

This model organism for teaching genetics was developed by Patti Soderberg of the University of Wisconsin [1]. Although *Reebops* have been around for a while we had not come across this delightful creature until a recent workshop delivered by Diane Donnelly of Queensferry Primary School.

Reebops provide a fun and simple way of introducing children to ideas of inherited characteristics and variation within a species. The genes and features are fantastical, and teachers may want to tell their pupils that genes would not usually throw up a three eyed baby from two eyed parents, for example. The original Reebops were made from marshmallows, toothpicks etc. However if these are unavailable or you don't want your Reebops eaten before their time, they can be made successfully from other materials. The ones in the photographs were made using coloured, commercially available modelling dough but plasticine would work just as well. They could even make their own and colour with different food dyes [2]. The colours used for body parts and legs are not important provided there is sufficient material of each of those colours to make all the Reebops in the population. In addition you will need drawing pins for the eyes, card for the legs and pipe cleaners for the tail.

In this exercise you will be considering the following genes on the chromosomes of Reebops.

Symbol for gene: Dominant/recessive	Feature
E/e	number of eyes
D/d	number of body segments
T/t	shape of tail
L/l	colour of legs
Codominant	
A/a	number of antennae
Q/q	colour of nose
M/m	number of humps

Table 1 – Gene symbols



Reebops in their natural habitat

Dominant, recessive and codominant genes

Pupils will be able to see dominant genes, such as in the gene for the number of eyes: EE and Ee give 2 eyes, E being *dominant* (or visible) while e is recessive (or hidden). Recessive genes are only visible when there are two copies inherited, e.g. three eyes are only produced by ee combinations. Codominant genes are different: each version of the gene is as strong as the other and each combination will give different results e.g. in the case of nose colour, QQ , Qq and qq all produce different colours.

Preparation

First of all make your parent Reebops. The parents look exactly the same and there is no (genetic) distinction between male and female!! Reebops have seven pairs of chromosomes: Mum's should be printed on coloured paper (pink?) and Dad's on a different colour (blue?). It's a good idea to make a Mum and Dad Reebop to show pupils before the process of creating baby Reebops begins. The "genetic code" used for these models is given in Table 2.

Copy the same number of pink and blue chromosomes. Cut out the chromosomes and put each set into an envelope marked "Mum" or "Dad" as appropriate. Distribute one envelope to each pupil. The next stage is mating. This may need careful handling in the classroom!

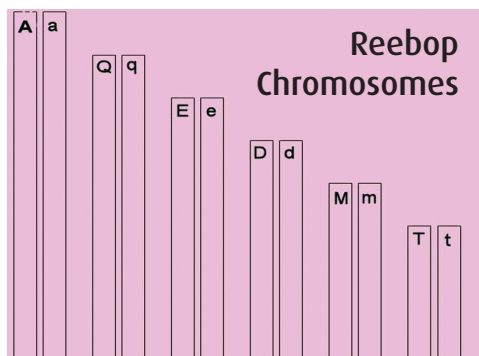


Figure 1 – Mum's Chromosomes



Figure 2 – The Happy Couple

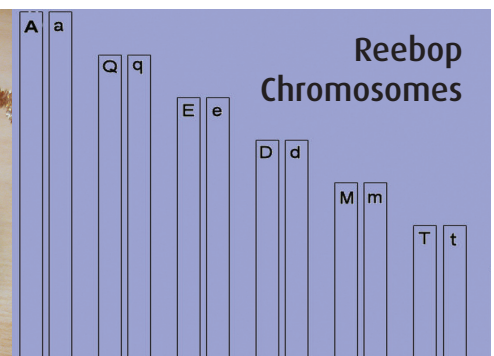


Figure 3 – Dad's Chromosomes

AA – 1 antenna	Aa – 2 antennae	aa – no antenna
QQ – red nose	Qq – orange nose	qq – yellow nose
EE – 2 eyes	Ee – 2 eyes	ee – 3 eyes
DD – 3 body segments	Dd – 3 body segments	dd – 2 body segments
MM – 1 hump	Mm – 2 humps	mm – 3 humps
TT – curly tail	Tt – curly tail	tt – straight tail
LL – blue legs	Ll – blue legs	ll – red legs

Table 2 – ‘Genetic code’ for models

The Activity

Two pupils who have different coloured sets of chromosomes are paired up. The chromosomes should be laid face down on the table and each pupil randomly picks one chromosome of each length. The blue half set and pink half set are laid out as in Figure 4 – and thus the set of chromosomes for a new Reebop has been created. This set of chromosomes determines the baby’s characteristics. Using the code given in Table 2, each pair of pupils makes their baby Reebop. The details of colours can be altered to suit the materials you have to hand.

This Reebop (Figure 5) has been constructed using the set of chromosomes in Figure 4. In this case the Reebop has three eyes but in all other respects, looks the same as the parents. If you want the same parents (i.e. pair of pupils) to have another baby Reebop so that, for example, each pupil has their own Reebop to take home, the whole process should be repeated. This will also give you a bigger population in which to explore variations. Even with only seven chromosomes variation within the Reebop population will be clearly seen. To increase the variation, increase the number of chromosomes e.g. introduce XX (female) and XY (male).

Curriculum for Excellence

This activity, with obvious links to reproduction, lends itself to addressing several other draft outcomes:

Science: Second Level – From a range of sources, including my local environment, I can identify and classify examples of living things to help me appreciate their variety. SCN 205B

Health and Wellbeing: Early/First Levels – I recognise that we possess similarities and differences and that we are all unique. HWB 02255/HWB 12355

Maths: Second Level – I can conduct simple experiments involving chance and communicate my findings using the vocabulary of probability. MNU 235Y

Background Information

Meiosis is the process whereby eggs and sperm, which contain half the normal number of chromosomes, are formed. This is modelled when each pupil randomly selects half a set of each parent’s chromosomes. Putting these two half sets together models the process of fertilisation. This set of chromosomes determines the baby’s characteristics and thus the Reebop is “conceived”. A full explanation can be found on the website[1]. Why not try out the Reebop Powerpoint activity (Figure 8) on the website version of Primary Science & Technology Bulletin 46 [3].

References

- [1] http://www.wisc.edu/cbe/cbe_pubs/reebops.html
- [2] <http://www.geocities.com/holidayzone/recipes/dough.html#perfect>
- [3] http://www.ise5-14.org.uk/Prim3/New_Guidelines/Newsletters/46/body.htm

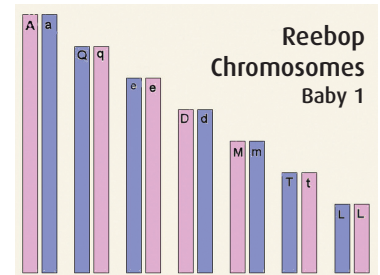


Figure 4 – Baby Reebop 1 Chromosomes



Figure 5 – Baby Reebop 1

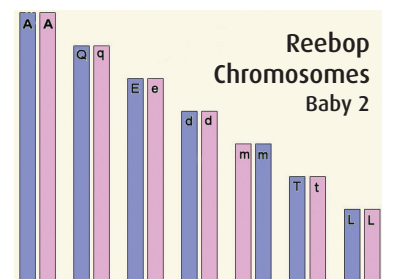


Figure 6 – Baby Reebop 2 Chromosomes



Figure 7 – Baby Reebop 2

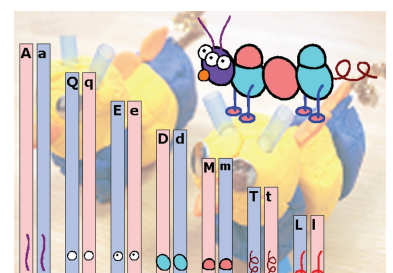


Figure 8 – Screenshot from Reebops Powerpoint