

# OpenUpScience

Issue 30



**Metamorphosis  
Issue**

**Make a butterfly  
feeder**

**Play the Frogs  
Life game**

**Make a  
metamorphosis  
anamorph**

Welcome to  
**OpenUpScience**,  
the magazine from Cambridge  
Science Centre.  
In this issue, we're thinking  
about metamorphosis.  
Find out more with the  
fun activities and  
puzzles inside!

## Welcome to OpenUpScience

from Cambridge Science Centre.  
This issue is all about metamorphosis.

Metamorphosis is a series of dramatic physical transformations that an animal's body goes through to become an adult. Not all animals go through metamorphosis (humans don't) but lots do!

There are two types of metamorphosis with different stages; complete and incomplete.



### Complete Metamorphosis

The animal starts  
off as an egg...

... and out  
hatches a very  
hungry larva that  
looks nothing  
like an adult!

When it gets full,  
it forms a hard  
shell and stays  
still in there  
until...

...an adult  
amazingly  
emerges!



### Incomplete Metamorphosis

The animal starts  
off as an egg...

... and out  
hatches a tiny,  
tiny nymph. The  
nymph looks like  
a little adult. It  
sheds its skin,  
gets bigger and  
grows wings to  
form...

...a full grown  
adult!



More about the animals that go through these crazy changes inside!

## Spark, Ignite, Fuel, Illuminate



# Butterfly Anamograph

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One of the most recognisable animals that goes through complete metamorphosis is a butterfly.



An adult butterfly lays eggs on a leaf.

The caterpillar forms itself into a hard pupa. Inside, the tissue, limbs and muscle completely transform.

And out pops a little caterpillar. The caterpillar munches its way through lots and LOTS of leaves until it is very full and around 100 times the size it was born – wow!

When it's ready, a beautiful butterfly emerges!



## What to do

## What you'll need

- The template
- Scissors
- Glue

1. Read the instructions and then cut the template
2. Fold it in half down the middle horizontal line so that the two halves are back to back and stick with glue.
3. Fold in a zig zag along the vertical lines; one way and then the other.
4. Stand the anamograph up. You will see a different image depending on whether you look at it from the left or the right! Flip it over to see the full metamorphosis from tiny egg, through caterpillar and pupa to beautiful butterfly.

# Butterfly Anamograph Template

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# Make a butterfly feeder

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Caterpillars munch on the leaves around them for food, but once they transform into a butterfly, they eat something different – sugar! Attract butterflies to your garden for a meal with this simple feeder.



Usually butterflies get their sugar food from the nectar inside flowers – but fruits contain lots of sugar too! Do the butterflies prefer one kind of fruit?

## What you'll need

- Some old cut up fruit
- String
- Foil pie tin
- Hole puncher
- (Optional) Beads
- A helpful adult



## What to do

1. Get an adult to help punch four even holes on opposite sides of the pie tin.
2. Measure and cut four pieces of string the same length (around 1m but it doesn't have to be too precise).
3. Insert each string through each hole in the pie tin, then tie big knots at the bottom so it's secure.
4. (Optional) Thread beads on your string to make it colourful.
5. Tie all the strings together at the top so your tin hangs well.
6. Put the fruit on the tin.
7. Hang your feeder up outside and watch for butterflies!

Send us photos of your butterflies to [openupscience@cambridgesciencecentre.org](mailto:openupscience@cambridgesciencecentre.org)

# Transformation Crossword

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Can you find the names of the animals that go through metamorphosis?



F	O	D	R	L	K	G	D	D	A
I	R	M	T	F	L	R	R	O	H
U	D	O	T	T	Q	A	F	E	C
E	B	T	G	M	G	S	L	R	A
B	E	H	J	O	E	S	A	Y	O
R	E	A	N	T	U	H	T	S	R
B	T	F	O	B	O	O	F	S	K
H	L	H	R	D	S	P	I	C	C
Y	E	Y	W	A	S	P	S	P	O
M	L	A	H	O	I	E	H	S	C
F	B	U	T	T	E	R	F	L	Y

FROG  
BEETLE  
DRAGONFLY  
FLATFISH  
BUTTERFLY  
MOTH

TOAD  
WASP  
GRASSHOPPER  
ANT  
COCKROACH  
FLY

Solutions at the back

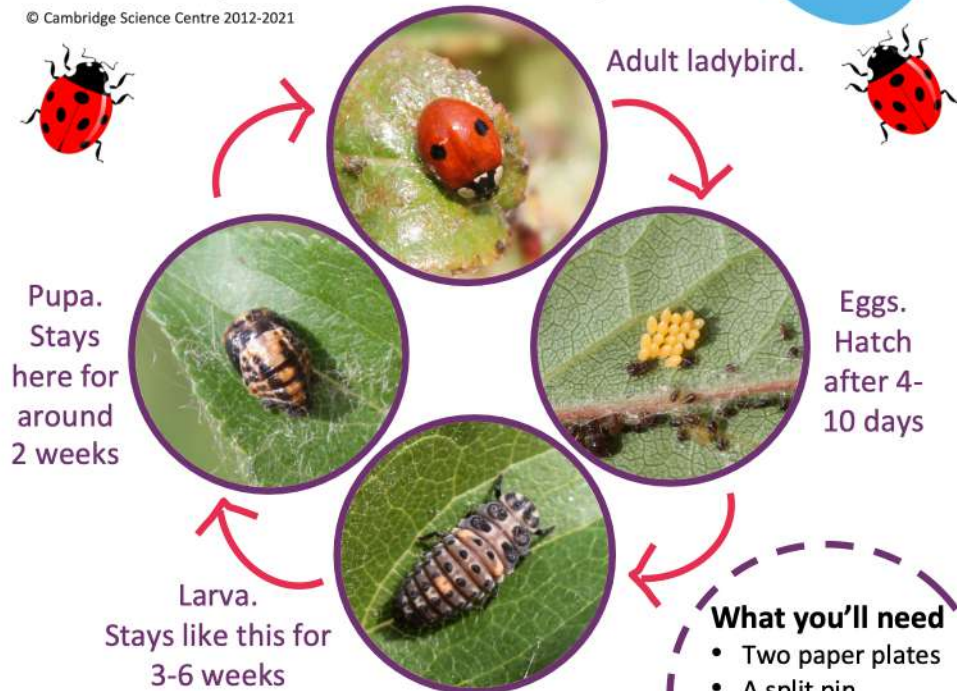


# Ladybird Lifecycle

Ladybirds also go through a dramatic metamorphosis in their life. Explore it with this craft activity!

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## What you'll need

- Two paper plates
- A split pin
- Colouring pencils
- Scissors
- A ruler

## What to do

1. Use your ruler and a pencil to draw a big cross on each paper plate so they're split into four sections.
2. Look at the pictures above and draw the stages on a paper plate, one in each section. Don't forget to label them!
3. Cut out one of the four sections on the second plate.
4. (Optional) Decorate the second plate however you like.
5. Put the split pin through the middle of the plate with the section cut out and then through the middle of the lifecycle plate and secure so one is on top of the other.
6. Spin the the top plate to explore the lifecycle of the ladybird!



# Maria Merian Quiz

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Maria Merian was a German artist, scientific illustrator and naturalist (which means she studied nature) born in 1647. At that time people thought insects magically came from mud, and Maria was one of the first to show this was wrong and what goes on instead is metamorphosis!

*Here she is on a bank note!*

When she was 13 she raised silk worms. She studied them and drew what she saw. In 1679 she published her first book on the metamorphosis of butterflies. In 1699 she sailed with her daughter to tropical Suriname to observe the plants and animals there. She tried a pineapple for the first time and said it tasted like a mix of grapes, apricots, apples and pears! Afterwards she published another book called the *Metamorphosis of insects of Suriname*.



1. Where did people used to think insects came from?
 

A. Space	B. Rain
C. The sea	D. Mud
2. What did Maria Merian raise at age 13?
 

A. Silk worms	B. Hamsters
C. Frogs	D. Cats
3. Where did Maria Merian travel to study plants and animals?
 

A. The Sahara	B. Suriname
C. Scotland	D. Australia
4. What did Maria Merian **not** say pineapples tasted like?
 

A. Apricots	B. Pears
C. Kiwi	D. Grapes

Solutions at the back



# A Frogs Life Game

Frogs go through a dramatic metamorphosis during their life. They start off as eggs, or frogspawn, in the river. They hatch as legless tiny tadpoles that swim around the pond. They then start to grow legs and venture onto land, eventually losing their tails and becoming adult frogs. Follow a frogs journey, the dangers they face and challenge your friends with this game.



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## What you'll need

- A Frogs Life Game Board
- A coin
- Frozen peas
- Yoghurt pots
- Counters
- One or more friends to play with

## What to do

1. Each player needs a yoghurt pot, a counter (this could be anything, like a bottle top), and 10 frozen peas. These are your frogspawn.
2. Place your yoghurt pot to the side. This will be the frogspawn graveyard - you can put your frogspawn here when they die.
3. Take turns to toss the coin;
  - Move forward one place if heads
  - Move forward two places if tails
4. The winner is the team with the most 'live' frogspawn when they get to the end of the board.

## Did you know?

Only 5 out of every 2,000 frogspawn survive into adulthood. This is why frogs lay so many eggs!

# A Frogs Life Game Board

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 <p><b>START</b></p>	<p><b>1.</b> Spring is here! Frogs are busy mating in the pond.</p> <p><b>Move on 1</b></p>	<p><b>2.</b> Thousands of eggs huddle together in the frogspawn.</p> 
<p><b>5.</b> The frogspawn hatches into tadpoles.</p> 	<p><b>4.</b> Someone takes some spawn out of the pond.</p> <p><b>Lose 2 and move on 1</b></p>	<p><b>3.</b> Frost kills some spawn. Oh no!</p>  <p><b>Lose 2</b></p>
<p><b>6.</b> A dragonfly nymph attacks and eats two tadpoles.</p> 	<p><b>7.</b> The tadpoles grow bigger. They get back legs and start to form front legs too!</p>  <p><b>Lose 2 and move on 1</b></p>	<p><b>8.</b> Rubbish is thrown into the pond and hurts some of the froglets.</p>  <p><b>Lose 1</b></p>
<p><b>11.</b> A heron catches frogs for its lunch.</p>  <p><b>Lose 1</b></p>	<p><b>10.</b> Some of the baby frogs are eaten by a hungry grass snake.</p> <p><b>Lose 1</b></p>	<p><b>9.</b> The tadpoles look like little frogs and can live on land as well as water</p> 
<p><b>12.</b> The frogs leave the pond for a new home. Some are killed on the road.</p> <p><b>Lose 2 and move on 1</b></p>	<p><b>13.</b> The frogs have found a safe place to live!</p> <p><b>Move on 1</b></p>	 <p><b>END</b></p>



# Puzzle solutions

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F	O	D	R	L	K	G	D	D	A
I	R	M	T	F	L	R	R	O	H
U	D	O	T	T	Q	A	F	E	C
E	B	T	G	M	G	S	L	R	A
B	E	H	J	O	E	S	A	Y	O
R	E	A	N	T	U	H	T	S	R
B	T	F	O	B	O	O	F	S	K
H	L	H	R	D	S	P	I	C	C
Y	E	Y	W	A	S	P	S	P	O
M	L	A	H	O	I	E	H	S	C
F	B	U	T	T	E	R	F	L	Y

Quiz Answers:  
Q1 – D, Q2 – A, Q3 – B, Q4 – C

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**Tell us what you think!**  
We always want to improve, so  
let us know what you liked – or  
didn't like – about this issue!



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children and young people to  
discover science for  
themselves through hands-on  
activities. While the centre  
isn't open as normal at the  
moment, we're finding new  
ways to reach the families that  
need us most – like this  
magazine!

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