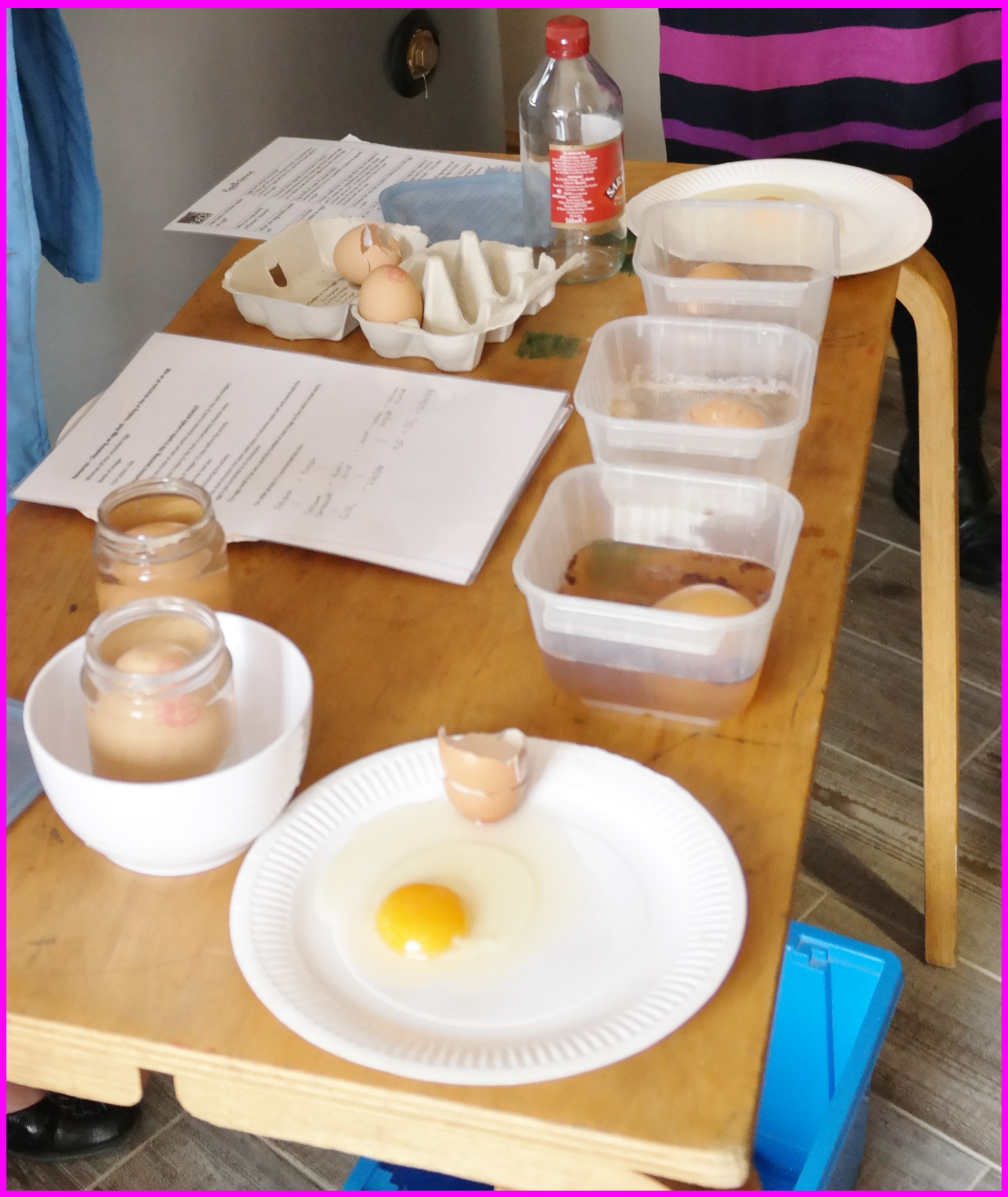
Activities for STEM

(Science, Technology, Engineering & Maths)

LEAF Education



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Introduction

This e-booklet uses activities inspired by food and farming to deliver Science, Technology, Engineering and Maths (STEM) subjects. Initially, we sampled all the activities at a seminar with adults and then we published a booklet for teachers.

Now you can try the activities with your children at home! Don't panic—we have included "answers" to the questions posed. Enjoy learning alongside your children!

Egg Science

The two activities here illustrate how to tell if an egg is fresh or not and what egg shells are made of. There is also a diagram of the structure of an egg which children can see if an egg is broken onto a plate and some FAQs.
n.b. Anyone handling raw egg should wash hands thoroughly afterwards.

Resources – How to tell if an egg is fresh
Minimum of two eggs – one freshly laid (supermarket eggs are usually very fresh because there is such a sales turnover and poultry farms do not store eggs but move them to shops as soon as possible) and one at least three weeks old
2 empty clean jam jars (deeper than an egg) filled with cold water
2 clean plates

instructions

Put a fresh egg in one jar of water and an older egg in the other.

Egg shells are porous and absorb air. The air sac at the end gradually gets larger as the egg ages. The fresh egg will lie horizontal in the water and the older egg, with larger air space should tilt semi-vertical or even 'stand' upright in the water.

Ask the children why this happens – if they have already looked at the structure of the egg and its shell they may be able to work it out.

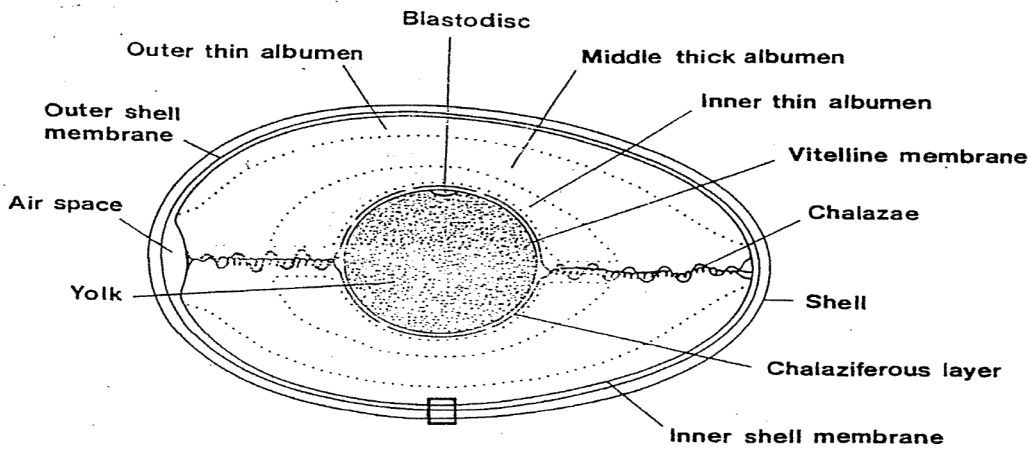
Break the eggs onto plates to see if they look the same – fresh eggs have plumper whites, older eggs have flat, watery looking whites.

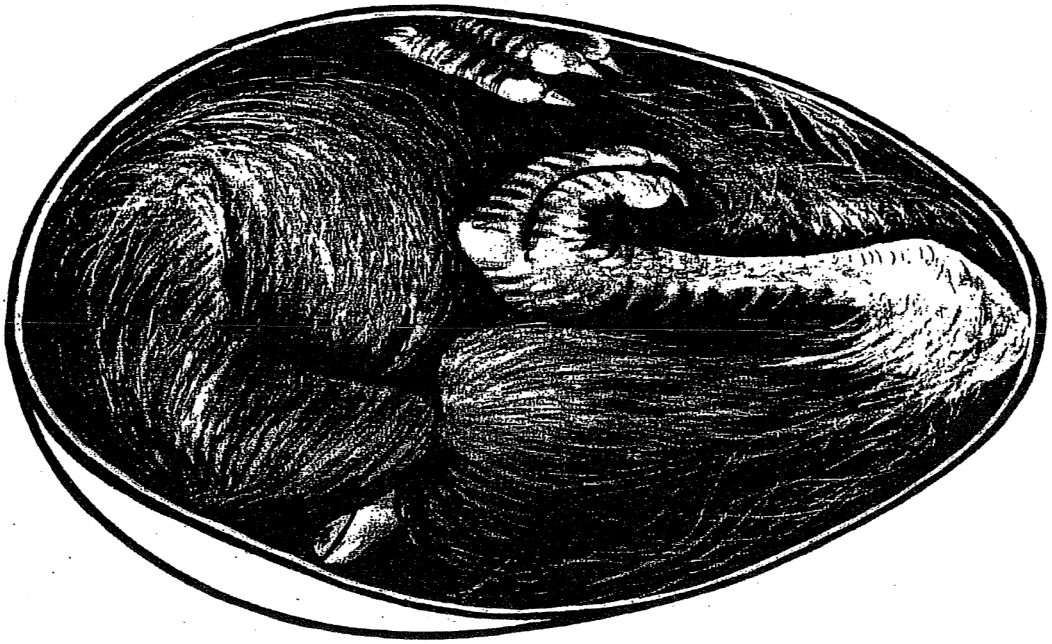
How does a chicken make an egg?	Eggs form inside the chicken. It takes just 25 hours for an egg to form. The chicken lays a clutch of 5-9 eggs and then has a rest for 24 hours before it starts again.
Why are egg shells different colours?	The shell colour depends on the breed of the bird. For example Marans lay dark brown eggs ; Rhode Island Red eggs are a lighter brown and White Leghorns lay white shelled eggs.
What are *egg* shells made of?	Egg shells are made of calcium (chalk). Calcium dissolves in acid so it is possible to dissolve an egg shell in vinegar.
How old does a chicken have to be to make an egg?	Chicken usually start to lay eggs when they are between 16 and 21 weeks old - depending on the breed of chicken. Chickens can have a 5 - 10 years life span although commercial chickens are only kept on the poultry farm for a year. Chickens moult once a year.
How many eggs can a chicken lay in a year?	Chickens that are kept on poultry farms lay up to 320 eggs a year.
How does the chick get out of the *egg?*	The chick that has grown inside the egg uses a special bit on the end of its beak (called an egg tooth) to crack the shell so that air can get in and it can breathe. This is called pipping. The chick is not ready to hatch out of the egg then but will do so later on, once it has enough air in the *egg* to breathe.
What changes the colour of *egg* yolks?	Yolks are made into a darker yellow colour by the food that the chicken eats. Because some people think that darker yellow *eggs* are tastier, farmers sometimes add things like calendula petals to the chickens' food so they lay dark yellow eggs.
Are brown shelled *eggs* and dark colour yolks better for you and tastier?	The colour of eggs shells and yolks doesn't make a difference in the quality or taste of eggs. Some people think they look better so the supermarkets prefer to pay farmers for brown eggs with darker yellow yolks.
Remember - only the female chickens, also called hens, lay *eggs.* Chicks will only develop in eggs that have been fertilised by a cockerel. Poultry is the word for birds that we get food from: chickens, geese, ducks and turkeys.	

Resources – Dissolving an egg shell – looking at the structure of an egg

Minimum of four uncooked eggs
Bottle of vinegar
Four plastic tubs

Instructions (warning, this is quite a smelly activity!)
Egg shells are made of calcium which dissolves in acid (in this case vinegar).
It takes about 3 days for the shell to completely dissolve away.
Set one egg in vinegar 2/3 days before the activity.
Set another the next day.
Set a third during the activity.
As the shell dissolves the layers peel away, it becomes quite soft and eventually the egg is just contained in its membrane.
The eggs need to be very carefully handled at each stage as they will break easily.


Blastodisc
Outer thin albumen
Middle thick albumen
Inner thin albumen
Outer shell membrane
Vitelline membrane
Air space
Chalazae
Yolk
Shell
Chalaziferous layer
Inner shell membrane



OPAL Environmental surveys

Open Air Laboratories (OPAL) is a Citizen Science project which has developed ecological surveys to address current environmental research questions. These aim to encourage people to engage with nature and environmental issues while also involving the public in scientific research activities and encouraging them to feel part of a wider scientific community.

Resources and space required
OPAL Citizen Science environmental surveys are available to download at http://opalexplorenature.org/surveys

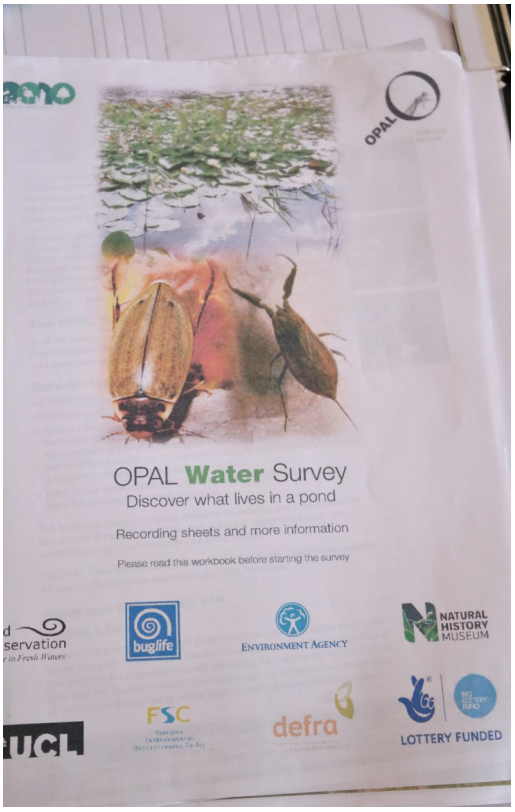
There are seven surveys. Some are more suitable for primary school children than others. “Bugs Count” and the “hedgerow” survey are highly recommended. The soils and earthworms activity is interesting, but children will probably only get as far as digging for worms and looking at them through a magnifying glass. OPAL has now developed a simplified guide to earthworms for use with school children. “Bugs Count” can be done within school grounds, and is quite suitable for urban or rural environments.

“Soils” requires the ability to dig holes in soil to find, count and identify earthworms.

“Biodiversity” involves a survey of a hedgerow, and is suitable for any sort of hedge, whether urban or rural.

Instructions

Excellent instructions are provided with each survey. Be sure to read through several times prior to beginning with children. There are lists of equipment required, health and safety advice, and excellent guides to identify trees, bugs, works etc.
How you use these surveys is up to you. You can just do what the survey pack suggests, or you can use the survey to suit your needs.



Sugar Awareness quiz:
Watch out, watch out, there's sugar about!

We need a small amount of sugar in our diets and we all love a sweet treat now and then - but sugar is also to be found in some surprising foods.
In this quiz children are asked to match some popular, supermarket shelf food products with the sugar quantities they contain. This activity will help in a small way with the work being done nationally to reduce obesity levels through increasing awareness and improvements in diets.
GDA (Guideline Daily Amounts) Sugar:
Adults: about 50g (about 10 teaspoons)
World Health Organisation recommend should be 6 teaspoons
Children, depends on age and how active, but less than 6 teaspoons is the recommendation.

Resources
1 can of "Coke" + plastic bag containing 36g of sugar (label to show only amount of sugar in bag)
Tin of beans + plastic bag containing 24g of sugar (label to shows only amount of sugar in bag)
Tomato Ketchup + plastic bag containing 4g of sugar for one serving or 88g sugar for bottle (label to show only amount of sugar in bag)
2 Digestive biscuits +plastic bag containing 4g of sugar for 2 biscuits or 68g sugar for packet (label to show only amount of sugar in bag)
Pot noodle + plastic bag containing 6g of sugar (label to show only amount of sugar in bag)
Crunchy nut corn flakes + plastic bag containing 12g of sugar for one 30g serving or 176g sugar for box (label to show only amount of sugar in bag)
Mars chocolate bar (51g) + plastic bag containing 32g of sugar (label to show only amount of sugar in bag)
4g sugar = 1 teaspoon = 1 sugar cube

Instructions

The food packets and plastic bags are put out randomly on a table and the children doing the quiz are asked how much sugar they think is contained in each pack and to match the bags to the pack.

In addition:

Ask them to look at the ingredients lists on the pack and check how much sugar they contain.

Add an additional sugar free product (check the label carefully!) and an empty bag.

Have a discussion about why sugar is even added to savoury food products.

Note the difference between Silver Spoon sugar, made with sugar beet grown in the east of England, and other brands, for example Tate and Lyle, made from cane sugar grown in warmer climates. Silver Spoon sugar packets explain how the sugar has been produced.

If you can get hold of a sugar beet (October – March only) try eating some raw, making sugar beet crisps or making sugar crystals (chopping and boiling the beet in water and allowing the resulting liquor to crystallise).