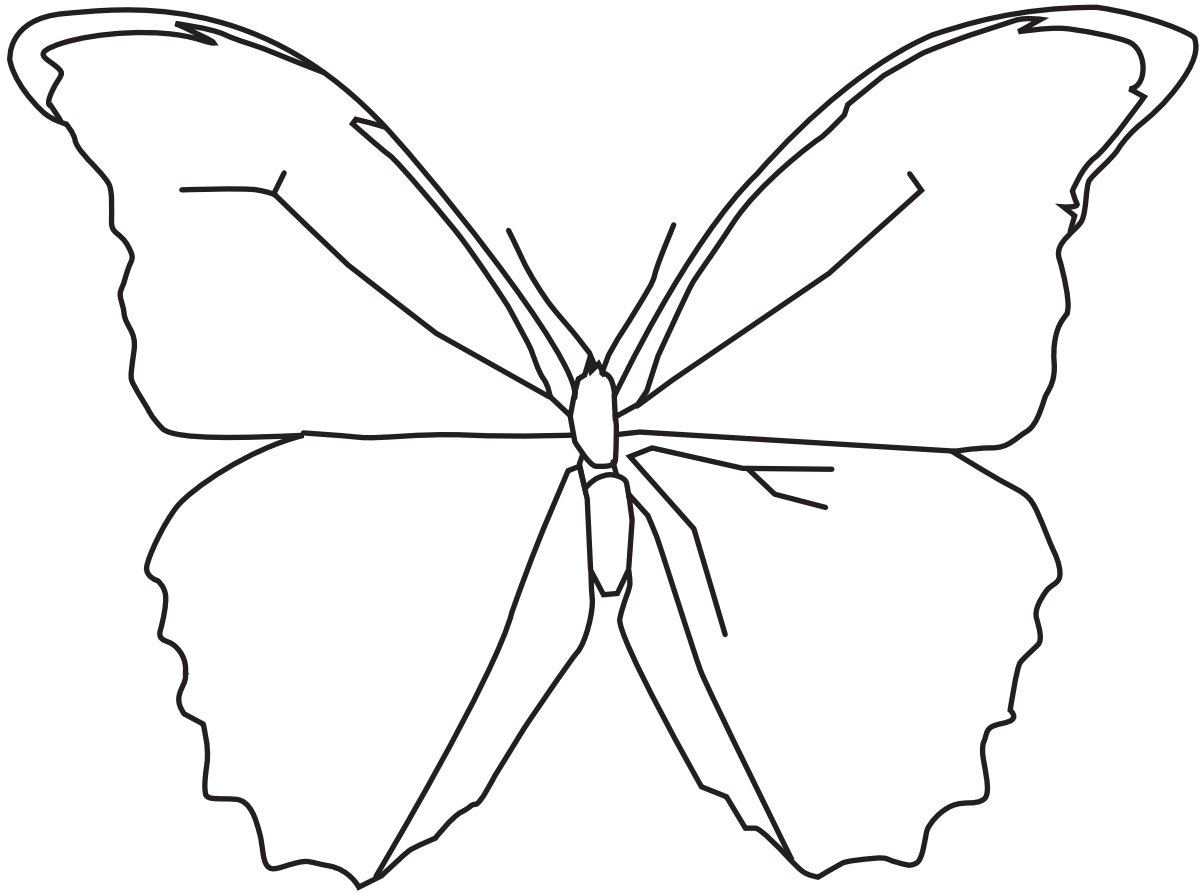


the  
structural  
colouring book

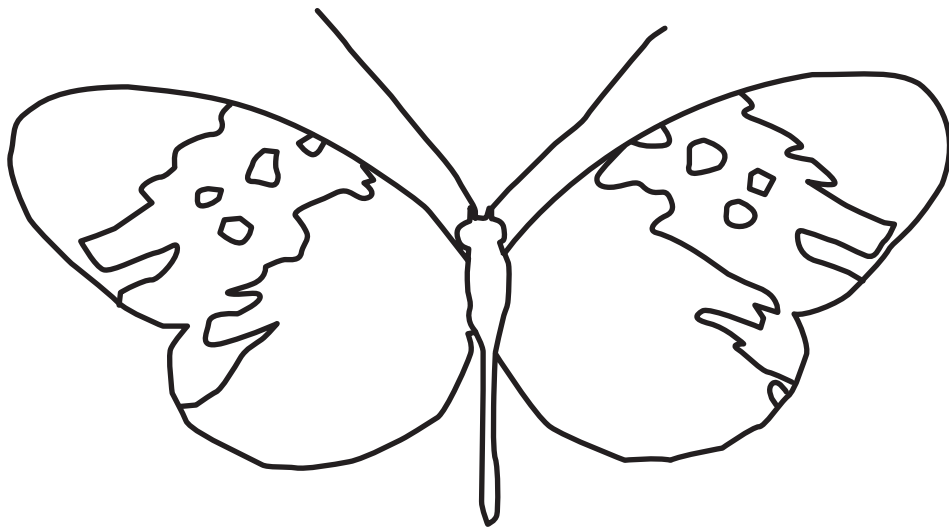




# MORPHO

The Morpho butterfly has iridescent wings that change colour depending on the angle of light ...

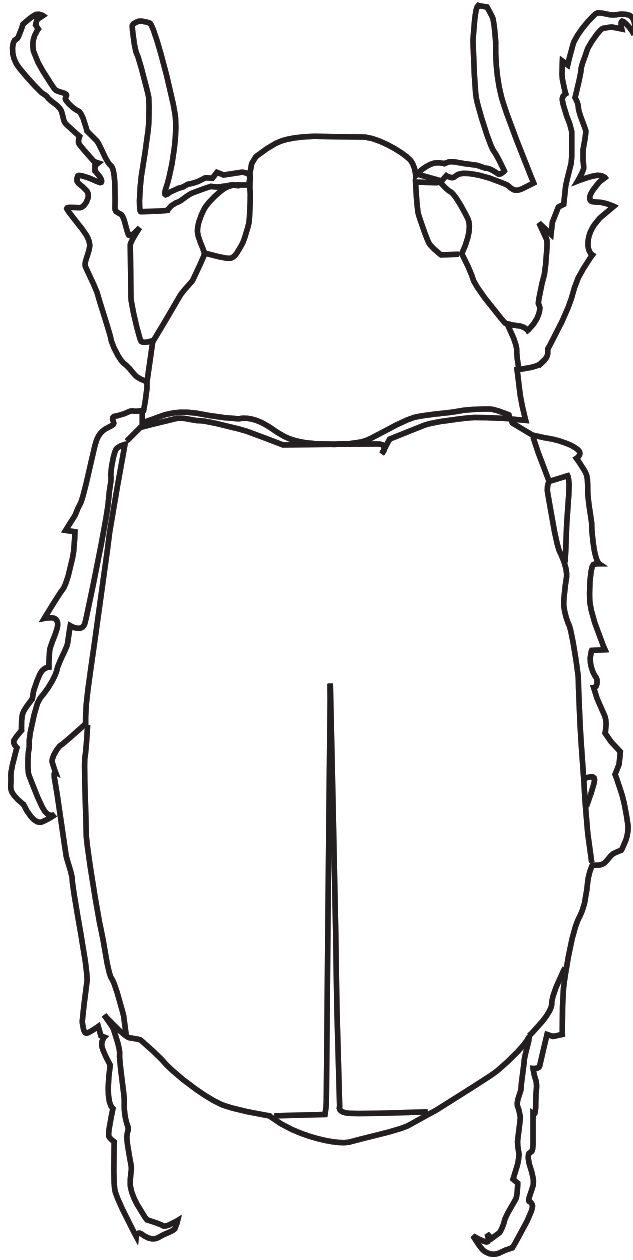
Use four to six colours to create an iridescent effect based on the colours that can be seen in a Morpho butterfly.



# HELICONIUS

The Heliconius butterfly uses its colours to mimic poisonous or nasty tasting butterflies to avoid being eaten!

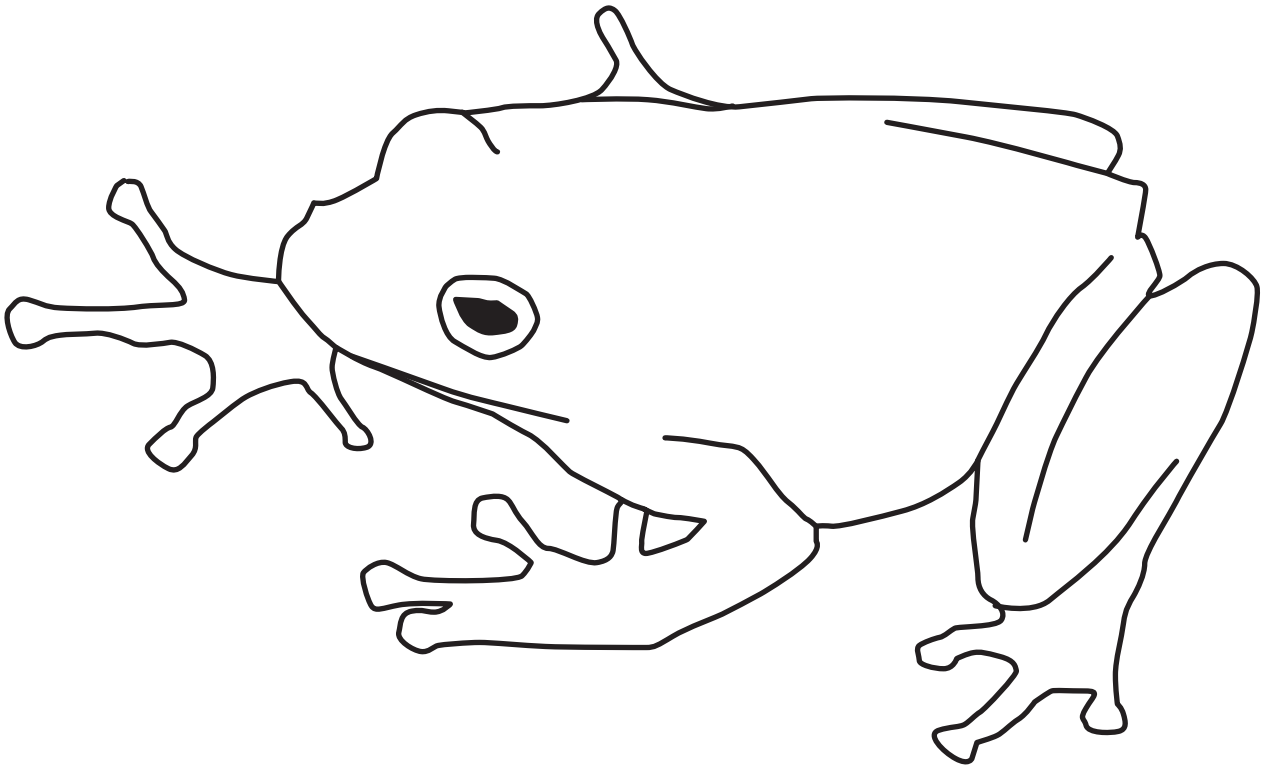
Choose two bright colours for the butterfly above that might suggest a warning to predators.



# CYPHOCHILUS

The Cyphochilus beetle is the whitest shade of white ...

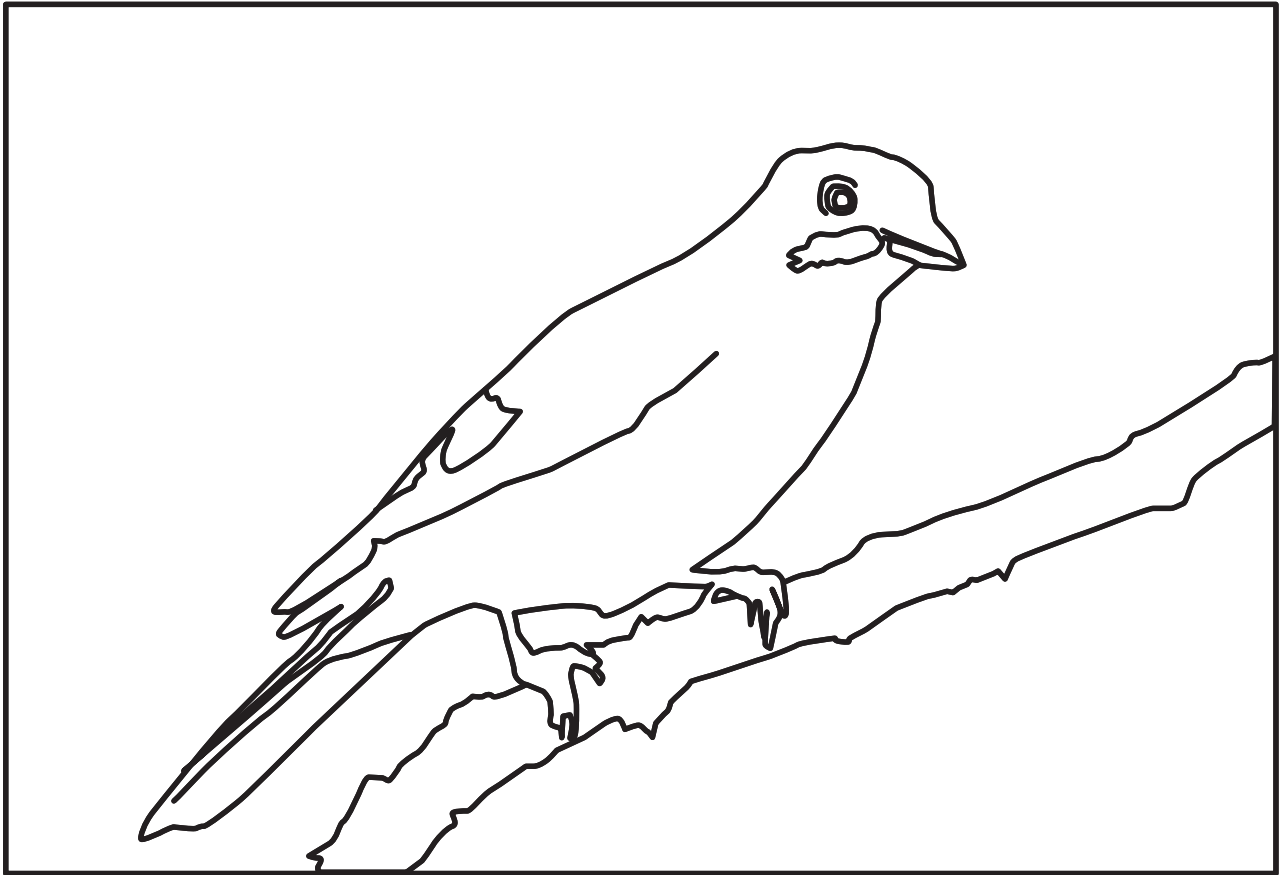
Use white coloured pencil, pastel or crayon to 'colour' the beetle above. When finished compare the colour of your beetle to the colour of the paper - is it whiter or less white than the paper?



# GREEN TREE FROG

A zombie frog? If you look at early paintings of the green tree frog you will see that it is coloured blue. This is because the artists were painting preserved specimens (in death it is blue in colour - this is structural colour, not pigment). In life it has active pigment cells that turn the frog green!

Use bright green and light blue pencils to colour in your frog. You can decide how 'living' or 'dead' your frog appears by your choice of colours!



# JAY

The jay has brilliant bands of blue on its wings. Surprisingly these are not pigments but physical structures that interfere with the wavelengths of light. We can see this when we dip the jay's wings in water - the wing becomes transparent because the refractive index changes!

Colour in the outline of the jay above. Use blue pencils for the blue bars on the jay's wings.



# PEACOCK

The peacock's distinctive 'eye' pattern is created from two kinds of colour - which kinds?

Use the colours you have at hand to find the best match for the colours in the peacock's feather above.

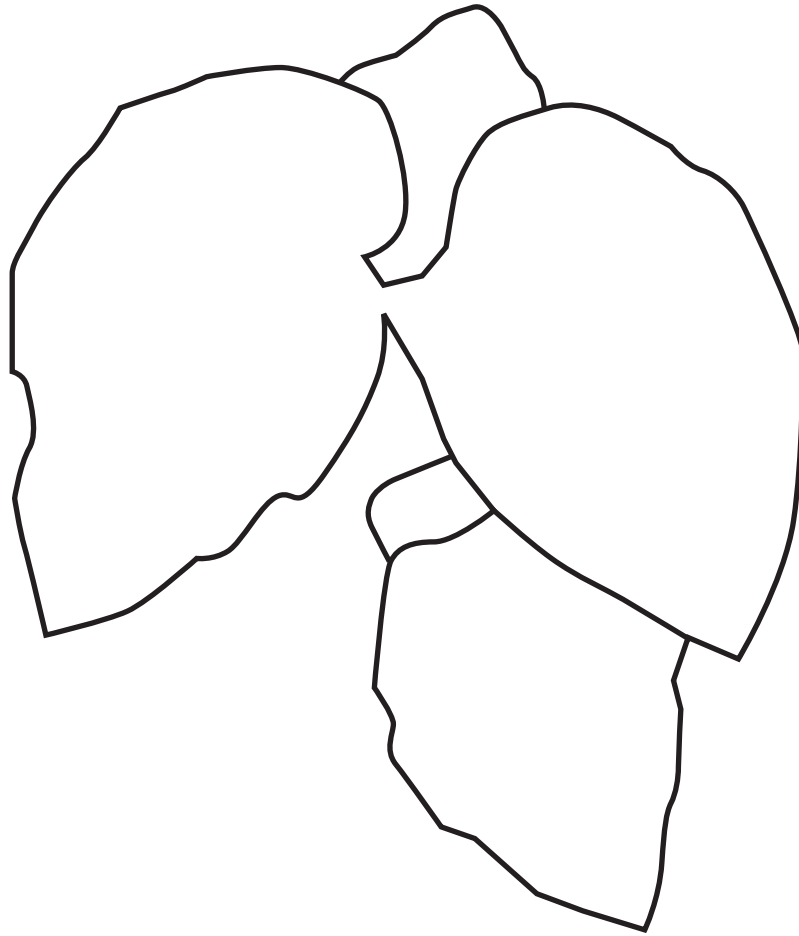




# BUDGERIGAR

Some species of Budgerigars (budgies) have brightly coloured crowns that are invisible to the human eye. This is because budgerigars (like all birds) see colours from a different range of wavelengths to human beings.

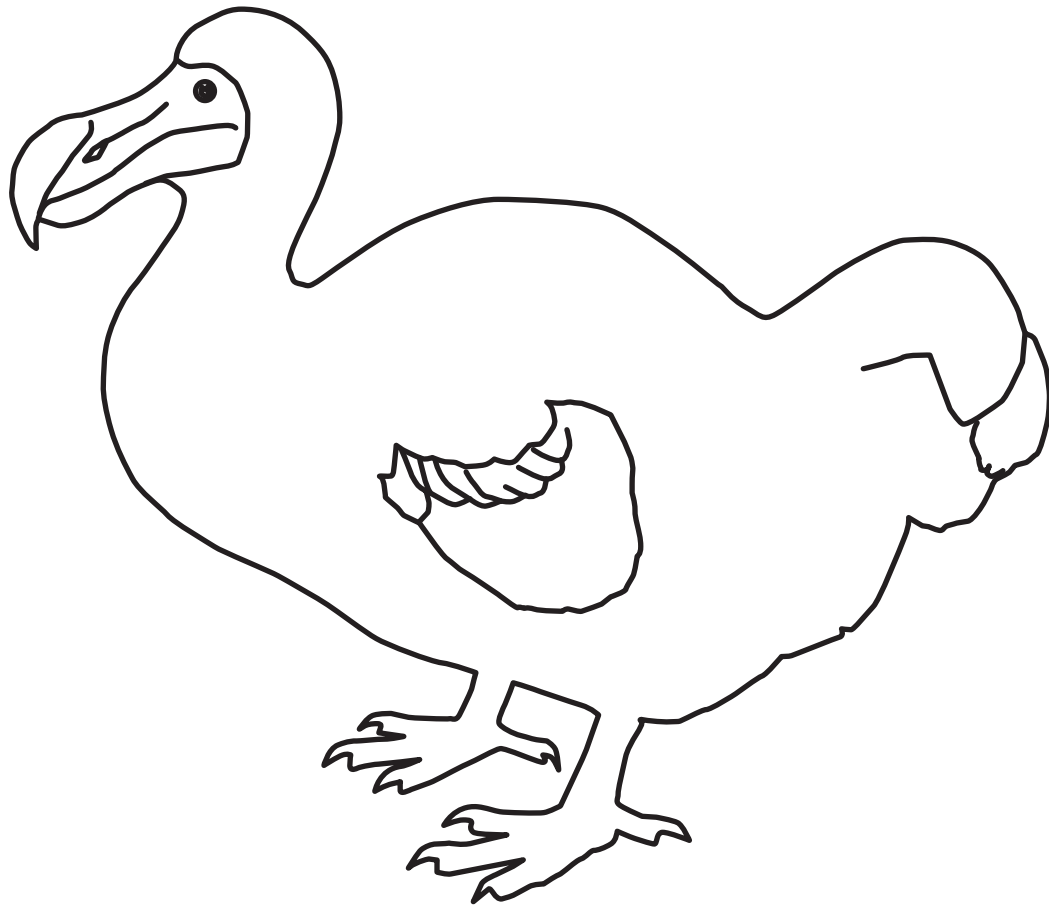
If you had a choice of colours for the top of your head what would you pick? Use 'normal' budgie colours for the outline above - but use your imagination when choosing colours for the budgies crown or the top of its head.



# PEACOCK BEGONIA

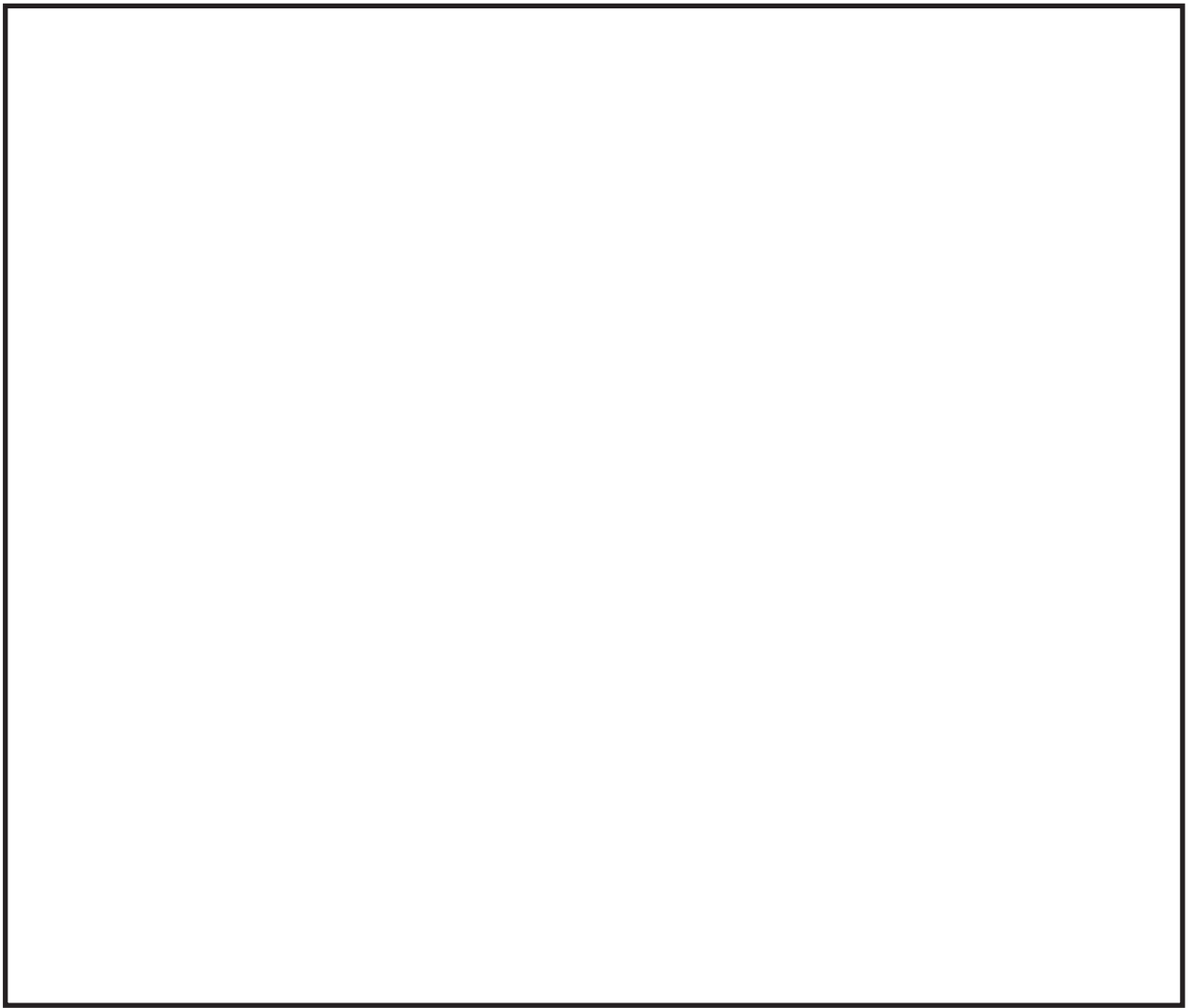
Structural colour in plants! Peacock begonias contain structures called iridoplasts that allow the plant to absorb the available light in forest shade. These structures also bend light to create iridescent effects (like we see in the wings of the morpho butterfly).

Using a variety of green and blue colours, try to create an iridescent effect in the leaves of the plant above (use a variety of light greens around the edge and various blues in the middle of the leaves).



# DODO

The Dodo is an extinct flightless bird that once lived on the island of Mauritius in the Indian Ocean. The Dodo's closest living relative is a brightly coloured pigeon. Nobody alive today has ever seen a living Dodo. We have drawings and paintings of Dodos from the 17th century but these are by artists who probably never visited Mauritius or laid eyes on a living Dodo. Scientists at The University of Sheffield are currently working with Dodo feathers to help create a clearer picture of how these birds might have appeared in life. What colour do you think the Dodo would have been?



# DRAW YOUR OWN COLOURFUL ANIMAL

Draw your own colourful animal in the box above. Why is your animal brightly coloured? Is it to scare away predators or to blend in with its environment? What other reasons might an animal have for being colourful?



The Structural Colouring Book contains a series of colouring activities based on the phenomenon of structural colour.

Structural Colour (or structural coloration) is the production of colour by microscopically structured surfaces fine enough to interfere with visible light, sometimes in combination with pigments.

The Structural Colouring Book has been created by the artist Paul Evans in collaboration with physicists from the University of Sheffield as part of the STFC funded Unweaving the Rainbow Project.

[www.unweavingtherainbow.org](http://www.unweavingtherainbow.org)



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