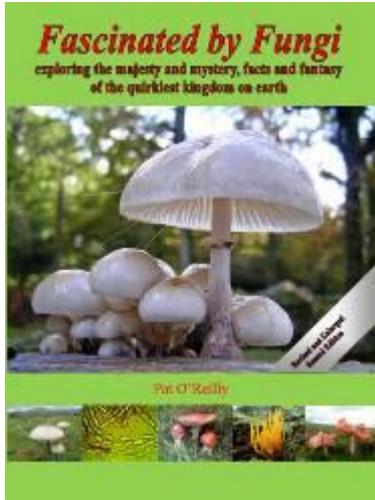


Fascinated by Fungi

Revised, enlarged 2nd edition

by Pat O'Reilly



ISBN-13: 978-0-09560544-9-4

Hardback, 450 pages fully illustrated

With more than 1000 colour pictures and bang up-to-date, this new edition incorporates recent taxonomic name changes resulting from recent DNA analysis, together with previously common synonyms and the British Mycological Society's recommended English names of fungi species.

A great book exploring the majesty and mystery, facts and fantasy of the quirkiest kingdom of life on earth.

For millennia the mysterious nature of fungi has intrigued the intrepid. Fungal fruits of field and forest have fed the fearless, while the (surprisingly few) resulting fatalities have fuelled myths and legends. Monks and murderers have turned mushrooms to their advantage; artists and authors have fallen for the fascination of fungi.

Once enticed into this quirky kingdom, the magical mix of majesty and mystery has enough power to captivate the interest for a lifetime. But the complexity and scientific jargon of the subject made it difficult for newcomers to gain a broad view of this vast topic... Problem solved! *Fascinated by Fungi* is an easy-to-follow introduction to a complex and largely unexplored kingdom of life and the history, mystery, facts and fiction born out of the fascinating foibles of mushrooms, toadstools and other fungi.

Review Extracts (first edition)

"To be bang up to date you have to get Pat O'Reilly's amazing book, a 'must have' with more than 1000 wonderful photographs. It combines one of the most readable and deliciously idiosyncratic accounts of what fungi are, where they come from and what they do for us with an excellent identification guide almost uniquely based on habitats. Excellent diagrams and photographs are provided to explain all. If you want to photograph it, look down a microscope or just eat it, there is all the help you need to get started and maybe become an expert." Ray Woods, review in *Plantlife Magazine*

"It's fantastic. For years, I have been looking for a good guide to fungi that includes identification tips, the kind of habitat that it frequents and similar species, and at last it's here." Iolo Williams, BBC Wildlife Presenter

"...this is a tour de force, a tremendous achievement in bringing this extraordinary kingdom to life... With its originality, freshness of approach and liveliness of text, I would like to think that Fascinated by Fungi will become a classic text, introducing a new generation to the wonders of fungi." James Robertson, review in *Natur Cymru*.

"A clear, logical guide to a crucial part of our life support system; the kind of book that most people (including me) really need." Roger Thomas, Chief Executive, Countryside Council for Wales

"It's a fabulous field guide!" Doug Collins, California USA

"Its fantastic! Everything I wanted in a fungus book is there." Penny Turner, Drymos, Greece

"It's so nice to find a book that covers more than ID and delves into more aspects of the natural history." Laura, UK

"Let me take the opportunity to tell you how happy I am with the book. I'm only halfway through reading it, but I can tell you this is the best book on Fungi I've ever read." C.R., Sweden

Whether you are a beginner, an experienced fungus forayer, or a practising field mycologist, you will love this beautiful book. It is written in jargon-free plain English and a lively and highly readable style by one of our most entertaining and perceptive writers on wildlife and countryside matters.

Softback laminated, 450 pages all in full colour; more than 1000 colour photographs. Great value at RRP £25 plus P&P.

Book contents include:

Uses, history, facts and mythology of mushrooms and other fungi

Fungus biology and classification

Wood, trees and forest ecology;

Woodland fungi and their vital roles

Grass, grasses and grassland types;

Fungi of grasslands – lawns, meadows, moorlands and mountainsides;

An Identification Guides to more than 400 of the most weird and wonderful mushrooms, toadstools and other fungi;

Fungus photography; microscopy; foray planning; recipes for the 'Mushroom Magnificent Seven' great fungi dishes...

...and much more.

"If you buy only one book about fungi, this should be it"

Reviewer's Comments on books by Pat O'Reilly

"Sets a new standard that I would hope other writers will emulate." **Daily Telegraph**

"Best of the bunch." **The Times**

"An absolute must for anyone interested in this fascinating subject. I rate this superb book at 10 out of 10."

Martin James, BBC Wildlife and Countryside Correspondent.

More details about this book

Many books about fungi are field guides with just the essential information to aid identification. *Fascinated by Fungi* is different. While it does contain details of identifying features for more than 400 mushrooms, toadstools, brackets, puffballs and other kinds of fungi, what you also get are fascinating facts such as historic uses, infamous poisoning cases, uses in food, medicines including antibiotics, and country-craft processes plus illustrated guides to fungi photography and the selection, setting up and use of microscopes to help in identifying fungi.

There is advice on producing mushroom meals - field and forest food for free - with menus, preparation and cooking details, and pictures of the final meals. And if the biology of fungi interests you, there is a large chapter covering the structure, nature, growth, reproduction and habitat needs of basidiomycetes, ascomycetes and lichens.

Unique features of *Fascinated by Fungi* that book reviewers have highlighted are the liveliness and readability of its entertaining and informative text; the author's tremendous enthusiasm that shines out from every page; and the wealth of superb pictures and clear diagrams - more than 1000 colour images of specimens at their very best and photographed in their natural habitats plus close-up pictures of gills, pores and other key identifying features. This is a big book, with a great deal packed into it that you will not find in any other book about fungi.

So many fungi books are much the same as one another; this book on fungi is very different; it stands out from the crowd. One eminent mycologist has already described it as '...the best book on fungi produced in recent times'. Certainly, the reviews support the view that *Fascinated by Fungi* is unique and destined to become a classic.

About the Author



Pat O'Reilly's fascination with mushrooms and other fungi stretches back more than 40 years and has taken him to many countries; but, as he says, there is a special satisfaction in finding and identifying beautiful fungi close to home.

Writing and broadcasting on wildlife and countryside topics for more than 30 years, Pat is the author of more than 20 books and hundreds of articles. With his wife Sue he produced and maintains the First Nature website, which receives up to a million visits a year and hundreds of enquiries via an extensive Fungi section.

Pat, an active conservationist, has chaired and served on several advisory committees and special commissions. Until April 2013 he was a member of the Council of CCW (the Countryside Council for Wales, now Natural Resources Wales), making good use of his special interest and expertise in fungi conservation (he is a Member of the British Mycological Society) and the management of National Nature Reserves in Wales.

For his environmental work Pat O'Reilly was awarded an MBE in 2003.

Sample pages

Fascinated by Fungi

Amanita muscaria (Amanitaceae) – Fly Agaric

Now for perhaps the most famous of all mushrooms: *Amanita muscaria*. It comes as quite a surprise to many people when they discover that this is not simply a fantasy confined to children's books but a real live mushroom. Such a distinctive mushroom that once seen is never forgotten, the Fly Agaric is the classic toadstool of fairy tales, the mushroom of more myths than any other, and always such a startling find. *Amanita muscaria* fruits throughout the summer and autumn months, usually under birch trees but occasionally under conifers.



Most common on acid soil under birch and spruce, these notorious hallucinogenic mushrooms can attain a cap diameter of 20cm.

Cap: red, fading to orange; with white velar warts; convex, flattening; 8 to 20cm across.
Gills: white; free; crowded.
Stem: white; often rough with attached veil fragments; fragile floppy white ring; 8 to 18cm long, 1 to 2cm dia.; swollen stem base with velar fragments.
Spore print: white.

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Fascinated by Fungi (EM) Woodland Fungi

Amanita regalis (Amanitaceae) – Brown Fly Agaric

Quite common in Scandinavia, *Amanita regalis* is known as the Brown Fly Agaric. Apart from cap colour it is similar in size and form to the red Fly Agaric. It is also hallucinogenic.



The Brown Fly Agaric appears in summer and autumn under spruce and larch trees.



Young fruitbodies of *Amanita regalis* (left) and *Amanita muscaria* (right). In a fungal beauty contest these two mushrooms would present the judges with a very difficult decision.

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Fascinated by Fungi

Piptoporus betulinus (Fomitopsidaceae) – Birch Polypore

Also known as the *Beefsteak Fungus* because its hard surface was used to hone the edges of cut-throat razors, this common bracket of broadleaf woodlands is found almost exclusively on birches. *Piptoporus betulinus* causes a yellowish-brown cubical rot, and it is a powerful decomposer of dead wood. Fruitbodies can be seen throughout the year, but in wet or frosty weather they soon decay and fall to the ground.



This annual polypore may be parasitic on weakened birches, but without doubt its fruitbodies are most commonly seen when the host tree is already dead.

Fruitbody: Up to 20cm in diameter and 6mm thick, with a brownish top that is initially rounded but later flattens, often with a wavy margin.
Tubes: white; 1.5 to 5mm deep.
Pores: white; spaced at 3 to 4 per mm.
Spore print: white.

Inonotus hispidus (Hymenochaetaceae) – Shaggy Bracket

This bracket fungus acquired its common name because the upper surface of its fruitbodies is finely velvety. It is a serious pathogen with a particular liking for Ash trees. Apple trees and other hardwoods can also be infected by this colourful polypore. The white rot caused by this parasite results in brittle fracture, where large branches or even trunks of Ash trees suddenly snap, with potentially disastrous results. In common with other parasitic fungi, timber infected with the mycelium of this bracket fungus continues to produce fruitbodies long after the host tree has died.

The Shaggy Bracket can be distinguished from the superficially similar Beefsteak Fungus *Fistulina hepatica* not only by the texture of its upper surface – velvety rather than smooth – but also by the cap flesh, which is creamy brown. (The bloody droplets that exude from all but the oldest of Beefsteak Fungi provide another clue that is difficult to miss.)

Fruitbody: rust-brown on top with concentric zoning on a distinctive, downy surface that is usually wrinkled at the edges; up to 30cm across; broadly attached to the substrate (no stem).
Tubes: buff; 6 to 10mm deep.
Pores: initially cream, later turning buff then brown; round; spaced 2 to 3 per mm.
Spore print: yellow.

Fortunately for Ash trees in particular (but unfortunately for anyone interested in hunting for this bracket fungus) *Inonotus hispidus* is a rare species in Britain and Ireland.



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Parasites, Brackets and other Hangers-on

Pseudoinonotus dryadeus (Hymenochaetaceae) – Oak Bracket

Another parasitic fungus, this annual bracket attacks mainly oaks, although occasionally it is reported on other broadleaf trees including Beech and alders.



Initially fruitbodies occur singly, but in time they spread all around the base of the tree.



Beneath the honey-coloured cap with its caramel droplets is a gray pore-bearing surface that releases pale yellow spores.

The genus suffix *-inonotus* comes from *ino*, meaning fibrous, and *otus* meaning ear. 'Fibrous ear fungus' is not a particularly descriptive name for something which more closely resembles a 'thick ear' with a rather nasty skin complaint.

The *dryadeus* specific epithet is easier to understand: it is a particular reference to oaks rather than a more vague reference to a dryad, or wood nymph.

Fruitbody: light brown; usually 20 to 30cm across but exceptional specimens can attain a diameter of 60cm; stemless; attachment to the trunk is typically half the width of the fruitbody.
Tubes: brown; 5 to 20mm deep.
Pores: 3 to 5 per mm; buff; exuding drops of amber liquid when young, turning brown when old or bruised.
Spore print: yellow.

What makes this such a striking polypore are the amber teardrops that ooze from the upper surface. With droplets of 'runny honey' on a 'set honey' background, this fungus looks as if it really belongs inside a beehive! Despite its delectable appearance, this polypore is inedible.

Look out for this not-so-common bracket fungus on the boles of old oak trees, where it causes white rot of the tree's base and major buttress roots. Note, however, that this species can also infect the stumps of recently-felled trees, where it feeds as a saprophyte sometimes for as long as two or three years. Oak Brackets can be seen throughout the year, but attractive young fruitbodies are produced during late summer and autumn.

Pseudoinonotus dryadeus enters via bark wounds on the lower trunk and buttress roots – damage often caused by power mowers, tractors encroaching too close to the trunk, road traffic accidents and even fencing wires or notices nailed to trees. Whether this fungus is a strong enough parasite to kill otherwise healthy trees is questionable, but it certainly affects not only the timber but also the growth of its host. Oak trees carrying this polypore show a thinning of the crown, and since this reduces the leaf area available for photosynthesis the functioning of the tree's respiratory and feeding systems must inevitably suffer. There is, of course, no cure, and so prevention of bark damage is the only effective management strategy... but perhaps it is worth losing just a few oaks so that occasionally we can see these gorgeous bracket fungi.

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remote flash then you have the option of front, back or side lighting the main subject. Side lighting can make an object appear to stand out from its background.

I began this section with a plea for using a tripod to avoid the inevitable blurring associated with hand-held images. To get down really low, you will need a botanical tripod. I don't own such a gadget, and in any case who wants to carry more than one tripod with them on their rambles? A simple answer is to modify an ordinary tripod so that the legs can splay out widely. Then cut the central stem short so that the camera can be lowered almost to ground level. Here's one I made earlier:



A cut-down central stem makes this tripod ideal for photographing grassland and forest-floor fungi – not to mention any that might spring up overnight in the lounge carpet

An infrared remote shutter control is one answer, but these things can be quite expensive and not all cameras have such optional accessories available.

But fear not; all is not lost. Use the camera's timer, so that the picture is taken a few seconds after you press the shutter; this way all the camera movement is over before the image capture process even begins. It works equally well whether your camera is mounted on a tripod or perched on a bean bag.

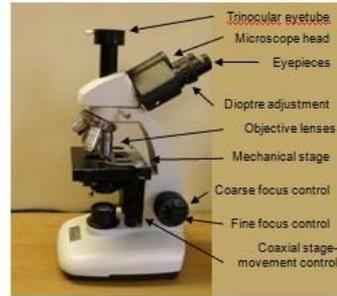
One other special item needed for photographing fungi is a pair of carpet-layer's kneepads. Gardening knee pads are almost as good unless the habitat is dominated by plants with extremely long thorns, in which case stick with carpet-layer's kneepads. A plastic sheet for lying down in wet grass or mud is a luxury worth considering, too. And finally, a fold-up photography reflector/diffuser with one side silver for reflecting light onto the shaded side of your subject and the other white for a softer fill-in when required. That's it!



Making a start with microscopy

When you can't identify a fungus in the field you might want to bring a specimen home for more detailed investigation. Microscopy is the way to look at fine details, and the good news is that you can do so indoors, when the time suits you. I won't pretend that getting to grips with fungus microscopy is easy, but it is fascinating and can be very rewarding. Here are a few tips to help you get started.

Toy microscopes are great for introducing youngsters to the intricacies of animal and plant structures, but for mycology you really do need a good microscope. That's because some of the fine structures of fungi are close to the limit of what can be resolved using visible light. (X-ray wavelengths are much shorter than those of light waves, and hence a lot more detail can be observed using x-ray microscopy, but don't even contemplate remortgaging your house to buy a bottom-of-the-range x-ray microscope.) Some very usable optical microscopes are now available from around £150, while £500 will buy you a superb compound microscope built to last a lifetime.



To study fungal spores, basidia, cystidia and other tiny features you will need a microscope capable of at least x400 magnification. Ideally, go for a microscope with a maximum of x1000, but to obtain reasonably clear images at such high magnification it should have an oil immersion lens.

Dimensions, shapes and ornamentation (warts, grooves etc) of spores are key identifying features for most kinds of basidiomycete fungi and for many of the ascomycetes. Spore shapes have their own 'jargon' names, including these:



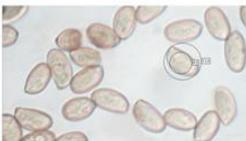
Spore vary considerably in other respects, too. Features to look out for include:



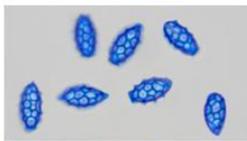
Let's now move on to using a microscope for examining and measuring features of fungi.

Microscopy of spores

The easiest slides to make are of spores. All you have to do is to place a mature mushroom, bracket, cup fungus or whatever fertile side downwards on a microscope slide and wait a while for ripe spores to drop. Unlike when trying to make a nice spore print you don't even need to cover everything over, although I generally do so just as a reminder that there is a sharp-edged piece of glass underneath. Because you want to be able to see separate spores rather than determine the colour of spores when piled layer upon layer, you don't need a dense print and so you mustn't leave it too long.



Spores of Stubble Rosegill *Volvoxyletus gloeocephalus* stained with Congo Red



Spores of Orange Peel Fungus *Aleuria aurantia* stained with Cotton Blue

Once you have some spore dust on the slide, use a scalpel to scrape it into a tiny pile. Add a drop of stain and place a cover slip on top. Note that cover slips come in different thicknesses, and while most biological microscope objective lenses will give crisp images with No. 1 cover slips (0.13 to 0.16mm thick), should you ever decide to lash out on a x200 oil objective you may find that it requires No. 0 cover slips (0.085 to 0.13. thick). What will definitely degrade the quality (and at high magnification make focussing impossible) is if you don't notice that you have two cover slips stuck together. It can happen all too easily!

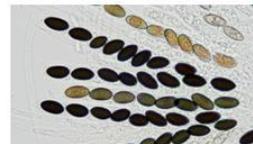


By capillary action water is drawn beneath the cover slip and washes out excess stain.

After a few minutes wash out unused stain by placing a drop of water on the edge of the cover slip while holding a piece of tissue against the opposite edge to draw out and soak up the excess. Repeat if necessary so as to maximise spore edge contrast.

For *Russula* and *Lectarius* fungi Melzer's reagent is a good first choice, as it stains the warts and ridges with which such spores are ornamented. As well as improving contrast, Melzer's can help with identification: hold the slide up to the light and you will see whether the spores are strongly amyloid or dextrinoid.

If there is only a weak reaction to Melzer's reagent, the colour change should still be visible via the microscope. Similarly, when examining asci – the spore-bearing structures within ascomycetes such as cup and flask fungi – knowing whether the tips of the asci turn blue in Melzer's is a test that can help determine species identification.



Asci and spores of Nail Fungus *Baronia punctata*, a rare ascomycete that grows on pony dung. The sterile structures between the asci are known as paraphyses, and without a suitable stain they are difficult to see.



Spores, asci and paraphyses of the cup fungus *Scutellinia subtrifida* are brightly coloured. The sterile structures between the asci are often crucial in separating similar ascomycete fungi species.

Basidiomycetes: examining the basidia and cystidia

When studying basidiomycetes under a microscope you are not limited to spore size, shape and ornamentation; you can also examine the basidia and several kinds of cystidia-hyphal cells that stand out from various surfaces. Depending on where they occur, cystidia are given different names. Pleurocystidia occur on gill faces, cheilocystidia are those on the gill edges, pileocystidia occur on the cap surface, and caulocystidia are found on the stem of the mushroom. The sizes and shapes of cystidia in these locations may be different, and these differences can help you to, gr... differentiate between species. In each instance you need to make a slide containing a tiny piece of gill, cap or stem material.

Making slides from very thin slices of fungal tissue is difficult, and initially you can expect more failures than successes. Having cut off a thin sliver of material place just the tiniest piece of it on a slide, add a drop of stain and then a cover slip, applying slight pressure to flatten the section. Be gentle: cover slips are little more than one tenth of a millimetre in thickness, and they break very easily. After a minute or so wash out any excess stain; you are now ready to examine microscopically the basidia and/or any cystidia.



Four-spored clavate basidia on gills of Pale Brittlestem *Esatryella candolleana*.



A cheilocystidium of the Cucumber Cap mushroom *Macrocyttidia cucurmis*.



The Deer Shield *Phuteus caryensis* has horned cystidia on gill edges and gill faces.