

THE GOOD, THE BAD AND THE FUNGI: introducing fungi to children

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The strictures of new teaching curricula, the rigours of health and safety assessments and lack of funding have all contributed to a large proportion of a child's education taking place firmly in the classroom. When learning does go out of doors, Countryside Rangers and other services that offer environmental education often undertake introducing primary school children to the natural world. For the purposes of this article I will refer to 'Rangers' although it should be understood that this term covers a number of different job titles. Rangers do a wonderful job teaching about a wide range of subjects from trees to pond dipping and birds to mini-beasts. One subject that they rarely feel confident to tackle however is fungi. Most are wary of not being able to identify many of the species that will undoubtedly be found. Since fungi are of fundamental importance to all our natural habitats and actually fit into many aspects of the school curriculum, there would seem to be a need to give Rangers the tools to add fungi to their repertoire.

The 'Fungus Foray' approach:

A public fungus foray usually follows the format of a guided walk with participants and a leader moving through the habitat, searching for fungi and stopping every so often to recap and listen to the leader's efforts to identify the catch. Most of the people taking part in such an event will be interested in the subject and straining to hear every last word. If you are faced with a group of thirty 10 year olds and the task of trying to enthuse them about mycology, an activity of this nature is quite likely to degenerate very rapidly. The 'keen' children may stick with it and enjoy finding fungi but others will very quickly drop out into a bored and potentially disrupt-

ive group lurking just out of range of the 'action'. I question what children might take away from an activity of this nature. Some of them might be able to name several fungi for a few weeks but have they learnt anything about the important fundamental concepts? For instance, what about the part that fungi play in the energy flows of our planet? What about the interrelationships between fungi and ourselves and other organisms on the planet? An introduction to these concepts is important to the developing 'world view' of our 'guardians of the future'. Labelling comes later – taxonomy is a vital part of mycology but, in my opinion, should not be the main objective of mycological education for the average 10 year old.

How people learn:

Learning takes place in response to a number of different stimuli. Some people learn best from visual activity (reading, pictures), others learn best from aural activity (listening), whilst others might do better by actually experiencing the activity for themselves (practical hands-on). Most of us learn best when a combination of these methods is used. In learning about the natural world the first two activities are easy to provide in the classroom using books, videos, lectures etc. The hands-on experience is more difficult to achieve. Yet many would argue that learning anything about the natural world is incomplete without the opportunity to experience the great outdoors itself. It is quite possible to understand systems on a cerebral level but without 'feeling' it is difficult to ensure 'caring'.

Starting to plan:

With this theory in mind a workshop was organised involving some members of the

Grampian Fungus Group and members of the Ranger Services in northeast Scotland. This first meeting was an opportunity to work on ideas to solve some of the above problems and enable Rangers to find a way of confidently teaching about fungi to visiting school parties without having to worry too much about their own identification skills. Having a clear idea of what knowledge we wanted the children to take home with them was an important first step. This proved to be fertile ground and so much progress was made that it was possible, at the end of the day, to produce a draft programme of activities aimed at 10 to 12 year olds who would come out to the site for a day of fungus fun in the autumn.

The aim for the day was to:

‘Explore the kingdom of the fungi through a fun and interactive series of activities and discover their vital importance in the natural world.’

Our objectives were to:

- Have an enjoyable and informative day out.
- Demonstrate how all parts of the natural world are inter-related.
- Find out how flowering plants and fungi differ.
- Find out why fungi are important in the forest habitat.
- See where fungi fit into food chains.
- Find out how people use fungi today.
- Practise the use of a simple key.

Phew!!

The Activities:

NB the following is not intended to be a complete description of the activities, rather just an overview. Further details, if required, are available from the author.

Before the children arrive:

Planning and preparation are key to the success of any day of activities with children. Leaders need to be clear about their own perceptions and should try to be consistent in using language. For instance how do you use the terms ‘mushroom’, ‘toadstool’ and



Roleplay is an essential and integral part of many of the lessons developed and one which the children really enjoy. Photograph © John Latham.

‘fungus’? We decided mushroom and toadstool are interchangeable names for the ‘agaric style’ fruiting body whilst fungus refers to the whole organism. A clear idea of what you wish to achieve will help the activities to flow seamlessly into one another. The leaders need to know exactly what they are doing, risk assessments must be completed, evaluation forms need to be prepared and any props must all be carefully made and in position. Chaos, panic, last minute photocopying or mending, mugs of tea and coffee are all acceptable during the hours prior to a visit but when that coach arrives all must be calm and welcoming efficiency! The children will need the toilets (and time for this must be built into the session) and access to their packed lunches - nothing spoils even the best activity session more than suddenly realising that the children have not removed their packed lunches from the bus, the driver has gone off ‘to make a phone call’ and has not been seen since – believe me, it happens! Taking care of the physiological needs of the children is vital to the success of any day.

Parachutes:

At the beginning of any session like this it is

important to start with a warm up activity. The children are in a strange environment with new people to deal with. They may be very unsure about what they are coming to, but more than anything it is a day off school and they are very excited! Parachute games involve everybody in a non-threatening and fun way. For those who have never enjoyed the delights of 'parachute games' this involves standing around the edge of a parachute and using the canopy in a variety of ways. If you start with it on the ground and then all lift it up at the same time, the centre of the parachute will lift up into the air and gently descend. The 'traditional chant' for this part of the game has always been '1,2,3 mushroom!'. The 'mushroom' can go high enough for children to run underneath in response to 'yes' / 'no' questions. If you stretch it tight you can bounce balls on the canopy or roll them around in a 'Mexican Wave' effect. You can let somebody move around underneath the parachute and be a shark or a crocodile or a parasitic spore and gradually 'catch' all the unsuspecting legs / fish / elderly trees around the edge pulling them underneath until eventually everybody is crawling about under the canopy! A few adaptations to traditional parachute games provided a very good tool for introducing some of the ideas that the children were going to meet during the day. Even when teacher's notes are sent out to the schools in advance of the day, it is worth going over basics. Repetition is no bad thing and many of the activities are designed to reinforce the information that we would like the children to take away with them.

From spore to mycelium:

The parachute gave a wonderful opportunity for the children to shriek and scream and generally let off steam before settling down to some of the quieter activities. We wanted to start with trying to explain that the toadstool is just a part of a larger organism. This is both complex and abstract; most adults find it hard to grasp that the mushroom or toadstool is only the tip of a hidden 'iceberg' – how do you explain a mycelium in a meaningful way? We decided to work backwards from the toadstool and use spore

prints to introduce the function of the toadstool. Experiments to produce spore prints with shop bought mushrooms were unsuccessful as the gills had moved away from the vertical during storage and spores could not be dropped onto the paper. This year we intend to use a combination of pre-prepared spore prints and wild mushrooms set up on the morning of the visit to give the children an introduction to spores. If the only purpose of the toadstool is to produce and disperse spores, how is it getting the energy to do that? Let's see what happens when a spore germinates...

Make a Mycelium:

The children stood back to back in a tight circle around a central wooden post, surrounded by randomly placed wooden posts (food outlets), which in turn were encircled by an outer ring of posts – enough of the latter for one per child. They were a spore about to germinate and send out the tubes (hyphae) that form the main body of the fungus. Each child had a reel of string attached to the central post and they set off to find food (on the tops of posts located immediately around them). Every time the growing 'hypha' reached a food post it was taken around the post and sent off in a different direction, collecting a food item on the way past. Each 'hypha' needed to collect four different coloured food items before heading off to one of the outer circle of posts. Once all the hyphae had reached the outer posts, they can look back at the network that they have created, this was briefly discussed and then the mycelium was allowed to produce toadstools (there are a number of ways that this can be achieved e.g. using cocktail umbrellas, suggesting that the children make their own 'mushroom hats' before they come or by each child blowing up a red balloon, initially wrapped in tissue paper and sprinkled with water – try it sometime!). The children became a perfect fairy ring – a nice way to link into our own folklore.

Using keys:

The children were then encouraged to look closely at real toadstools growing in the park. They worked in small groups with an adult



Children weave an intricate web of mycelium about a central mushroom 'spore'; eventually mushrooms will appear at each of the posts - usually made by the children in another part of the learning activities. Photograph © John Latham.

present with each subgroup. Using dental mirrors the children were able to see underneath the cap, usually finding enough information to answer the questions in the illustrated dichotomous key provided - without having to pick every toadstool. The children all enjoyed this activity; they were focused and interested and learnt a lot about the different parts of the toadstool and some of the different shapes that fungal fruit bodies can take. Working with keys in the field is a part of the National Curriculum (England, Wales and Northern Ireland) and the 5 - 14 Curriculum (Scotland) that schools find difficult to fulfil - this was the perfect opportunity for teachers and pupils to experience a simple key in operation.

How fungi get their food:

After lunch, the children were introduced to the three main ways that macrofungi obtain their 'food'. Two activities ('Build a Tree' - a Joseph Cornell activity adapted with his permission and 'Mushroom Murder Mystery') were used to introduce the ideas of mycorrhizal (food exchangers), saprotrophic (recyclers) and parasitic fungi. 'Exchanging' and 'Recycling' are both ideas that children

are familiar with. The latter is of particular interest because the process of recycling by humans is a part of the curriculum - it is important for the children to understand that recycling is of major importance in the natural world as well.

In the first activity the children become the different parts of the tree and act out the function that each component has. The role of the fungus is explained and a mycorrhizal fungus is allowed to attach itself to the tree's root hairs and fruit. The spore of a fungal parasite (usually in the shape of the activity leader!) can try to attack and those children 'being' the bark will try to defend their tree.

The second activity splits the children into toadstools and trees and, using clue bags, each toadstool has to find a tree that it can live with. Some of the toadstools are mycorrhizal - exchanging nutrients, some are recycling dead tree materials and one is going to kill a tree!

Working with the 'parasites' needs handling with care. There is nothing that children like better than a good 'murder mystery'. The idea that one of the trees in their game is going to die is a wonderful 'hook'. Care must be taken however, that the



Mushroom umbrellas and forming fairy rings is all part of the fun - and the learning - in this innovative approach to mycology in education. Photograph © John Latham.



Children studying real fungi, learning how spore-prints are made and becoming familiar with the fascinating world of mycology. Photograph © John Latham.

whole activity does not revolve around 'the dreadful deed' however much fun is generated by it! The leader must explain that in the wild wood the parasites have an important role to play in taking out the weaker trees, opening up the canopy and providing a wonderful habitat for other fungi, invertebrates, birds and so on up the food chain.

Fungi and people and fungi and food chains:

Some time was also spent indoors where the children could look at different displays and think about the way that humans use fungi in their everyday lives and where fungi fit into food chains. They also made coloured toadstool badges to take home with them. The power of good artwork should never be underestimated and we were lucky to have the skills of Kath Hamper to make our toadstools fun and friendly.

Where we go from here:

The full day of activities ('The Good, The Bad and the Fungi') was tried out by three primary schools in 2001. The feedback was very positive both from the teachers and the children and, thus encouraged, the Aberdeenshire Rangers decided to run a full week of the activities in 2002. 126 children plus their teachers and parent helpers took part; the week was over-subscribed by schools and so plans for next year are already taking shape. 2002 saw a set of 'background information' notes about fungi going out to the schools in advance of their visit, a development much appreciated by the teachers. By 2003 there should be a full set of 'Teacher's Notes' which will include optional activities for the class to do both before and after their visit. This has taken a little longer to develop as a full set of risk assessments have had to be drawn up in association with Aberdeenshire Council Health and Safety Unit. The message is that as long as the risks to health and safety are understood, and appropriate action taken to deal with them, then there should not be a problem in bringing wild fungi into the classroom. The new BMS publications 'How the Mushroom got its Spots - An Explainer's Guide to Fungi' and 'Fungus Fred goes Foraying' provide lots

of additional ideas and background information and will certainly be on the recommended reading list.

The teacher said: 'An excellent interactive learning experience' The children said 'It was way better than school...'

'Who would have thought that there was fungi in marmite?'

'My fav bit was seeing the stink bomb' (i.e. *Phallus impudicus* and its egg!)

'Fungi is fun to learn about'

Special thanks to:

Aberdeenshire Ranger Service
Buchan Countryside Group
Aberdeen Environmental Education Centre
Meldrum Primary School
Tough Primary School
King Edward School

Useful Refs:

- How the Mushroom got its Spots – an Explainer's Guide to Fungi 2002 by Sue Assinder and Gordon Rutter
- Fungus Fred goes Foraying 2002 by Maggie Hadley

Both the above books are available from: The Librarian, British Mycological Society, Joseph Banks Building, Royal Botanic Gardens, Kew, Richmond, Surrey TW9 3AE email: v.barkham@rbgkew.org.uk

- Track down your Toadstool 2002 by Liz Holden and Kath Hamper.

For further information on this introduction to dichotomous keys contact Liz Holden.



Mushroom Wiz - one of the characters used in the keys and other literature developed for teaching children about fungi.