF project can be found on <https://www.kew.org/blogs/kew-science/the-lost-and-found-fungi-project>.

### A dung surprise

Readers of these reports will have become familiar with my new county records for dung-loving fungi in Norfolk. Most of these are micro-fungi which appear when the dung is incubated and are generally overlooked, but occasionally a 'real' dung fungus is found. On a foray organised by the Dersingham Mushroom Club at East Winch Common (TF7015; July 2016) we were surprised to find dried cow dung bearing several brown funnel fungi which turned out to be *Clitocybe amarescens*, a species unfamiliar to all present. About



*Clitocybe amarescens* on dried cow dung. East Winch Common. Tony Leech.



**Table 1. New county fungus records in 2016, in addition to those given in the text**

Species	Place	Date	Collector [Identifier if different]	Notes
<i>Arthrotrrys superba</i>	Sandringham. TF6828	17.12.2016*	Tony Leech	Incubated on Muntjac dung
<i>Cladosporium uredinicola</i>	Banham Zoo. TM0587	10.9.2016	Tony Leech	A small black microfungus on dead leaf of <i>Iris foetidissima</i> . Probably parasitic on rust <i>Puccinia iridis</i> .
<i>Corynespora olivaceae</i>	Bayfield Estate, nr. Glandford. TG0440	November 2016	Andrew Duff [Tony Leech]	Black spots on dead twig of Common Lime <i>Tilia x europaea</i> .
<i>Marchandiomyces corallinus</i>	Salthouse Heath. TG0734	29.7.2016	Tony Leech	A pink microfungus parasitic on lichens; here on <i>Parmelia sulcata</i> .
<i>Microsphaerella microsora</i>	Watermill Broad, Cranwich TL7795	17.8.2016	Tony Leech	Black spots on living leaf of Common Lime <i>Tilia x europaea</i> .
<i>Mycotypha microspora</i>	Sandringham TF6828	17.12.2016*	Tony Leech	Incubated on Muntjac dung.
<i>Puccinia epilobii</i>	The Lings, Little Snoring. TF9633	9.5.2016	Tony Leech	Rust fungus on <i>Epilobium</i> sp.
<i>Puccinia iridis</i>	Holt. TG0839	29.8.2016	Tony Leech	Rust fungus on Stinking Iris <i>Iris foetidissima</i> leaf.
<i>Rhopalomyces magnus</i>	Sutton Fen. TG3623	12.7.2016*	Tony Leech	A mould fungus from a disused Mute Swan nest.
<i>Scutellaria superba</i>	Holkham NNR. TF8645	May 2016	Andy Bloomfield [Tony Leech]	A small orange 'eyelash' fungus.

\*examined later

half of the approximately 20 British records for this species, none of them from Norfolk, are associated with dung.

Several conecaps are coprophilous and *Conocybe pubescens* was added to the Norfolk list at Hudson's Fen (TF6922; September 2016). Several new micro-fungi for the county are included in Table 1.

### Powdery mildews

Powdery mildews are parasitic ascomycete fungi that grow on the green parts of vascular plants. Until recently it has been easy to identify powdery mildews as it was assumed that many were host-specific; identify the host and you have a name for the fungus. Not any more! Molecular studies have shown that a number of plants can be attacked by more than one species of mildew so that identification can only be

secured if asci are present, and then often with difficulty. Bearing this in mind, it is unlikely that the fungus found on Creeping Buttercup *Ranunculus repens* by Ian Senior in Earlham Cemetery (TG2108, 2016) is anything other than *Erysiphe aquilegiae* var. *ranunculi* which does not hitherto seem to have been recorded from Norfolk on this host (although there is an anonymous record of it on Greater Spearwort *Ranunculus lingua* from 1947).

### Reference

LEECH, A.R. 2012. Fungus Report 2011. *Trans. Norfolk. Norwich Nat Soc.* 45(1): 118-120.

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## Gillian Beckett 1935-2016



Photograph: courtesy of Stanhoe Archive.

Gillian Beckett, who died on 23<sup>rd</sup> August 2016, was an excellent and well-known local botanist, having been BSBI Vice-County Recorder for West Norfolk (VC28) for 23 years. She was also a woman with a wide range of interests in many other spheres, particularly in history, geography and natural history. She was author of *A Flora of Norfolk*, published in 1999, in conjunction with Alec Bull, Vice-County Recorder for East Norfolk and Robin Stevenson, BBS Recorder for Norfolk. Gillian had a great talent for involving local people in botanical recording and training them to become good botanists, through encouragement, arranging regular field meetings, helping them to improve their skills, and all in a very friendly atmosphere. She, and her botanically knowledgeable husband Ken, who wrote many books on garden

plants, trees and horticulture, made a formidable team.

Gillian was born Gillian Tuck on 18th January 1935 in Bromley, Kent, and moved with her father and mother to Stanhoe, Norfolk, in 1948, soon after her father was demobbed from the army. He then worked for a time at Bircham Newton nearby, in the Officers' Mess. Mr Tuck's family had originally come from the Wells area of Norfolk. Gillian's mother was shocked at the cottage they moved into, Bramley Cottage, and burst into tears the first time she saw it. The cottage had no electricity supply or mains water. These 'mod cons' didn't arrive until the early '50s. However, the family soon became involved in village life, and Gillian's mother, a talented pianist, set out to organise a pantomime that very year. Cinderella was the choice and Gillian starred as Cinderella. Apparently, from newspaper reports it was a great success with requests for performances in neighbouring villages. A year or two later, *Beauty and the Beast* was the choice.

Gillian was an only child. She developed an interest in natural history and remembered counting the number of yellowhammer nests in a stretch of hedge and later contrasted it with how many fewer there are today. She went to Fakenham Grammar School after the family arrived in Stanhoe and after that to Teacher Training College. She started teaching at Docking primary school where, occasionally, in severe freezing winters, the school would be closed because they had only outside toilets. Later on in her teaching career she became Deputy Head at the primary school in Wells. To improve her qualifications she took an external Honours degree in Geography, with



a particular interest in Historical Geography and the Landscape.

John Pankhurst introduced Gillian to botany in the 1950s and she later learned a great deal from Eric Swann, who was Recorder for West Norfolk from 1949 to 1982. She joined the BSBI in 1961 and, under the name of Miss G. Tuck, contributed records to the Flora of Norfolk by C.P. Petch and E.L. Swann, published in 1968. For this publication she also provided many colour transparencies as illustrations.

For a time Gillian was Meetings Secretary (later Field Secretary) for the BSBI from 1972-1976. In April 1973 she led a two-week meeting to Yugoslavia, which, according to Arthur Copping, who was one of the members of the party, was "very successful, but fraught with difficulties associated with a Communist state". During the meeting, three members (Ken Beckett, Arthur Copping and Eric Clement) decided to leave the group on the free day, and take the train from Dubrovnik to Trebinje in search of *Helleborus* species. This aroused suspicion among the authorities and the three were arrested and detained for some hours before being returned on the train to Dubrovnik. It was later disclosed that they were suspected of being Croatian nationalists! Apparently Gillian, who had to cope with all the consequences, let her displeasure be known to the trio. It was at this meeting that Ken and Gillian first met, and they soon married, in August.

After their marriage Gillian joined Ken in Essex where he was working as technical editor for the Gardeners' Chronicle, and Gillian worked as his assistant. Soon after, there came an opportunity to buy the other half of the attached cottage in Stanhoe. Ken took the opportunity, and Gillian and Ken returned with their

young son, Keith, to Bramley Cottage in 1976. Whilst back in Norfolk, apart from looking after Keith, she would regularly lecture for WEA courses in subjects that interested her: for instance in 1981, there was a course on 'East Anglia', covering history, geography, geology, buildings, archaeology, landscapes and habitats. She was a talented and interesting teacher and her courses were very popular and fully illustrated by her photographic slides. Another WEA course she gave was on 'Norfolk Natural History', covering different habitats.

Photography – pre-digital – was, obviously, another of her skills. Gillian and Ken ran a picture library for many years, specialising in plants both wild and cultivated. She worked with Ken on some of his many horticultural books, providing numerous photographs and sometimes typing the manuscript. In 1979 *Planting Native Trees and Shrubs*, by Kenneth and Gillian Beckett was published by Jarrolds of Norwich. "Ken and Gillian have jointly borne the bulk of the work, with enthusiasm and tenacity" is a quotation from the foreword.

She also regularly led field meetings in Norfolk, looking at plants, as part of WEA courses, and also for the local Norfolk Naturalists' Trust (now Norfolk Wildlife Trust), for the Heacham and West Norfolk Natural History Society and for the Norfolk and Norwich Naturalists' Society. These were the meetings where many started their botanical interests, and the patience she, with Ken, showed to beginners was to pay off when collecting together a group of recorders for *A Flora of Norfolk* (1999).

In 1988 Gillian was appointed Vice-County Recorder for West Norfolk, with Ken as co-Recorder. She followed Charles Petch who had been Recorder from 1982 to 1988. Gillian was a very



well-organised person and kept meticulous and detailed records. She was also Recorder through the time when records were transferred to computer, to which she adapted readily (if not enthusiastically – the early inputting programmes for records being fiendishly difficult). Already in 1987 she began the project informally to produce a Flora of West Norfolk, after the end of the BSBI's Monitoring Scheme in 1987/88. The results of the Scheme made it obvious how much the county's flora had changed since Petch and Swann's *Flora of Norfolk* of 1968. Alec Bull, as BSBI Recorder for East Norfolk, soon joined in with the project which became *A Flora of Norfolk*.

From the start, Gillian set up numerous regular field meetings and gathered a number of local botanists to join in. These people were drawn mostly from the WEA classes she had taught over the years, and who had expressed an interest in botany. Organisation and preparation were the watchwords, and on meeting at 10.30am ("don't be late!") the group was ready to be divided into suitable sub-groups, given their instructions and maps and sent on their way to find and record. Usually lunch was taken together and whilst sandwiches and salad were munched, plants for identification were thrust at Gillian or Ken, sometimes in danger of becoming part of their salad. Identifications and explanations were passed round, so it was a real learning experience for all. Further tetrads were tackled after lunch and at the end of the day, another identification session followed. These meetings were extremely enjoyable for the participants, who appreciated the learning experience, the contribution they were making and the vast knowledge and good humour of Gillian and Ken. Part of the Flora's legacy lies in the Norfolk Flora Group.

This is a countywide group of botanists which includes both vice-county Recorders; it continued to hold regular and frequent meetings after *A Flora of Norfolk* was published in 1999 and carries on to the present day. As Recorders, she and Ken were also well known for being very quick to reply to queries and requests for naming specimens, something which is always appreciated by botanists.

Gillian wrote some of the introductory chapters for *A Flora of Norfolk* including 'The Setting for the Flora' and 'Man, the Landscape and Plants ... an Historical Perspective'. She also provided over 90 of the photographs. The tetrad maps had an informative and relevant background, showing soil-types, rivers or roads. In the words of Richard Mabey, who wrote the Preface, the book "will be an inspiration to all who love Norfolk and seek out its special plants".

Breckland plants were of special interest to Gillian. An article she produced on them, *Plants of the Breckland, 1869–1994* (*Transactions of the Norfolk and Norwich Naturalists' Society* 30(1): 53–63, 1994) showed also her special interest in the historical aspects of botany.

Many people who knew Gillian as a botanist were completely unaware of her wide range of other interests and talents. She had a deep knowledge of local history as well as an interest in history in general. She supported the Stanhoe Local Archive group and recorded some fascinating talks on her early life in Stanhoe. She was a fine needlewoman and ran embroidery sessions. One had only to see the doll's house she had furnished with delicately made carpets and curtains to appreciate her skill, and see her embroidered collages on the walls of Bramley Cottage. A member of the Stanhoe and Barwick WI for over



fifty years, Gillian was President for many of these. She re-inaugurated the Stanhoe Flower Show which had lapsed for a time.

Gillian was an excellent cook, and the members of the West Norfolk Flora Group always enjoyed her convivial end of season 'Cake Meetings', when her delicious home-made cakes were eaten, cups of tea drunk and plans for the following year discussed. She was a good pianist and a very good darts player. This skill arose because there was, not surprisingly, a dart board at the Bircham Newton Officers' Mess. Whenever Gillian went with her father she was allowed three darts. Subsequently the local WI put up a dart board in the village hall, and were

amazed to witness this undiscovered talent!

After Gillian retired from the Recordership in 2010, she and Ken continued to record plants locally and sent in records for a few years. She was sadly diagnosed with vascular dementia in 2011 and after a minor stroke and a time in a nursing home she suffered a further stroke and died on 23<sup>rd</sup> August 2016. She leaves her husband Ken, their son Keith and granddaughter Chelsea.

We have taken several details of Gillian's life in the village from the superb village website [stanhoe.org](http://stanhoe.org) and thank those maintaining it for their help.

**Tim Doncaster & Frances Schumann**











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**Cover photo:** Autumn Lady's-tresses *Spiranthes spiralis* at Gresham's School, Holt. *Simon Harrap.*