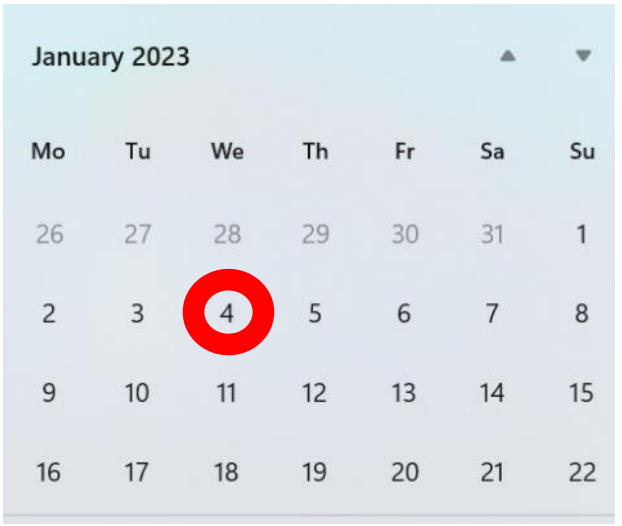
Recording Fungi

And Lichens

What is a Biological Record?

- **What?**
- **Where?**
- **When?**
- **Who?**

The Four W's



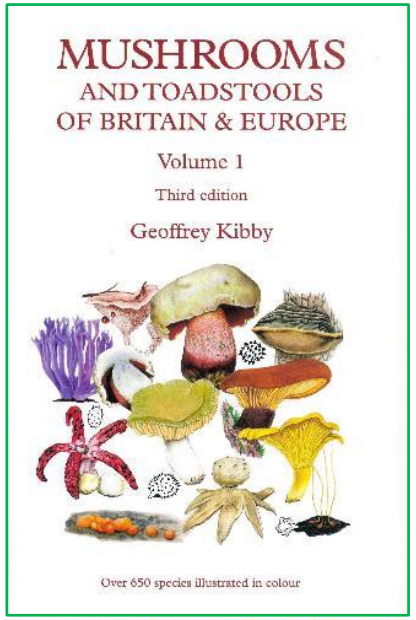
What do we record?

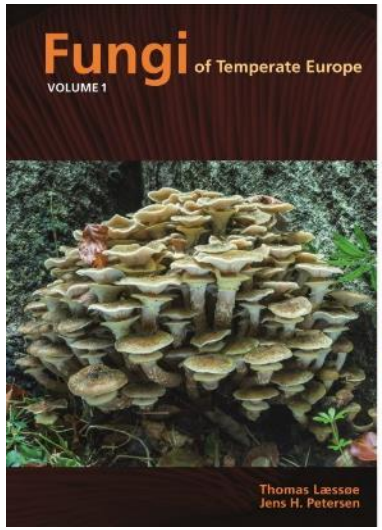
- Basdiomycetes: toadstools, rusts, smuts
- Ascomycetes: cup fungi, powdery mildews
- Heterokonts: downy mildews, water moulds - seldom
- Slime moulds: seldom

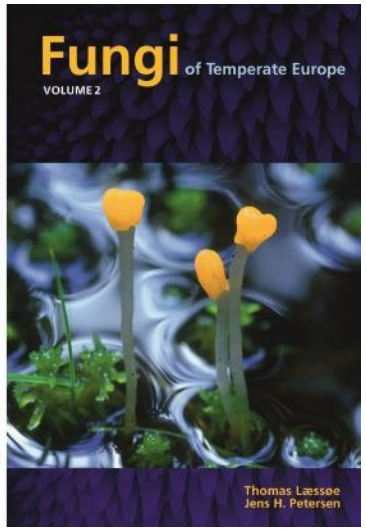


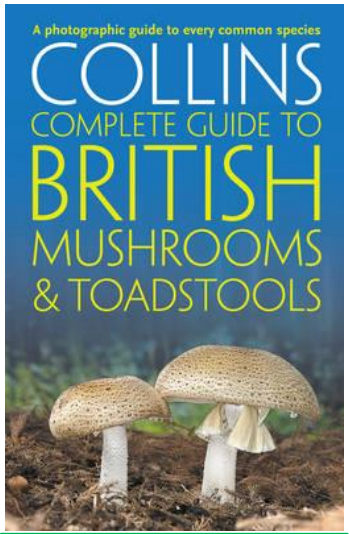


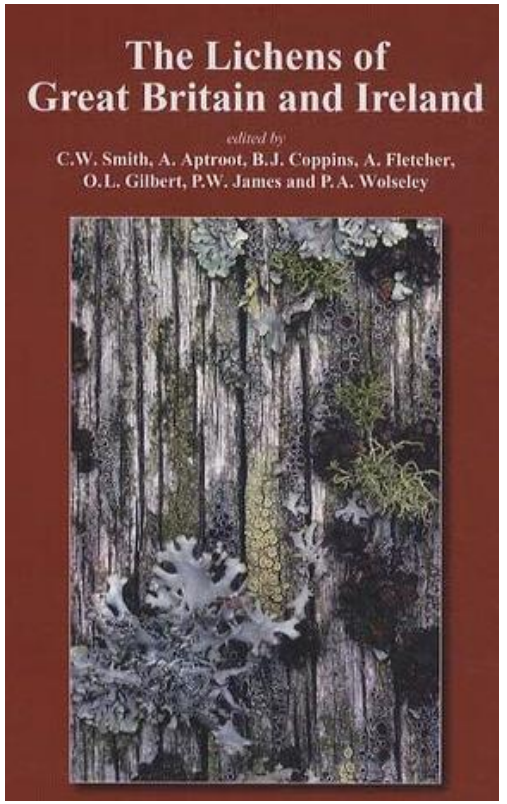

Scientific Names

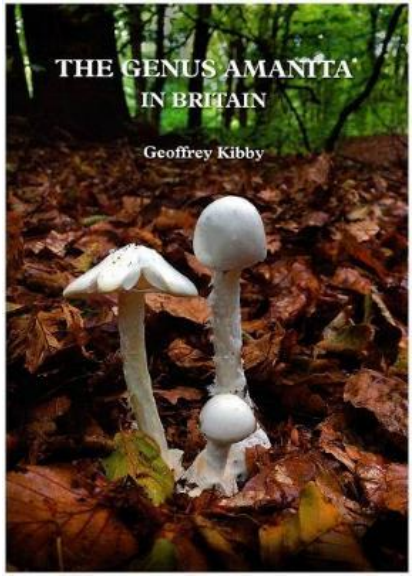


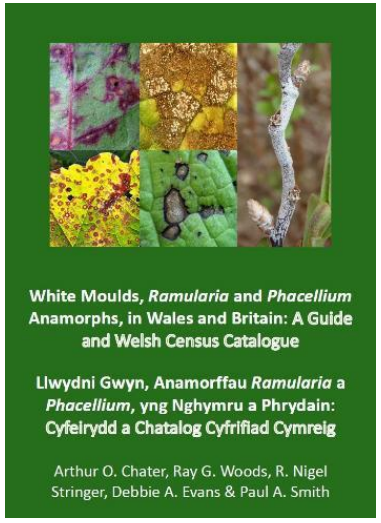


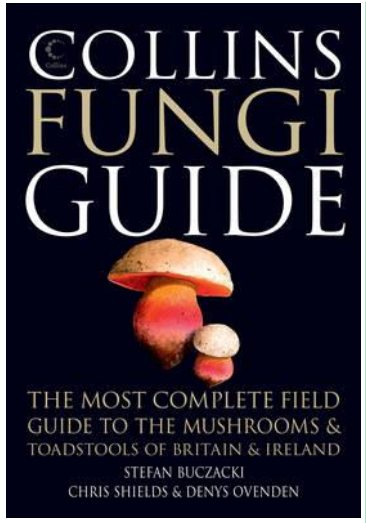


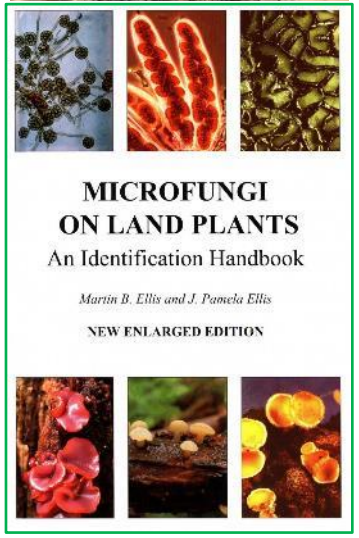


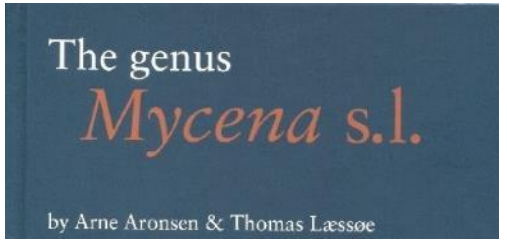


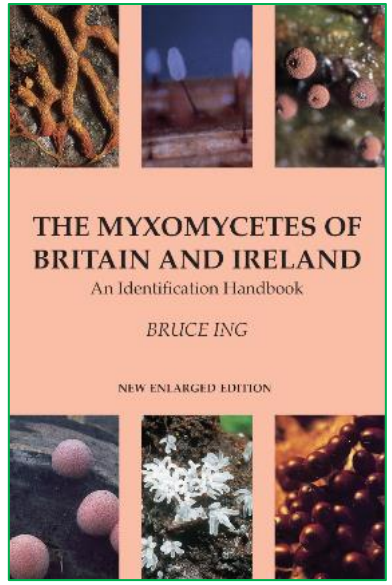




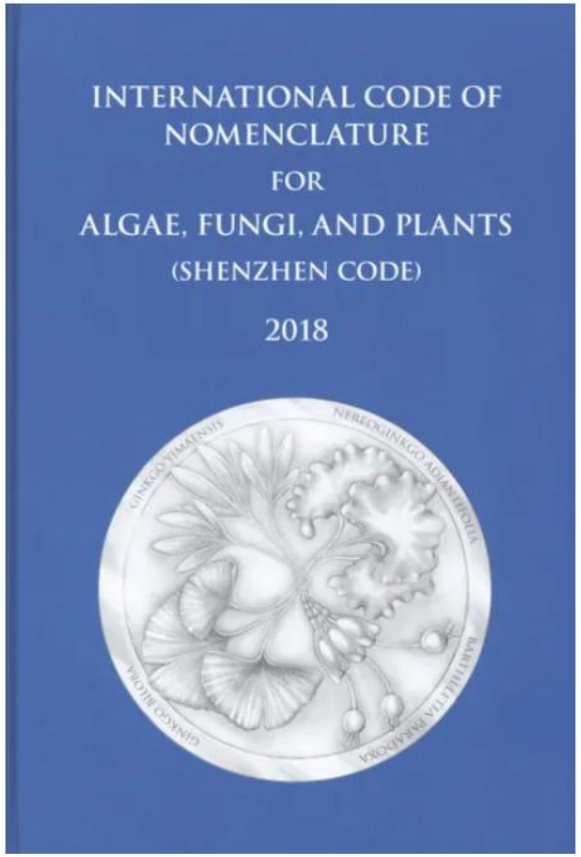




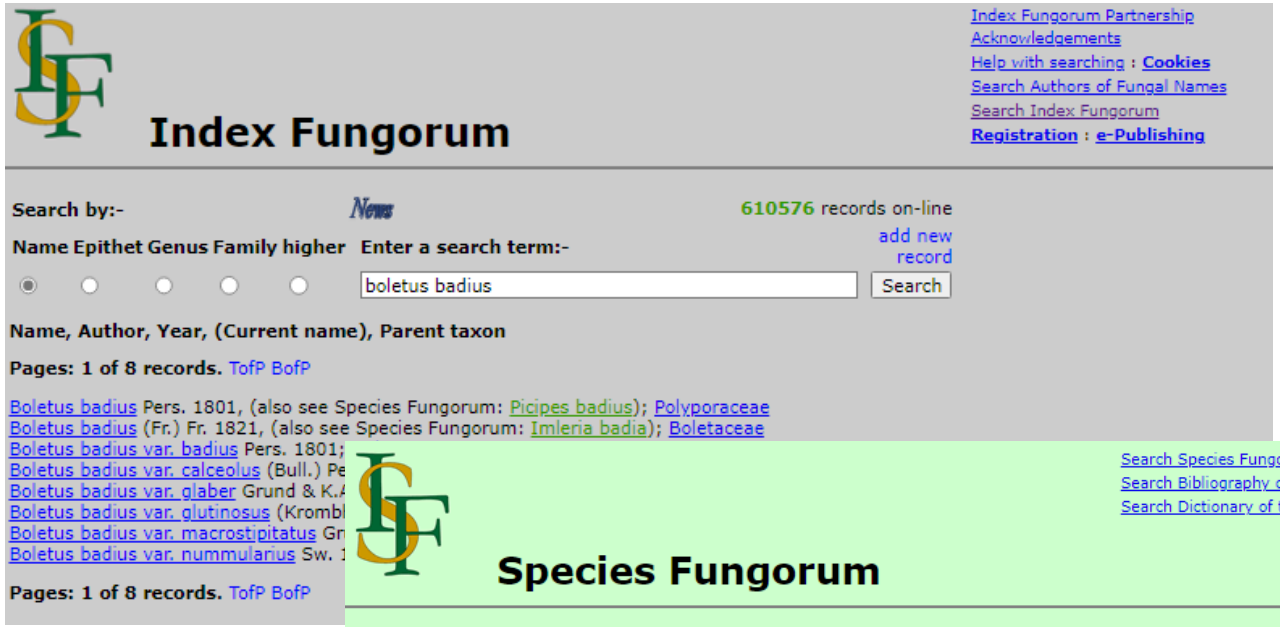




Nomenclature



The Rules for Naming Fungi



English Names

Recommended English Names for Fungi in the UK

Report to the British Mycological Society, English Nature, Plantlife and Scottish Natural Heritage

E.M. Holden September 10th 2003

Allanaquoich, Mar Lodge Estate, Braemar, Ballater, Aberdeenshire, AB35 5YJ
Tel: 013397 41410 E-mail: holdens@clara.co.uk

Excel Proposed_new_names_at_April_2022 - View-only

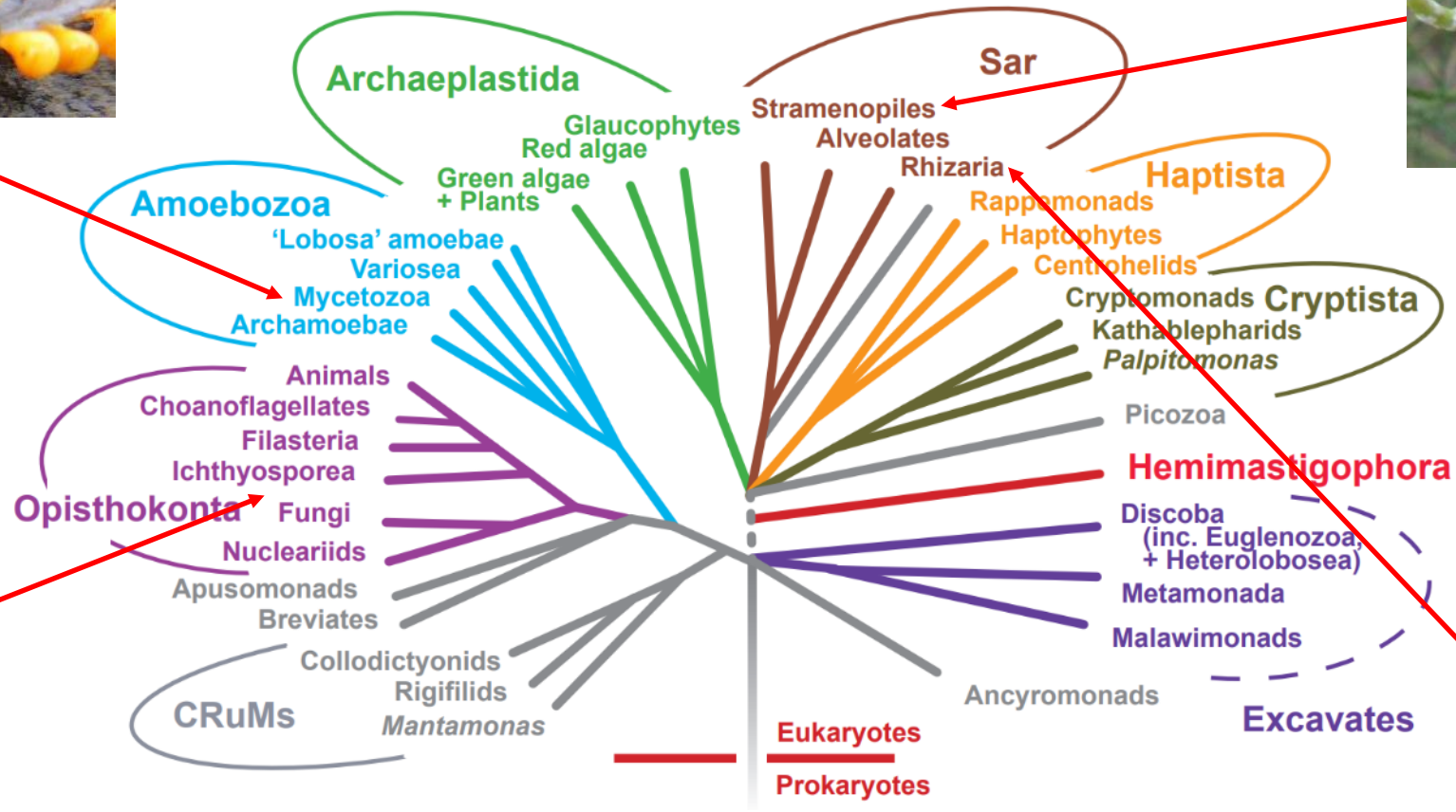
Search (Alt + Q)

File Home Insert Draw Page Layout Formulas Data Review View Automate Help Viewing

	A	B	C
1	**Scientific name current acc**	**Proposed Englsih name April 2022**	**Comments re proposed names April 2022**
2	*Bulgariella pulla*	dusky disco	pulla means dark-coloured
3	*Camarophyllopsis atrovelu*	dark velvet fanvault	SH Translation of the binomial and a fitting description LH just curious that it is not on CBIB ? If it is confirmed as being British I don't have to flag the name up as being non-native :-). SH Yes, so Camarophyllopsis came up on DNA work done at Hardcastle Crags by Gareth Griffith. This year I found it in several locations. It took me some time to nail it down until I referred back to that work and was then able to look at the details. Very distinctive once seen.
4	*Crepidotus carpaticus*	ochre oysterling	for the colour
5	*Crepidotus muscigenus*	mossborn oysterling	translation of muscigenus. Moss oysterling already taken
6	*Crepidotus subverrucispor*	rouged oysterling	spores and later the gills are described as clay pink. Rouge is a reddish powder…
7	*Crepidotus versutus*	downy oysterling / deceitful oysterling	versutus means deceitful (Rea). Described as with downy / felty tomentose upper surface and a syn is C. pubescens
8	*Cristinia coprophila*	dung duster	frequently but not always found on dung. Loosely attached to substrate
9	*Cristinia helvetica*	shortcelled crust	Helvetica refers to Swiss but try not to use proper names. It has short celled hyphae
10	*Cristinia rhenana*	tinted crust	the fruitbody is pale violet with KOH
11	*Crustoderma dryinum*	saffron crust	Rea - dryinus is oaken. Distinctive dark saffron colour of fruitbody
12	*Crustoderma fibuligerum*	buckled crust	for fibula - the arm bone, buckled together also in Roman broaches. Here I think it refers to clamp bearing - from 'A Grammatical Dictionary of Botanical Latin'. Presume because a clamp looks a bit like a buckle…
13	*Crustomyces expallens*	pallescent crust	Rea - expallens is becoming pale
14	*Crustomyces subabruptus*	thermal crust	described as liking warm dry places acc Hugill & Lucas. Thermal relates to heat

The proposed names will remain open for consultation until March 2023. If you wish to comment or make suggestions, please contact Liz Holden (working party coordinator) via admin@britmycolsoc.info

Classification

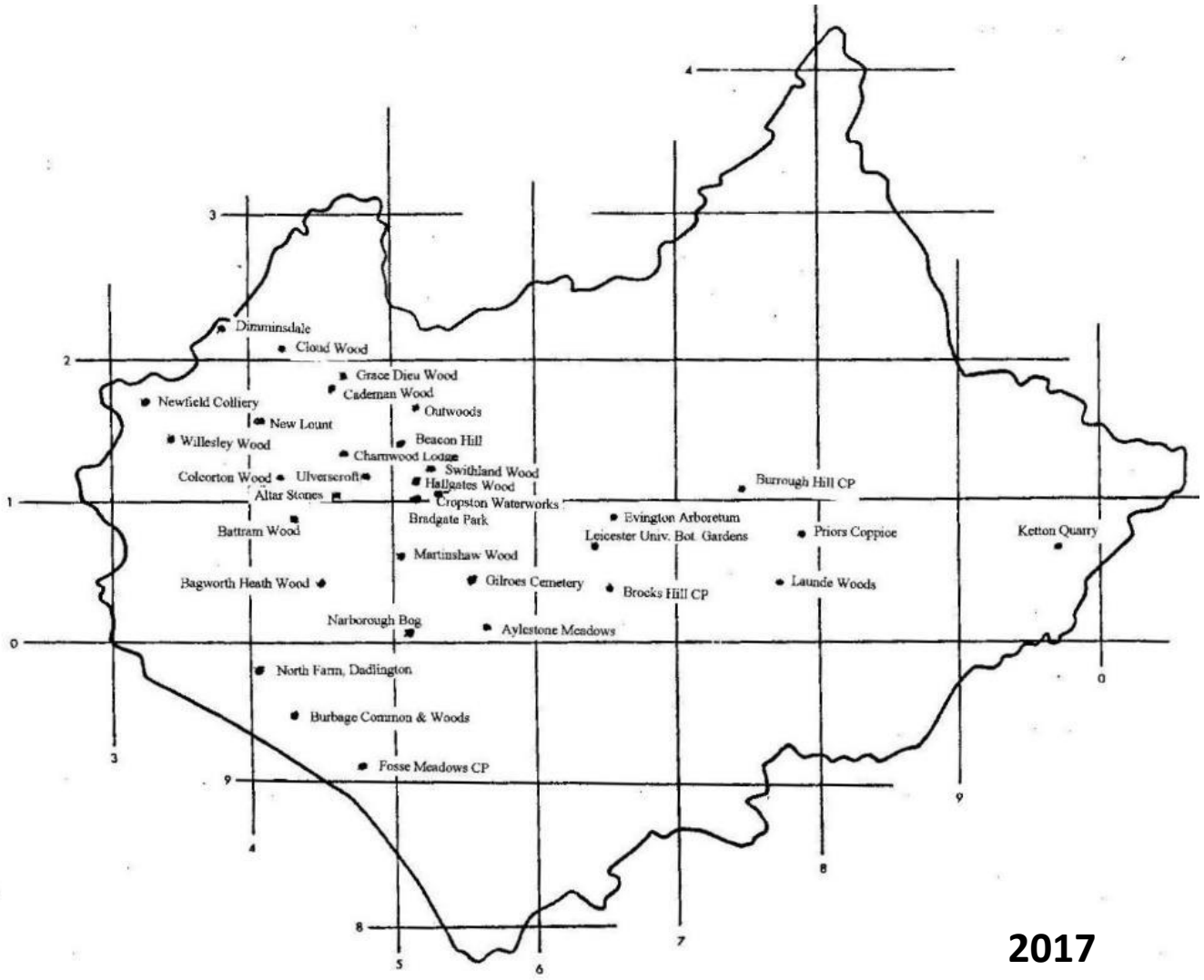


By Alastair Simpson - Dalhousie University, CC BY-SA 4.0, https://commons.wikimedia.org/w/index.php?curid=106553315

By David B. Langston - USDA Forest Service, http://www.forestryimages.org/browse/detail.cfm?

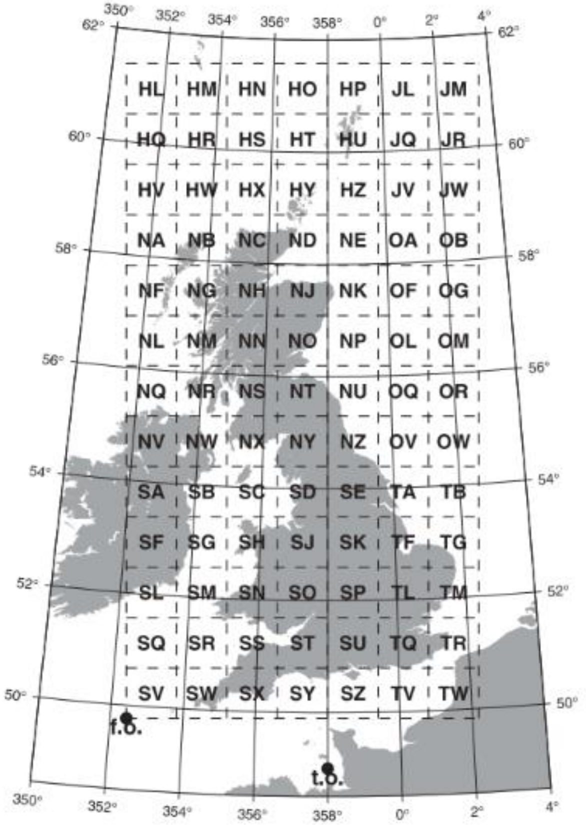
Where do we record?

- Group Forays
  - Site visits related to location of membership
  - Access, car parking
  - known diversity of site
- Individual observations
  - Casual, not systematic



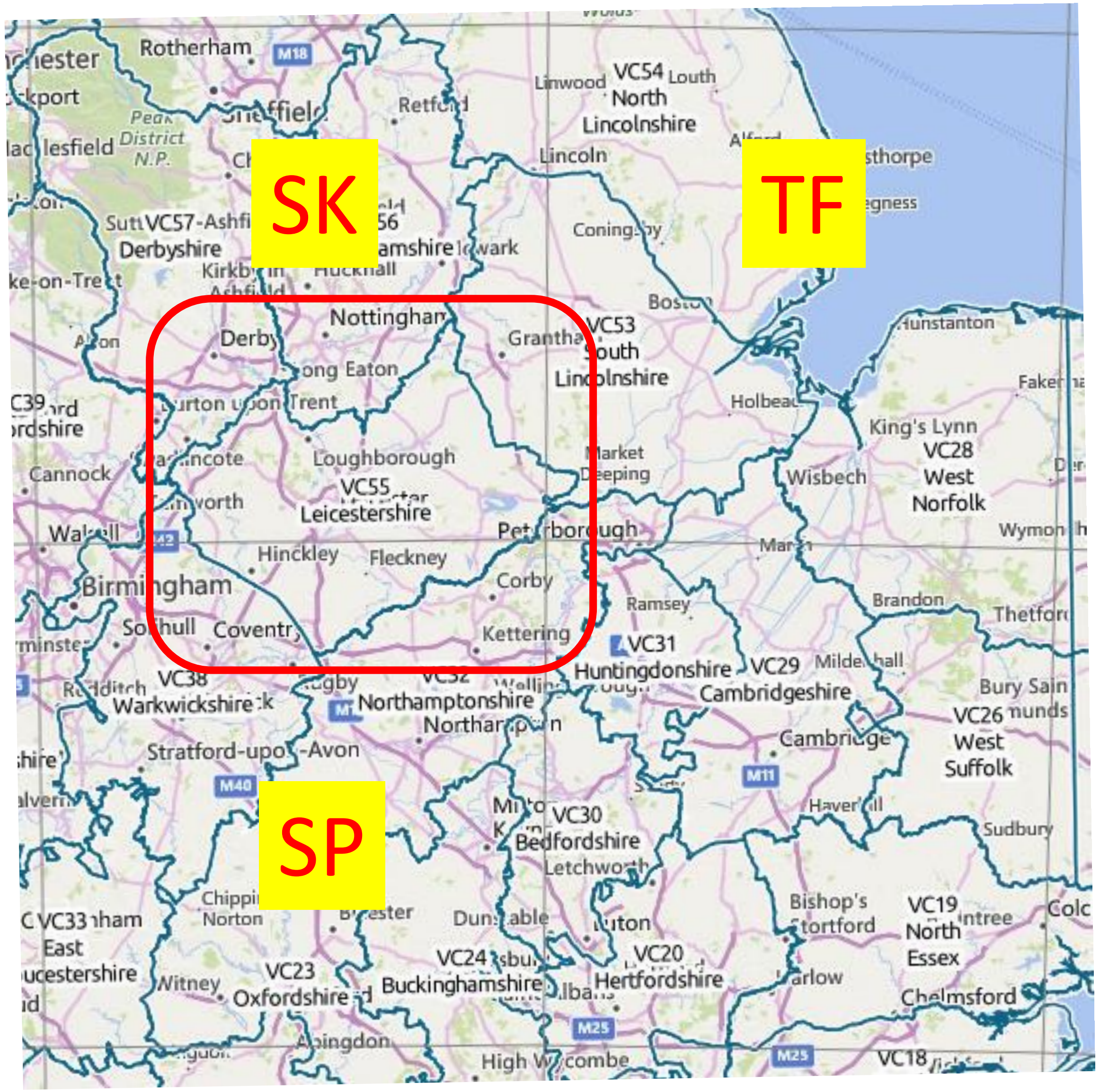
2017

Grid References - The UK Grid System

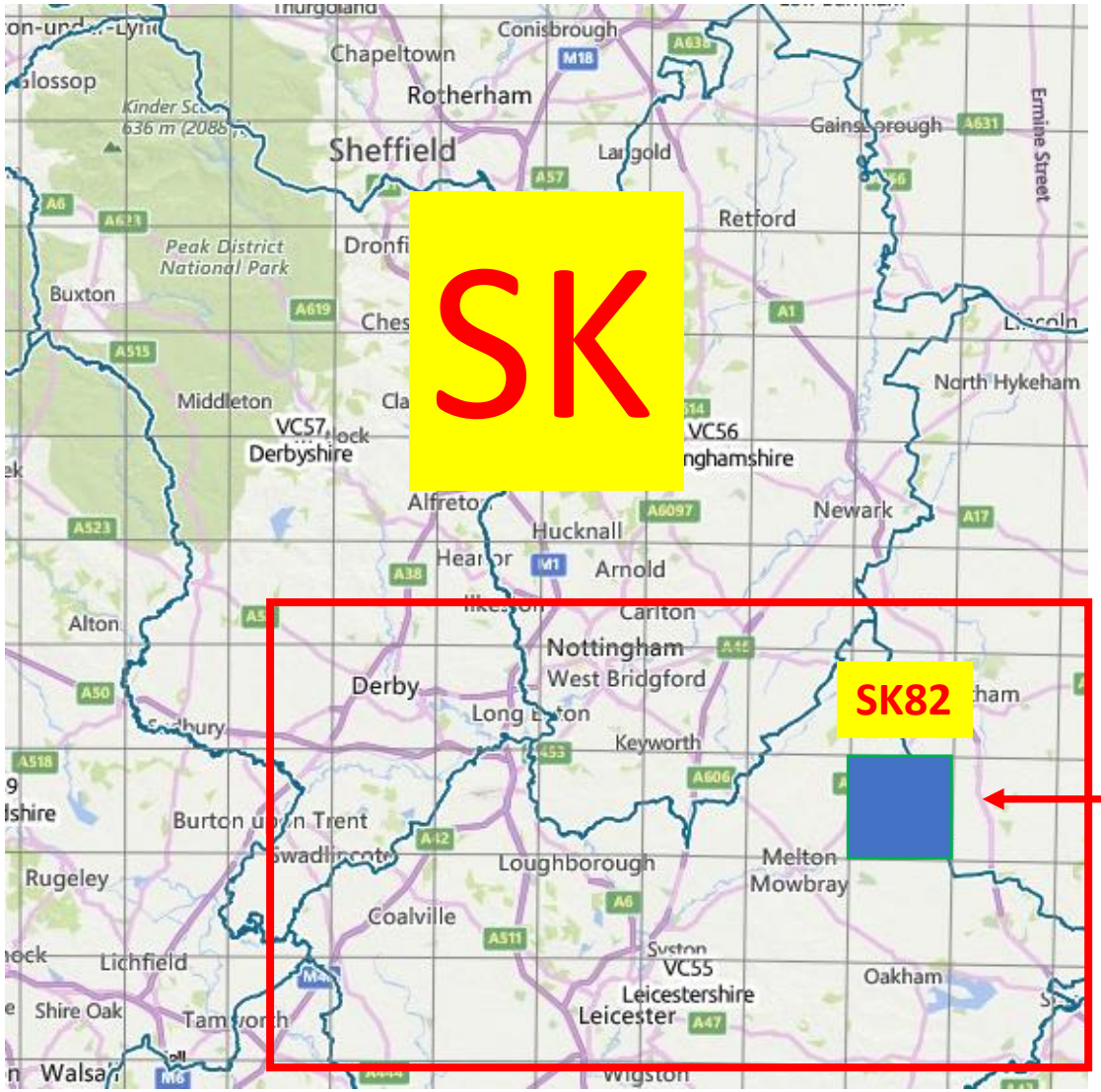


OS National Grid, with true origin & false origin

100 km squares



Grid Reference Format



Two letters and numbers: East, then North

SK 0-9 E, 0-9 N

Contains 100 x 10 km squares = **Hectads**

Hectad –10 km Square

9

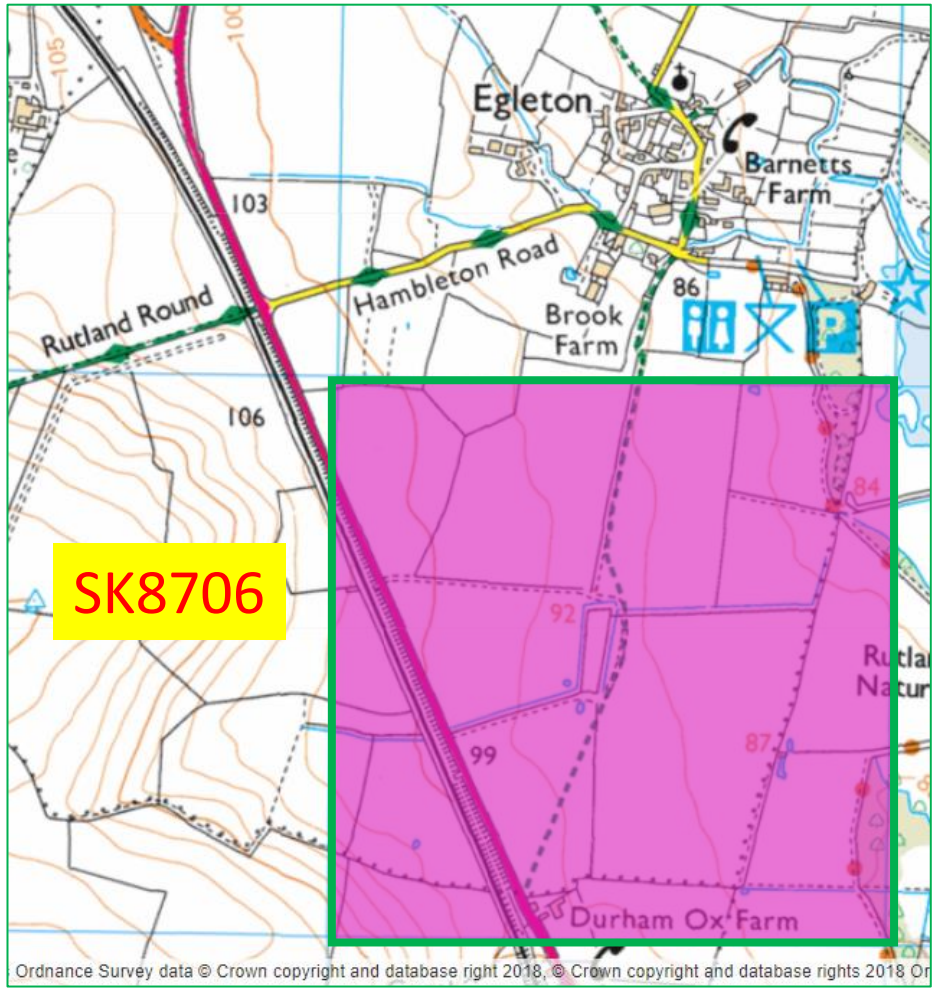
10 x 1 km

0

Contains 100 x 1 km squares = **Monads**

- Coarse Resolution
- Old imprecise records
  - e.g., ‘Charnwood’, ‘Chater Valley’

Monad – 1 km Square

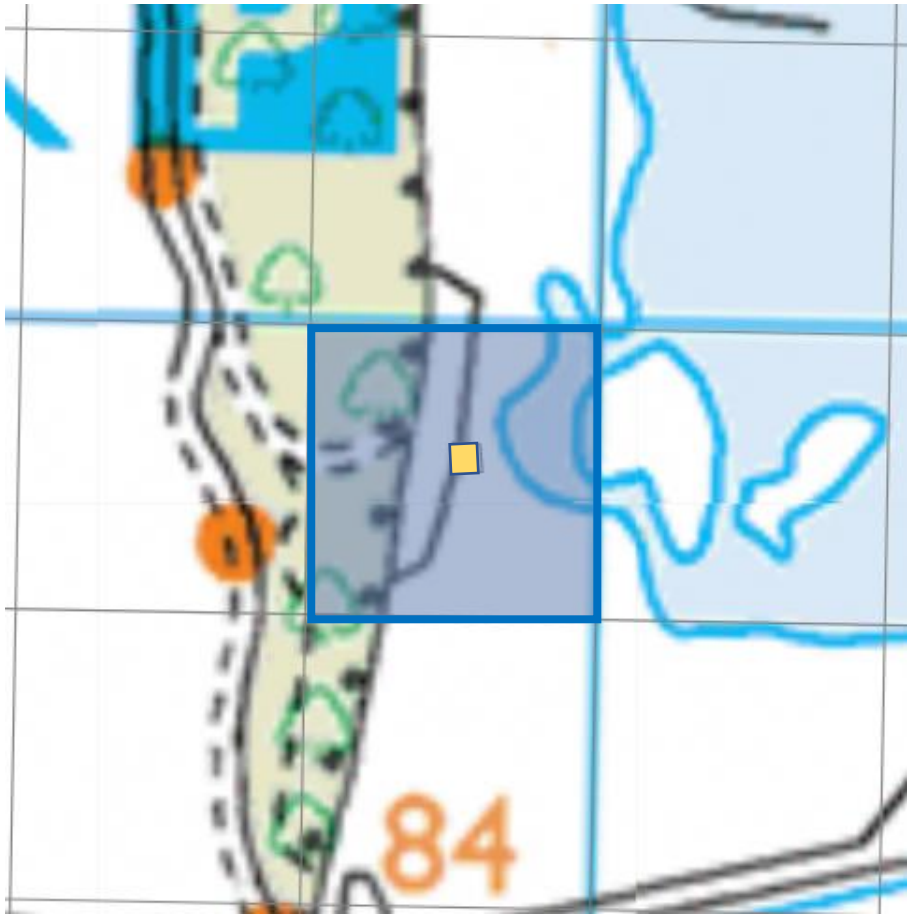


- SK 100 km square
- 87 East
- 06 North

- **SK8706 – 4 fig. Grid Ref**

- Most useful area for general recording

Fine Resolution – 100 m and 10 m Squares



- **100 m x 100 m square (hectare)**
- SK879069 – 6 fig.

- **10 m x 10 m square**
- SK87950695 – 8 fig.

- Rare species
- Detailed site surveys

- ~~1m x 1m square~~
- ~~SK8795306955 – 10 fig.~~

GPS inaccurate
Fruiting body may not there next year!

Tetrads - ‘Botanical Resolution’

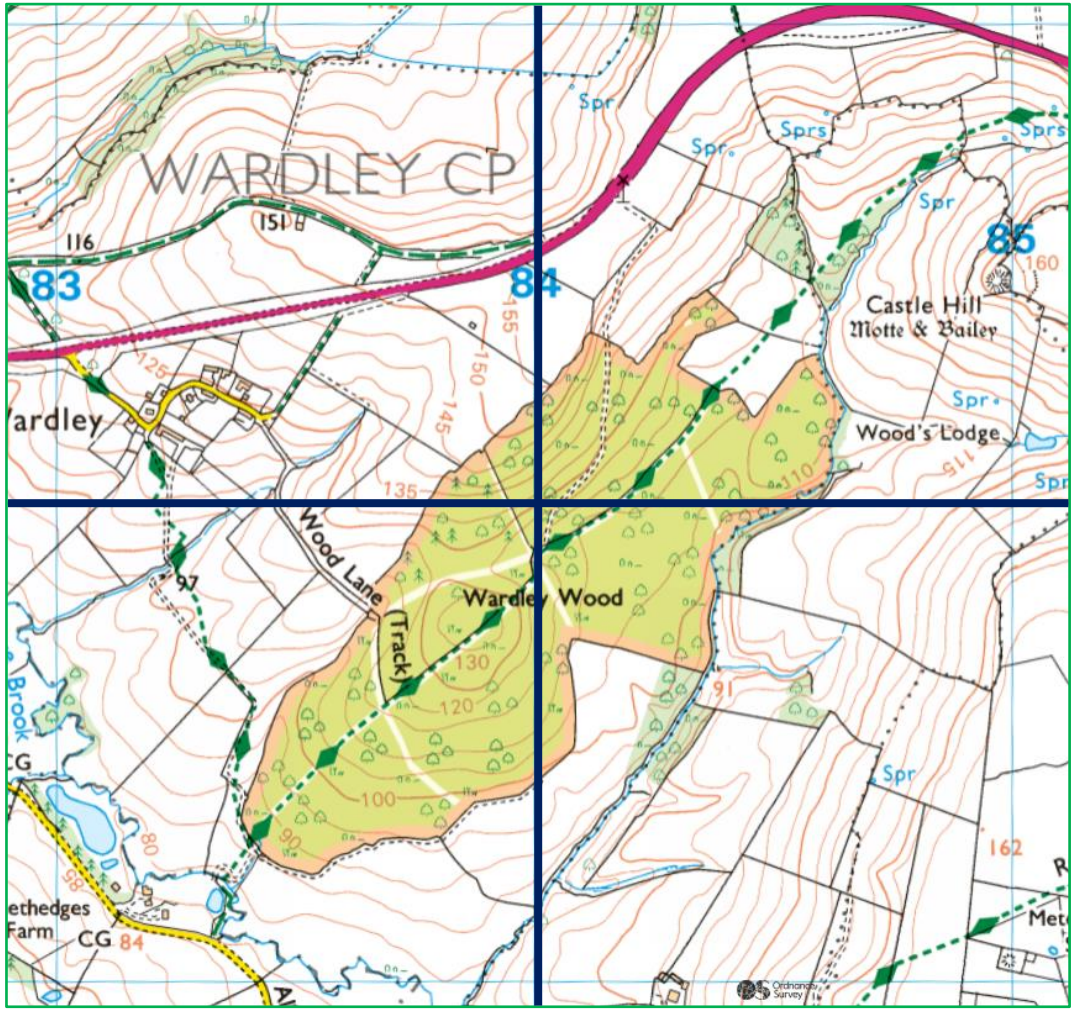
- **2km x 2km square** (tetrad)
- SK80T

- If area recorded covers two monads
- Avoid site centroids

8	E	J	P	U	Z
6	D	I	N	T	Y
4	C	H	M	S	X
2	B	G	L	R	W
0	A	F	K	Q	V
	0	2	4	6	8

‘Difficult Sites’

SK8300



SK8400

- Wardley Wood is in:
  - 2 hectads (SK, SP)
  - 4 tetrads (SK80F, K; SP89J, P)
- Record each 1 km square separately

SP8399

SP8499

Taking Grid References in the Field

Hand-held Device

Garmin inReach Mini 2

Garmin fenix 7S Sapphire Solar

Phone App

GridPoint GB 4+

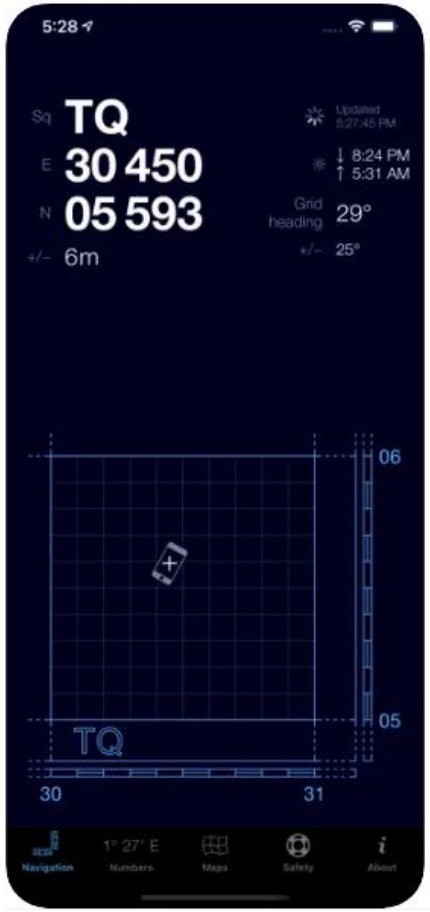
Find yourself on an OS map

George MacKerron

4.6 • 37 Ratings

Free · Offers In-App Purchases

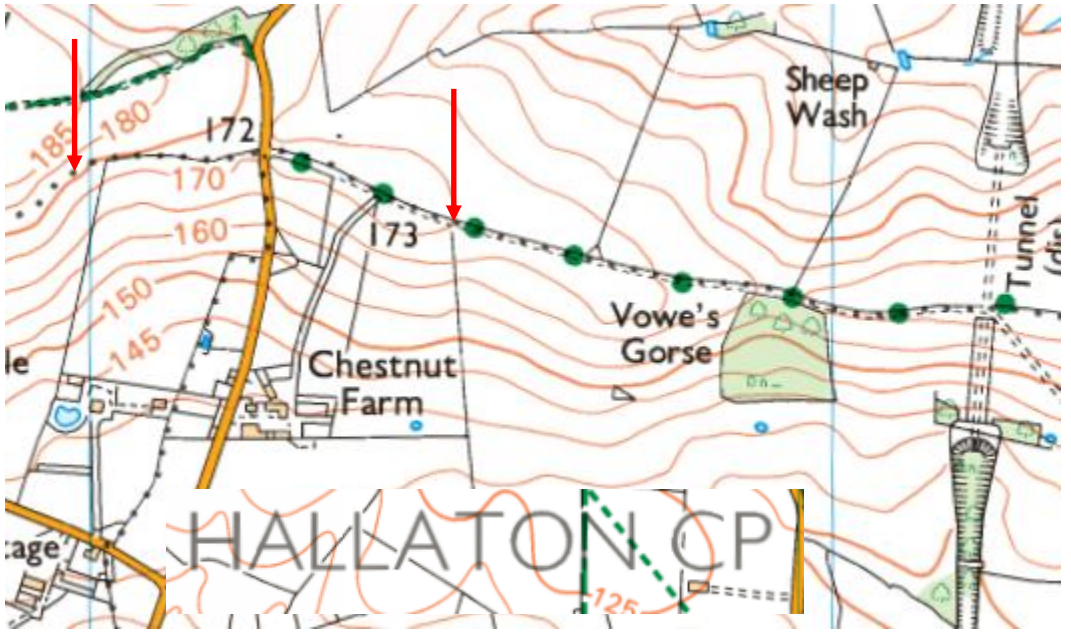
Grid Point GB: Only for iPhones



Place Name

- City, town, parish
- Location
  - Road, street
  - River
  - Path, track
- Nature Reserve
  - Charnwood Lodge LRWT Reserve
  - Rutland Water Nature Reserve vs.
  - Rutland Water

Shearsby,
Mill Mound



Hallaton Parish,
Vowe's Gorse

Before You Go: Check the Area on a Map

- UK Grid Reference Finder
  http://gridreferencefinder.com/
- Grab a Grid Reference
  http://www.bnhs.co.uk/2019/technology/grabagridref/gagr.php
- Cucaera
  http://Cucaera.co.uk
  A useful website for Vice-county maps, etc.
- OS Maps
  http://www.ordnancesurvey.co.uk/
  Subscription service; street names, aerial views etc.

Dates and Date Ranges

- Single date preferable 01/Feb/2023 — 01/02/2023,
- Date range
  - Within a month — 05-21/02/2023
  - Within a year — June to September 2023

Not 2 or more years preferably

Recorder Name(s)

- Surname and first name
- Group
- Group & leader(s)
- Legal things
  - Can’t publish these – GDPR
  - Records remain your property, so LFSG needs to have a recording policy in place

Data Protection Act 2018

Additions for Fungi & Lichens

- Substratum
- Host
- Notes: Habitat, quantity, chemical test results etc.

Substratum

Substrate is what a fungus *eats*

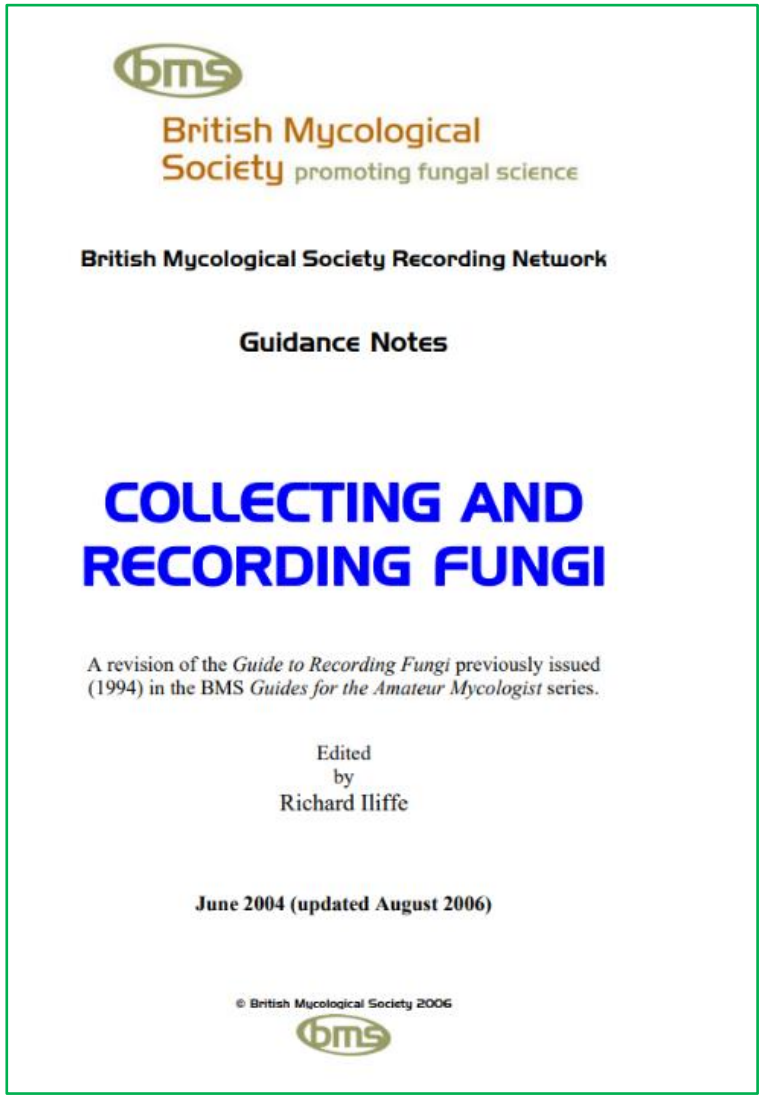
Substratum is what a fungus *grows upon*; its support

- Soil
- Wood
  - Tree/shrub name
  - Hard or soft
  - Fallen branch, twig
- Host
  - Plant name
  - Lichen name

Optional Notes

- Habitat
- Quantity
  - best simple (abundant, occasional, rare)
  - number for rare species if possible
- Stage
  - for rusts, smuts and mildews
  - for lichens (isidia, soredia, apothecia etc. present)
- Other
  - Microscopy results, chemical test results

Recording Forms



About NatureSpot | Help & Information | Recording | ID Help | Wildlife Groups & Projects | Events | Log in

NatureSpot

Recording the Wildlife of Leicestershire & Rutland

Home | Latest images | Species galleries | Wild places | NatureChat forums

Help to record the wildlife of Leicestershire and Rutland

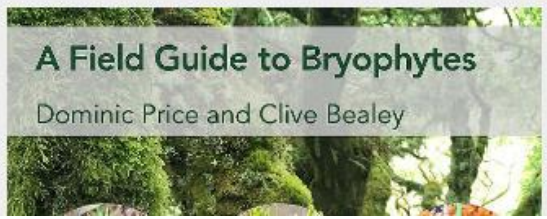
Submit any sighting of an animal, plant or fungus seen in Leicestershire or Rutland to put your dot on our species distribution maps. All records are passed on to local and national recording schemes and help add to our scientific knowledge which helps conservation. All wildlife records are valuable, common or rare, and whether from your garden, local park or a nature reserve. If your wildlife sighting is not in Leicestershire and Rutland, please submit the record to the national iRecord website.

You can now use the NatureSpot App to record in the field with your mobile phone.

To submit a record and experience this site in full, you must register (free and quick!).

Latest stories

Field Guide to Bryophytes



Login

Username*

Password*

DONATE

Please support NatureSpot

Identify 100 Species

Can you to identify 100 species from 10 different wildlife groups?

amanita muscaria

Total count of species: 7283

Wild places

20 Acre Piece NR | Go

Parishes / Wards

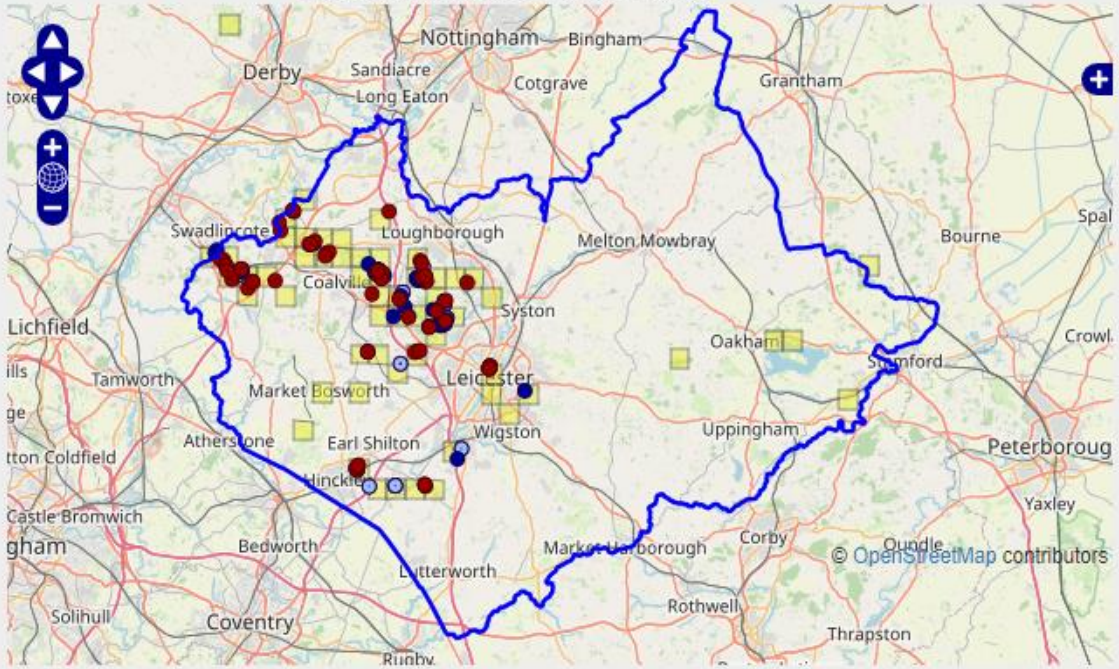
Arnesby | Go

Species pages

Leicestershire & Rutland Map

Search

Enter a town or village to see local records



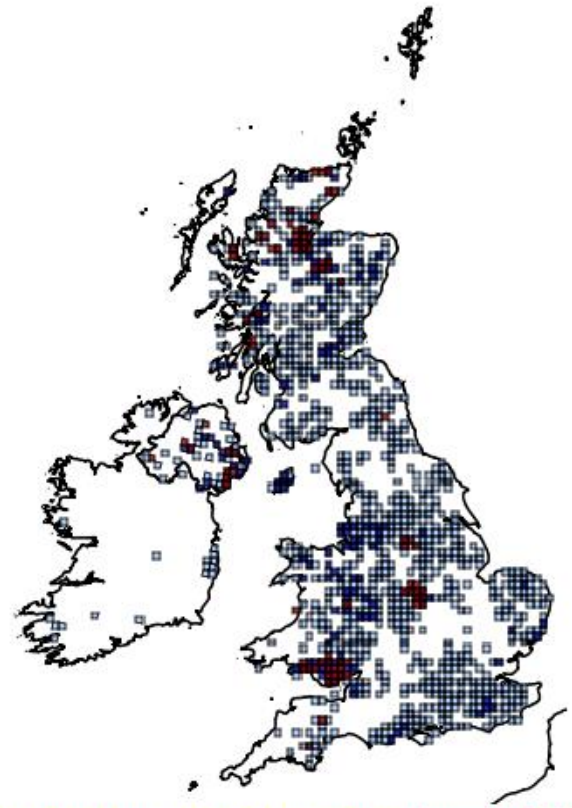
MAP KEY:

Yellow squares = NBN records (all known data)
Coloured circles = NatureSpot records: **2020+** | **2015-2019** | **pre-2015**

UK Map

Amanita muscaria

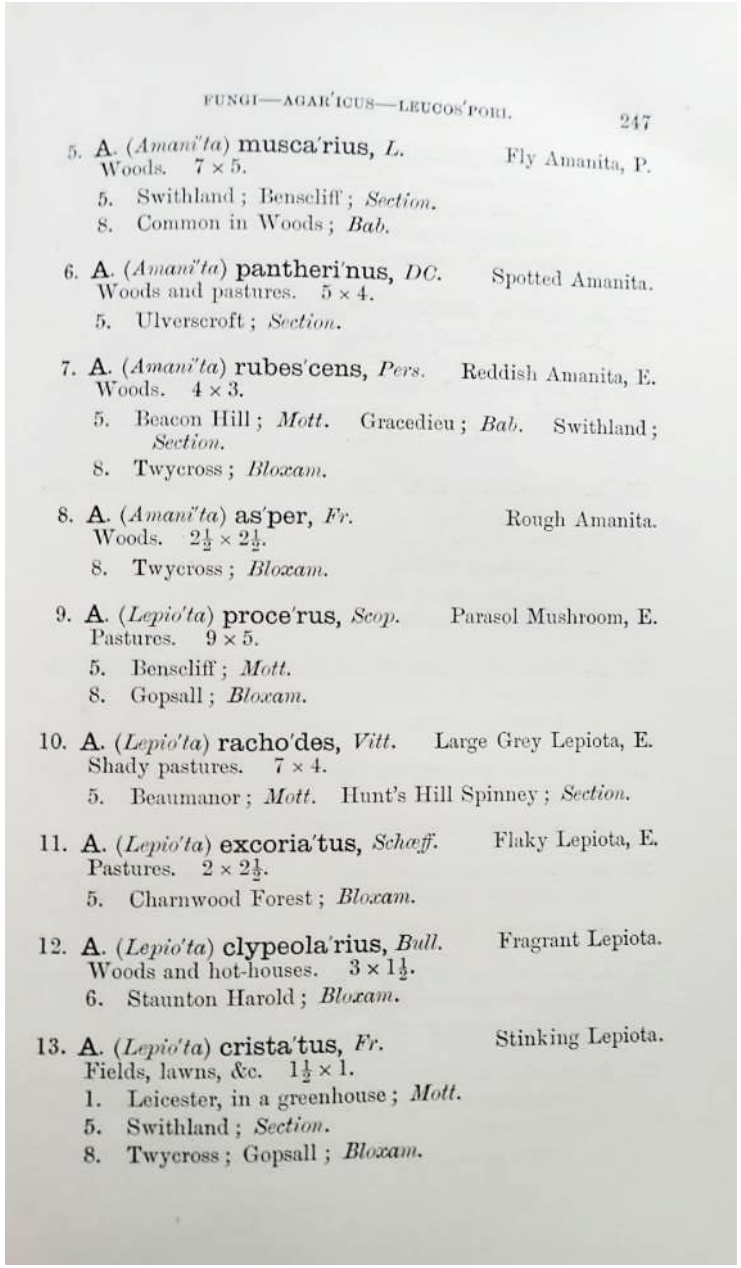
The National Biodiversity Network records are shown on the map below. (See terms and conditions)



Open interactive map in new window Powered by NBN

Problems with Old Records

- Imprecise location
  - Old names of sites
  - Site vanished
  - Site and grid ref don't match
- Dates
- Lack of recorders (Anon)



FUNGI—AGARICUS—LEUCOSPORI. 247

5. **A.** (*Amanita*) **muscarius,** *L.* Fly Amanita, P.
Woods. 7 × 5.
5. Swithland; Benscliff; *Section.*
8. Common in Woods; *Bab.*

6. **A.** (*Amanita*) **pantherinus,** *DC.* Spotted Amanita.
Woods and pastures. 5 × 4.
5. Ulverscroft; *Section.*

7. **A.** (*Amanita*) **rubescens,** *Pers.* Reddish Amanita, E.
Woods. 4 × 3.
5. Beacon Hill; *Mott.* Gracedieu; *Bab.* Swithland; *Section.*
8. Twycross; *Bloxam.*

8. **A.** (*Amanita*) **asper,** *Fr.* Rough Amanita.
Woods. $2\frac{1}{2} \times 2\frac{1}{2}$.
8. Twycross; *Bloxam.*

9. **A.** (*Lepiota*) **procerus,** *Scop.* Parasol Mushroom, E.
Pastures. 9 × 5.
5. Benscliff; *Mott.*
8. Gopsall; *Bloxam.*

10. **A.** (*Lepiota*) **rachodes,** *Vitt.* Large Grey Lepiota, E.
Shady pastures. 7 × 4.
5. Beaumanor; *Mott.* Hunt's Hill Spinney; *Section.*

11. **A.** (*Lepiota*) **excoriatus,** *Schæff.* Flaky Lepiota, E.
Pastures. $2 \times 2\frac{1}{2}$.
5. Charnwood Forest; *Bloxam.*

12. **A.** (*Lepiota*) **clypeolarius,** *Bull.* Fragrant Lepiota.
Woods and hot-houses. $3 \times 1\frac{1}{2}$.
6. Staunton Harold; *Bloxam.*

13. **A.** (*Lepiota*) **cristatus,** *Fr.* Stinking Lepiota.
Fields, lawns, &c. $1\frac{1}{2} \times 1$.
1. Leicester, in a greenhouse; *Mott.*
5. Swithland; *Section.*
8. Twycross; Gopsall; *Bloxam.*

Mott, Flora of Leicestershire, 1886

What Happens to the Records?

Fungal Recording

FRDBI

Records of fungal fruiting observed by BMS members and/or Recording Groups in Britain and Ireland are recorded in the **Fungal Records Database of Britain and Ireland** (FRDBI www.frdbi.info).

You can also find the FRDBI via the National Biodiversity Network records database, the NBN Atlas www.nbnatlas.org and GBIF data.gbif.org There are now **over 2 million records covering four centuries.**

(Note that records from the previous version of FRDBI are being transferred to the current site.)

Checklist of the British and Irish Basidiomycota

The database of vouchered and verified British and Irish Basidiomycota species can be found at: http://basidiochecklist.science.kew.org/ . This resource is maintained by staff and volunteers at Kew Mycology

Get involved

If you'd like to find out more about identifying and recording fungi near you, browse the list of **Recording Groups** for contact details.

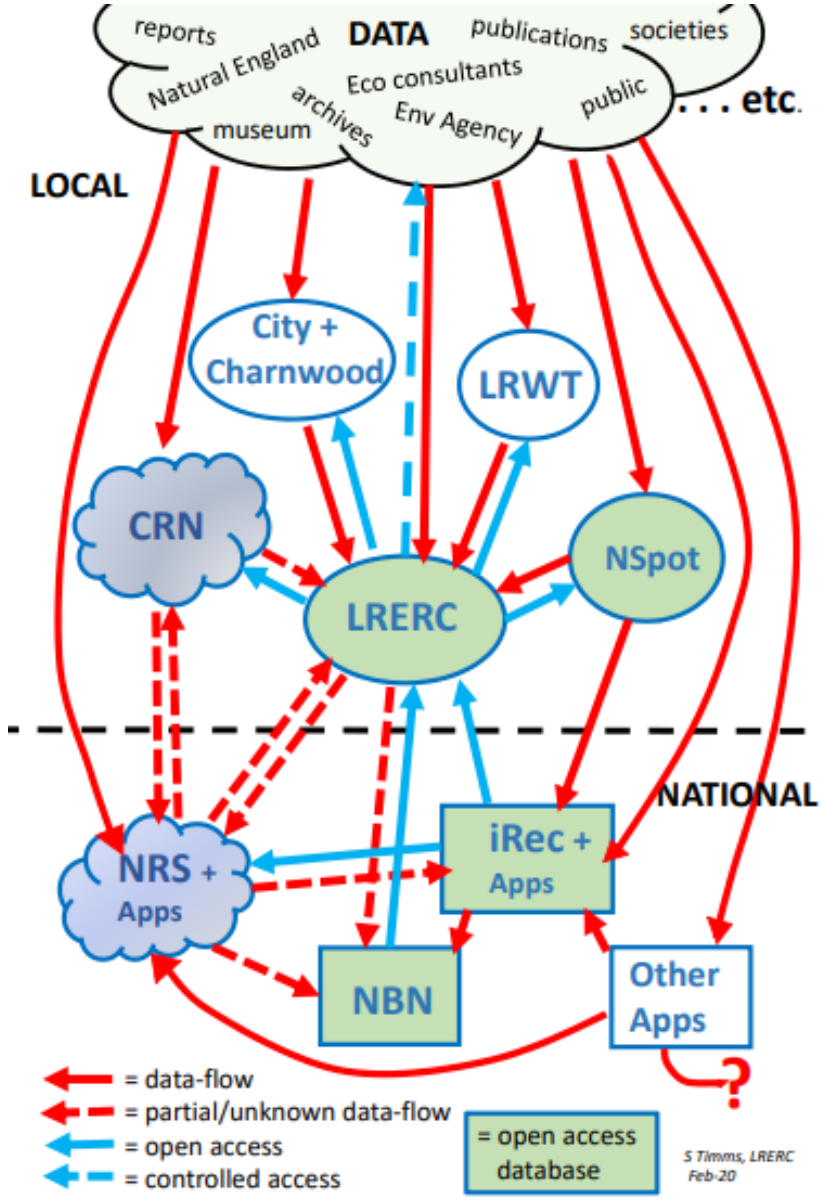
The Fungal Records Database of Britain and Ireland

- Administered by the BMS
- Online record entry
- Must register

http://frdbi.info/

Record Flow

CRN	County Recorders' Network
LRWT	Leicestershire & Rutland Wildlife Trust
NSpot	NatureSpot online recording portal
NRS	National Recording Scheme
iRec	iRecord
NBN	National Biodiversity Network
LRERC	Leicestershire & Rutland Local Environmental Record Centre



“What can we do with all these records?”

- Inform recording strategy
- Inform conservation advice (SSSI designation)
- Local natural history / ecological publications
- Research (?) Lost and found fungi project & home DNA sampling

Field Mycology Volume 2(1), January 2001

RECORDING FUNGI
SOME WHYS AND HOWS

David Mitchel

7 Westburn Crescent, Bangor, Co Down BT20 3RN

Sometimes it is useful to stand back and think why we are recording fungi. What uses can our data be put to and are we collecting all the data needed to support these ends? People have different reasons for recording fungi, but generally most of us record because we get a lot of personal enjoyment out of finding and identifying fungi and feel that we are helping advance, in our own little way, the scientific knowledge of these fascinating organisms. But once we have come back from the field, have identified our specimens or have sent them off for confirmation (or preservation) and have submitted these records to a database, what can our records be used for?

These are some of the possible uses:

Producing distribution maps. The most obvious use and the starting point in understanding species distributions. However, with limited recorders, do the maps produced show genuine species distributions or the distribution of recorders? If used for species monitoring, these maps can be misleading (Rich, 1998, Mitchel & Wright, 2000).

Providing ecological information about individual species. Understanding the ecology of a species is critical when it comes to working out how to actually protect a species. The BMS guide to recording fungi (Marriott, 1994), which is currently being updated, gives more detail on this.

Site Management. Providing site managers with information on rare or ecologically important species that occur on their site is critical if these species are to be included in site management plans.

Species Monitoring. Monitoring for an individual species or a suite of species tends to be a very specifically designed project which ad hoc records may or may not fit into.

Planning Applications. A key element when a planning application is assessed is how that application would affect nature conservation. Biological records are one of the core datasets used in such assessments.

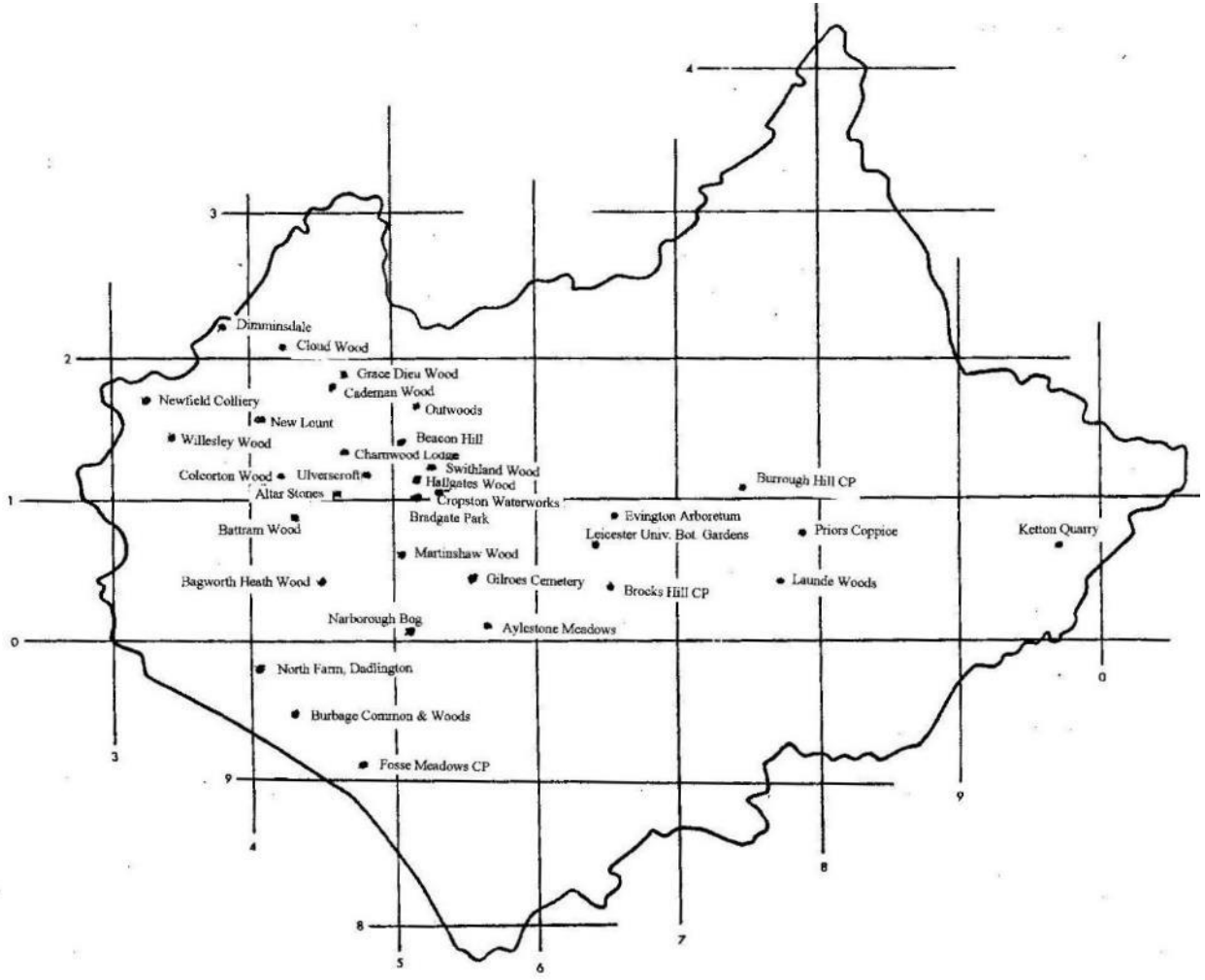
Research. Records that are not part of a systematic survey may be used in research at a later date depending on what data has been collected as part of that record. This could be DNA work if dried specimens were taken or trying to determine what soil types or geology particular species are found in.

One of the themes of this article is the accuracy of grid references for recording. For all of the above, with the exception of distribution mapping which is usually done on a 10km x 10km or tetrad (2km x 2km) level, accurate grid references are needed. The very minimum is a six figure reference (i.e. locating the record to a 100m x 100m area) with the ideal being an eight figure grid reference (defining a 10m x 10m area). This may seem excessive, but a site manager needs to know exactly where a Red List species has been found if management is to take it into account and the original recorder may not be around to show him. The way much decision making is currently made - and more will be made in the future - is by using Geographical Information System or GIS. GIS offers a way of plotting any data that has a spatial element in its geographical position. This means that completely different datasets can be queried against each other as there is the spatial element that is consistent between them. So, if a planning application is being assessed, the boundaries of that application will have been very accurately digitised, probably to

Recording Strategy

- Records reflect surveyor/recorder effort and time
- Increase sites covered: ‘look-and-see’ visits
- Encourage recording of ecological groups not normally sampled
- Encourage members to record Ascomycetes and microscopic fungi (training needed)

Where Should We Record?



Food for Thought

More systematic approach?

Need an aim!

A SYSTEMATIC APPROACH TO RECORDING FUNGI IN AN 'UNKNOWN' AREA

David Mitchel & Mark Wright

The Problem in Hand

Northern Ireland is an area where the status and distribution of most groups of fungi are poorly understood. Most of the published records stem from three BMS forays in 1931, 1948 and 1964 or from the 19th century (Muskett & Malone, 1978 & 1980). Very little work has been done in recent times.

Interpreting this sort of dataset is difficult as despite the paucity of records, the recording has been largely ad hoc and does not represent true species distributions, only the distribution of recorders as is demonstrated in the two maps below. The density of records largely reflects the density of mycologists.

When trying to respond to queries about which species should be on local biodiversity lists or which sites are or might be mycologically important, these sparse ad hoc records have to be used cautiously because of their limited predictive

Fig 1. All pre-1980 records of fungi in Northern Ireland. Larger dots represent higher density of records.

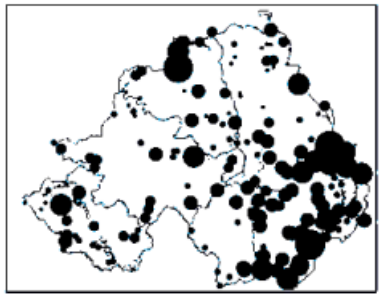


Fig 2. Post 1980 records of fungi in Northern Ireland.

practice. As the main limitations are the wide range of species groups and expertise demanded therefrom and the sporadic appearance of sporocarps, such a survey would depend on the number of competent and willing mycologists available.

Producing a full fungus flora of Northern Ireland following these guidelines would take a lifetime or two so the concept of a sampled survey arises. In such a survey, not all sites are visited, but sites are selected following certain criteria. These sites become the core sites that could be regularly monitored over a long period of time providing data on species population changes and distribution.

In Northern Ireland the problem is that there

Conservation Advice

- Giving conservation advice to the LRWT, Bradgate Trust etc.
- Rare, scarce or significant species
- Need to know to leave certain trees, create brash piles, leave burnt ground etc.
- No specific Conservation Officer role on committee

Publications

- Produce and update a VC55 Checklist
- Produce and update a VC55 Red Data List
- Compile a list of sites that have important assemblages of fungi
- Write a fungus flora?
  - Last one was 1909 (Horwood)
- Local guides?

A COUNTRY CHURCHYARD — A FUNGAL SURVEY

H I JAMES
5 Lovelace Close, Sibson, Nuneaton, Warwickshire CV13 6LH

Sibson is a small village in west Leicestershire, very near to the Warwickshire border. It lies some 26 km from Leicester, close to Market Bosworth and not far from the famed battle site of Bosworth Field where Richard III lost his crown in 1485. The church dates from the 13th century and has a large churchyard of 0.6 hectare. Mature trees are spaced around the boundaries, with ornamental trees and shrubs, including well established roses, as well as yews, laurels and other evergreens. Local records give no indication of when this planting was carried out. Suffice to say it was many years ago, and was done with skill and imagination.

The churchyard is notable for the great variety of fungi species appearing in the autumn, regular reporting started during the summer of 1985. Fruitbodies are distributed throughout the churchyard but the majority of records are confined to the grassy areas. The grass is intermittently cut, but the cutting has finished by the time of the main fungal growth. The grass is mostly *Poa* spp and *Lolium perenne*. Much of it is weakened by dense carpets of moss (*Mnium undulatum* and *Mnium hornum*) with *Hypnum cupressiforme* edging the gravel path between the two grassy areas. A few trees, cypress, holly, a cedar and yew grow in the grass, but casting little shade. The soil, undisturbed for hundreds of years, is a loam with a pH in the top five inches of 6.3, and below, a neutral 7.

The study of fungi has extended over four years, 1985-1988. Identification has been with the help of members of the Leicestershire Fungi Study Group.

The seasons varied. 1985 and 1986 saw typical winters with fungal growth ceasing in early December. 1987 and 1988 were mild winters and fruitbodies continued to appear. My last visit was on 19 January 1989 and there were then a large group of Sulphur Tuft, two groups of Fairy Ring Champignons, and several small *Tubaria* spp. *Pleurotus cornucopioides* was in an early stage in its usual place at the base of an old elm. Some species could be counted on to appear each year. One of these was our pride and joy, *Hygrocybe calyptraeformis*: pride because it is, as far as we know, the only site in the whole of Leicestershire, and joy because it is a thing of beauty from the time its pink cone pushes up through the grass to the time when it 'spreads it's wings', looking like a Chinese pagoda. It appears on the northern grass area – as many as 20 specimens at one time in the best year, 1988, encircling and within ten metres of a holly tree, though this is perhaps just a coincidence. In one year only, 1987, a few fruitbodies apeared to the south of the gravel path. Another species considered rare in county terms was *Clavaria vermicularis* (White Spindles). A single specimen appeared in 1985 and again in 1988. The only two really abundant species were *Lactarius deterrimus* and *Mycena swartzii*, on the southern of the two grassy areas.

The absence of some species in one or more years was interesting. *Macrolepiota rhacodes* var. *hortensis* was prominent in 1985 and 1986 at the base of a cypress tree, but no sign of it later. *Phallus impudicus*, one specimen only, appeared only once in the scrub in 1985. *Marasmius oreades* produced a beautiful ring in 1985 – in subsequent years there were only partial rings. This species was always at its best in mid-June. Other regulars included *Hypholoma fasciculare*, *Coprinus disseminatus* in deep shade, and *Coprinus plicatilis*. We were also fortunate to have *Chroogomphus rutilus* – another beauty. Others were recorded in three years out of four. They included *Mycena fibula*, *Agaricus arvensis*, *Clavulinopsis helvola* and *Scleroderma citrinum*. Species recorded in only two years, but pleasing nonetheless, were *Hygrophorus hypothejus*, *Suillus granulatus*, *Stropharia aeruginosa* and *Coprinus comatus*. *Psathyrella multipedata* appeared in three large clumps among the gravestones in the very old burial areas.

The weather played an important part. The long hot drought of 1986 warmed the soil so that when the rains came there was a spate of growth. The early warm, but very wet summer of 1985 produced a very fine fairy ring of *Marasmius oreades*.

In conclusion, a period of four years is too short for any serious deductions to be made. The study has however been very enjoyable with interesting results. Sadly the grassy areas are gradually being reduced by burials but that is, after all, what churchyards are for, however frustrating for the Mycologist.

Mycologist 4: 230 (1990)

Research?

Culham Research Group

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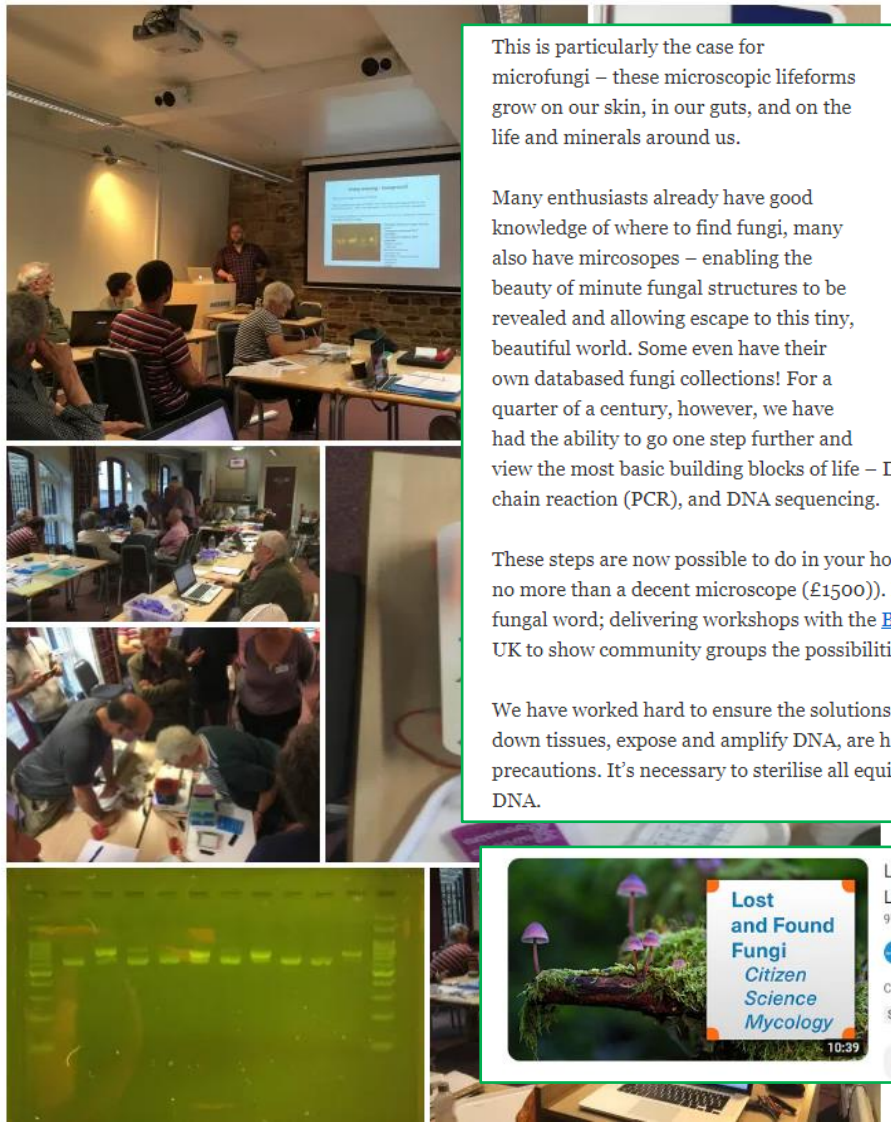
Community fungal DNA workshop

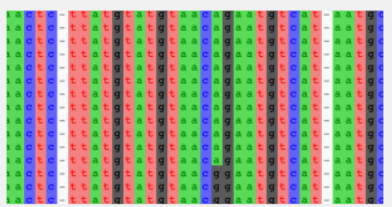
Posted on January 8, 2020 by Oliver Ellingham

The Lost and Found Fungi (LAFF) project have fungal enthusiasts DNA barcoding… With att protocols have been teaching allow you to read the D

In this particular case Brian and myself of Kew's Esn community project have been using the BentoLab to local enthusiasts. This is a kingdom full of mimics ar methods to identify them, the most conclusive is rea



This is particularly the case for microfungi – these microscopic lifeforms grow on our skin, in our guts, and on the life and minerals around us.



DNA barcoding is a method which allows us to identify species accurately by comparing an organisms genetic code to a reference library of life. These libraries are constantly being added to, particularly in the megadiverse, yet understudied kingdom of Fungi.

Many enthusiasts already have good knowledge of where to find fungi, many also have mircosopes – enabling the beauty of minute fungal structures to be revealed and allowing escape to this tiny, beautiful world. Some even have their own databased fungi collections! For a quarter of a century, however, we have had the ability to go one step further and view the most basic building blocks of life – DNA – using DNA extraction, polymerase chain reaction (PCR), and DNA sequencing.

These steps are now possible to do in your home, with the BentoLab equipment (costing no more than a decent microscope (£1500)). Brian and I have been spreading the good fungal word; delivering workshops with the British Mycological Society (BMS) across the UK to show community groups the possibilities, and train them as molecular biologists.

We have worked hard to ensure the solutions, reagents, and buffers, required to break down tissues, expose and amplify DNA, are harmless – providing you take some minor precautions. It's necessary to sterilise all equipment to prevent cross-contamination of DNA.

https://blogs.reading.ac.uk/crg/community-fungal-dna-workshop/

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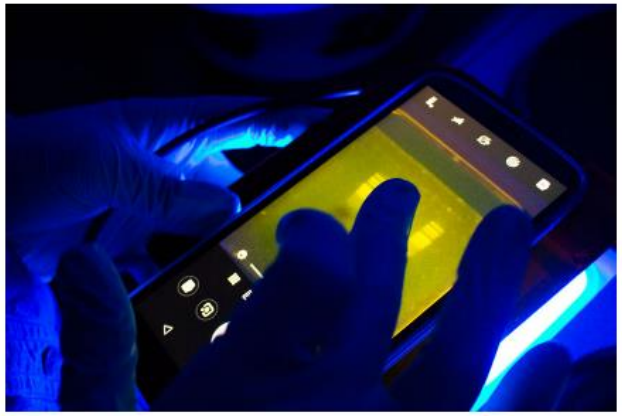

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DNA barcoding reveals *Clavulina etruriae* - new to Britain

David Harries*

In 2018 I found a collection of white coral-like fungi growing amongst a carpet of needles under one of three pines (*Pinus sylvestris*) in an otherwise broadleaved woodland planted over thirty years ago in open pasture overlying old red sandstone near Hundleton, Pembrokeshire. The specimens ranged from sparsely-branched clubs similar to *Clavulina rugosa* through to more highly branched collections resembling *C. coralloides* but with blunt rather than cristate tip ends (Figs 1 & 2). Specimens typically measured between 30 and 50 mm in height. The spores were subglobose and measured 8.7 x 7.2 µm (Fig. 3) which is below the range reported for *C. rugosa* (9.0–11.5 x 7.5–10.0 µm). The identity of the collection was thus uncertain and the voucher material catalogued and retained as *C.* cf. *rugosa*.

In 2020, I included the above collection in a DNA barcoding programme supported by the British Mycological Society. DNA was extracted from a sample using a CTAB extraction (Doyle and Doyle, 1987), the ITS region barcode amplified using a Bentolab thermal cycler (www.bento.bio) and the resulting amplicon sent to the Sanger sequencing facility at Aberystwyth University for processing.

The sequence generated from the *Clavulina* specimen was subjected to a Blast analysis on the NCBI website (https://blast.ncbi.nlm.nih.gov/Blast.cgi) which looked for matching sequences in the Genbank library. The results showed only one close match: *Clavulina etruriae*, a recently described species from Italy (Franchi & Marchetti, 2018). I contacted the authors who

Fig. 1. *Clavulina etruriae* showing the branched but often blunt tips. Photo © David Harries.

DNA barcoding reveals three *Rhodocybe* species new to Britain

Nick Aplin[1], Penny Cullington[2], Brian Douglas[3] & Eric Janke[4]

Introduction

As part of routine surveys during 2019 and 2020, several *Rhodocybe* species were collected from both Buckinghamshire and Sussex. Within *Rhodocybe*, the brown to pinkish colouration of three of our collections suggested a connection to section *Rufobrunnea*, a section for which only 2 species are currently recorded from the UK, neither of which appeared to be good matches to these collections. However, several new species in this section have recently been described from Turkey, Italy and Estonia (Vizzini *et al.*, 2016, Sesli & Vizzini, 2017; Vizzini *et al.*, 2018), which had some resemblance to our collections but had not yet been confirmed from the UK.

To investigate whether the three *Rhodocybe* collections did correspond to these newly described species, the collections were flagged up as candidates for DNA extraction, amplification, and sequencing by both the Sussex Fungus Group and the Hampshire Fungus Group. This DNA work was done as part of a field mycology DNA barcoding initiative set up in collaboration with the Lost and Found Fungi (LAFF) project (Royal Botanic Gardens, Kew).

Methods

Specimens were photographed in situ, microscopically examined and imaged in their fresh state, mounted in water, Congo red, Melzer's reagent and Cotton blue in lactophenol.

DNA extraction, amplification, visualisation, sequencing, and sequence analysis was conducted as described in Box 1 below.

Results

For one specimen, the newly generated ITS sequences produced a 99.5% full length match with the sequence derived from the holotype of

BOX 1
Molecular Methods

DNA extraction was performed using a slightly modified version of the dipstick protocol described by Zou *et al.* (2017). Briefly, an approximately 2 mm3 section of clean dried gill tissue was macerated in 200 ul of lysis buffer (20 mM Tris [pH 8.0], 25 mM NaCl, 2.5 mM EDTA, 0.05% SDS) using a plastic pestle, before diluting the crude extract with a further 300 µl of lysis buffer. A homemade filter-paper dipstick with wax handle was used to extract DNA from the crude extract; to wash the DNA in wash buffer (10 mM Tris [pH 8.0], 0.1% polysorbate 20); and to release the DNA into the PCR reaction mix – three dips of the dipstick were used at each step as recommended by Zou *et al.* (2017).

The internal transcribed spacer (ITS) region was amplified using the primer pair ITS1F and ITS4. Thermocycling was done with a Bento Lab (Bento Bioworks Ltd., London, United Kingdom), using the following protocol: 4 minutes at 95 ˚C, then 35 cycles of: 95 ˚C for 30 seconds, 52 ˚C for 30 seconds, 72 ˚C for two minutes followed by a final extension step for 10 min at 72°C and hold at 15 ˚C. 10 ul of PCR products were visualised on the Bento Lab electrophoresis unit on a 40 ml agarose gel stained with StainIN™ green (Client Life Science, Stourbridge, United Kingdom). Sequencing was done at the Institute of Biological, Environmental & Rural Sciences (IBERS) of the University of Aberystwyth.

Nucleotide traces were checked manually for quality and errors in FinchTV 1.4.0 (Yang *et al.*, 2017). Approximate taxonomic affiliation was determined using a BLAST search in Genbank (httpscbi phylogeny was created based on the ITS phylogeny in Vizzini *et al.* (2018). All phylogenetic work was done in AliView (Larsson, 2014). Sequences were aligned using the MAFFT E-INS-I algorithm; the alignment was trimmed; and phylogenies were calculated using the FastTree algorithm and visualised in FigTree. A final phylogeny was produced using RAxML. *Clitopilus prunulus* AFTOL-ID_522 (DQ202272) was selected as an outgroup.

Support for Local Fungal Recording

- Leicestershire & Rutland Environmental Records Centre
  - have few resources
- LRWT
  - arrange Recorders Conference
- L&R Recorder
  - edited by Steve Woodward
- BMS
  - Local groups
  - Field meetings
  - Training meetings

The Way Forward

- Recording needs to be standardised
- Improve site naming
- Develop a Recording Strategy
- Increase groups covered