wild type

peloric

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THE ROYAL SOCIETY SUMMER SCIENCE EXHIBITION

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The London Mathematical Society

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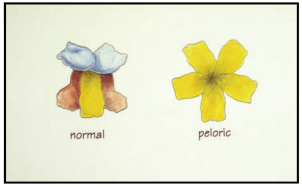
The Snapdragon's Tale

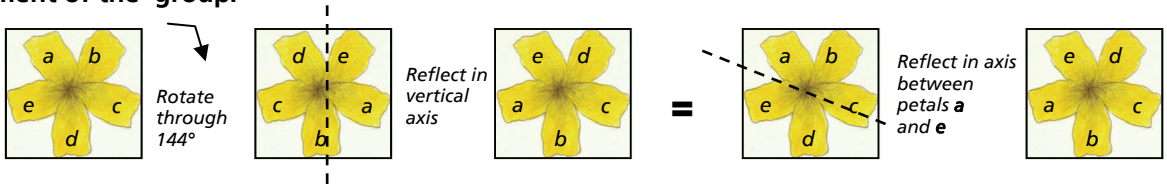
a story of symmetry and dihedral groups

The Greeks considered symmetry to be the balance or harmony between different parts of an object. We are naturally drawn to symmetry, with an innate sense that it is pleasing to look at and we actively seek out symmetry as we look at the world.



A human face has just one axis of symmetry, with the left side mirroring the right. Similarly, the complex petals of a normal snapdragon have a single axis of symmetry, again with the left side mirroring the right. But the *peloric* (or mutant) form of the snapdragon which fascinated Darwin, has a far higher measure of symmetry. This flower has two types of symmetry: reflective and rotational. There is not just one axis of reflective symmetry but five and the flower can be rotated five different ways leaving it looking the same as before it was rotated.

In mathematics, the symmetries of a peloric snapdragon flower are well known in group theory. They form something called a dihedral group, which is the set of symmetries of a regular polygon. For a polygon with *n* sides, there will be *2n* members of that group, which is made up of the *n* rotations and *n* reflections which leave the polygon looking the same. Performing any one of the members of the group followed by another member will result in a transformation that is another element of the group.



The mathematical analysis of symmetry using group theory is a powerful tool for helping us to understand systems, from animal coat patterns and walking gaits in biology, to crystal structure in chemistry and elementary particles in physics.

Symmetry Reflection Rotation Group theory Dihedral Group