Christmas Lectures 2009

From Porridge to Poo

Use these simple everyday household products to model digestion in an omnivore such as ourselves. Follow the journey of your lunch from your mouth, along the twists and turns of your alimentary (digestive) canal, all the way to your anus.

For this experiment you will need:

- 5 bowls to represent different parts of your digestive system. Label these as the mouth, stomach, small intestine, large intestine and anus.
- Old tights (make sure you ask!) cut up to give two long tubes
- Sieve
- Blender
- Bread
- Washing-up liquid
- Vinegar
- Bicarbonate of soda or baking powder

1. Put the bread in the first bowl, representing the mouth. Asking an adult to help, place the bread in a blender – this is just like what happens in your mouth when you chew. The bread is broken down to increase its surface area, making it easier for digestive enzymes in your saliva to start working. Digestive enzymes break down long molecules in your food into smaller ones, which can then be absorbed for use in your body.
2. Add your mixture into one end of a tights leg, and clench your fists around the stocking one after another to push food along into the second bowl – the stomach. In your body, this process is known as peristalsis and takes place in your digestive tract by wave like contractions of smooth muscles.
3. Add some vinegar to the stomach bowl, to show acid being released. Acid allows optimum conditions for enzymes in the stomach to work to break down food.
4. Transfer your mixture to the third small intestine bowl. Add some bicarbonate of soda or baking powder to neutralise the acid – one of the key functions of bile in the small intestine. Squeeze in some washing-up liquid to stimulate the other key property of bile – to emulsify or break down fats.
5. Place your sieve in the fourth bowl representing the large intestine. Pour your mix through the sieve, squeezing out any water. In the large intestine, water is absorbed from the products of digestion back into the body, and faeces (poo!) is stored until it can be eliminated from the body.
6. Use your second leg from the tights to illustrate faeces being squeezed out of the anus into the anus bowl, illustrating the end of digestion.

Take a photo of your finished poo, and share it with us! You can do this through our Twitter, Facebook or Bebo pages. Type in Royal Institution of Great Britain to search for us on Bebo or Facebook, or the hashtag #xmaslectures to find us on Twitter. Don't forget to become a fan!

Being a herbivore is a much more tricky process than being an omnivore! Plant material is mostly cellulose (a tough, resistant structure which protects plants' cell walls), water and some carbohydrates, but very little fat and protein, which are key nutritional requirements in an animal's diet. Herbivores therefore have to eat vast quantities of vegetation to be able to extract all the nutrients they need. Plants, particularly grasses, are also very hard to digest. Cellulose is largely indigestible to mammals as they do not have the correct enzymes to break it down. Herbivores therefore face two large obstacles in their diet – low protein content and tough cellulose hindering digestion. To get around the problem, herbivores such as cows have developed very different digestive systems to us omnivores!