

IC1 The Egg

A Great Natural Package

The product

The Bird's Egg

What is the problem to be solved?

The problem is water, actually a lack of water. All animals produce eggs. Well not exactly all – only females can produce eggs. The first vertebrates like fish and amphibians lived in water. Their eggs had no shell – but no chance of drying out for them. But living on land is much harder on eggs. Drying out on land is a very BIG problem. Insect eggs have shells, some very tough, reptiles have shells too, but birds really perfected the egg shell.

Challenge

How to keep the developing baby safe and sound, letting it breathe while giving it all the food it needs.

The solution

A contained environment that contains all the requirements for life, comes in a range of colours and patterns for camouflage, and resists impact but allows its contents to escape.

Award

Awarded millions and millions of years ago because it's still around.

KEY IDEAS How/Why is it innovative?

The bird egg is an amazing invention. It's been called "a self-contained life-support system" and if you look closely at and inside them you'll see what that means.

Innovation 1: The egg shell.

- It's hard. It protects the developing baby inside from knocks and bruises. It's actually quite hard to break into but pretty easy for the hatching youngster to break out of.
- It's nasty-proof. It's an important barrier to bacteria, viruses and fungi.
- It breathes. The shell has microscopic holes in it so the baby can breathe (holes so small you need a microscope to see them). There are just enough holes for all the oxygen the baby needs to diffuse in and for the waste carbon dioxide to move out. Too many holes and the egg would lose precious water.
- It's curved. Its shape spreads weight so it is hard to break.

Innovation 2: The shell membranes – another barrier to bacteria as well as containing the contents of the egg.

Innovation 3: The egg white – albumen: a protective 'jelly' that supports the embryo, is the major source of water and a source of food: protein and minerals.

Innovation 4: The chalaza – natural 'springs' that support the yolk in the centre of the albumen.

Innovation 5: The yolk – the egg's major source of vitamins, minerals and fats. And when the developing baby uses the fats for energy, ever-useful water is also produced.



Who is it for?

The developing bird embryo (or reptiles, amphibians, fish).

Materials

- 1) Shell: calcium carbonate
- 2) Membranes: thin layers of protein fibres
- 3) Egg white (albumen): water, protein and minerals
- 4) Egg yolk: vitamins, minerals, protein and fats

Who were the team?

Now this is a big question. It depends what you'd like to believe.



STUDENT INQUIRES

- What do you like about this?
- What would you make even better?
- What don't you like about this?
- What would you do to fix this?
- How would you solve this problem?
- What else would you do with it?

Definition: What does Innovation mean

Innovation is the process of converting knowledge and ideas into better ways of doing business or into new or improved products and services that are valued by the community.

Why innovate? – The Golden rules

Nature is a great innovator and evolution one of it's great tools.