

## ASK A SCIENTIST



### What causes diarrhoea?

Diarrhoea happens when there's too much water in your poo and you have to go to the bathroom a lot. Diarrhoea is usually caused by bad bacteria and viruses. You could get diarrhoea by not washing your hands properly when preparing food, eating foods that contain germs or by stomach flu (gastroenteritis). It is important to drink fluids, such as water, or chew on bits of ice to prevent dehydration.

### How do butterflies get into your stomach?

Butterflies in the stomach is a way of describing those nervous, fluttery feelings you might get before a test or an important game. It's your brain talking to your tummy and producing a hormone, called adrenalin, that causes the muscles to contract, giving you that tickling feeling. There really aren't butterflies in there.

### Why is yawning contagious?

The answer is, no one really knows why yawning is contagious. Or why we yawn at all. One popular explanation is that yawning allows you to get rid of too much carbon dioxide and increase the amount of oxygen in your blood.

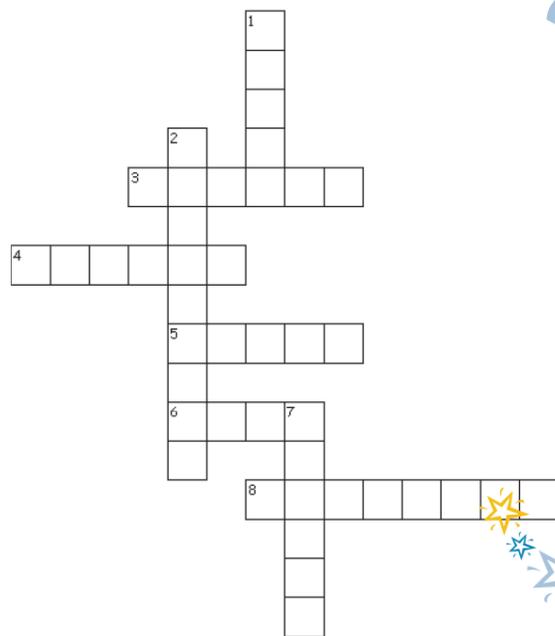
### Why are our veins blue when they are carrying blood, but our blood cells are red and some of them are white? I've never heard of blue blood cells.

Red blood cells carry oxygen, which makes them red and white blood cells (Leukocytes) are immune cells, which help us fight infections. Our circulatory system transports these around our body. Our arteries carry clean, oxygenated blood away from our heart to every part of our body, whereas our veins carry used blood back to our heart. Veins appear blue because they are carrying less oxygen and more of the waste product, carbon dioxide.

If you have any questions you would like to ask a scientist - why not post or email them to us (Ask a Scientist, Alimentary Pharmabiotic Centre, UCC or [apc@ucc.ie](mailto:apc@ucc.ie)) Answers will be displayed on the Microbe Magic website (<http://microbemagic.ucc.ie>) and in our newsletter.



## Activity (Crossword)



### Across

- The front part that protects your eye
- The type of lens needed to correct vision in farsighted people
- The nerve that carries signals to the brain
- The colourful part of the eye
- The automatic reflex that cleans your eyes

### Down

- The black circle in the centre of the iris
- The scientific word for farsighted
- The tough white coat that protects the eyeball

# Microbe Magic



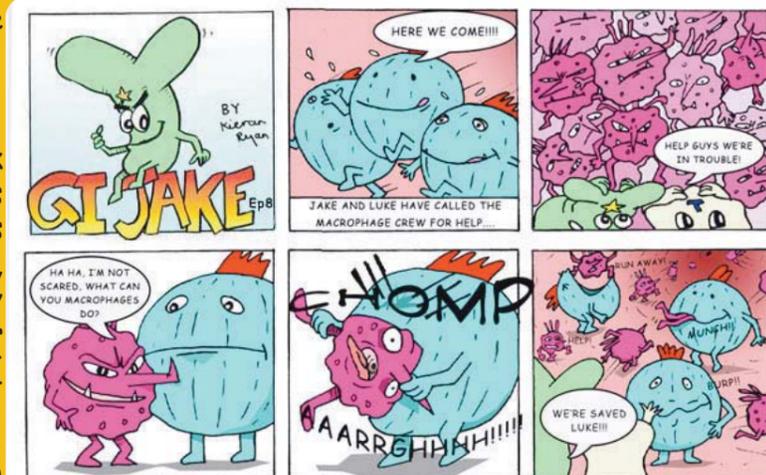
Hello,

ISSUE TWO 2006

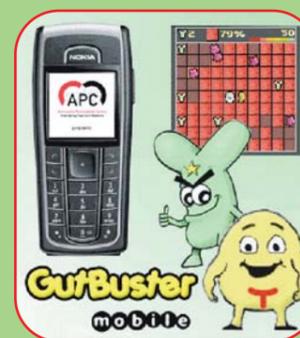
Good to see you all again. Welcome to this issue of Microbe Magic where there is lots to learn and do. Check out page 2 for the second part of the Immunology Lesson and learn all about your Eyes, on page 3. Keep those 'Ask a Scientist' questions coming and see page 4 and our website (<http://microbemagic.ucc.ie>) for a selection of answers.

This year Microbe Magic @ Schools Week was from Oct 23rd to 27th. Scientists from the APC visited 5th & 6th class students, to teach them about the heart, in a presentation called 'The Circulatory System - what keeps you ticking?' If your class would like a visit, email me at [<mailto:apc@ucc.ie>]apc@ucc.ie

This year Science Week is from November 12th to 18th. Why don't you get into the swing of things and carry out some of our experiments from this or previous issues.



## GET MOBILE WITH GUTBUSTER



GutBuster Mobile" is a game for your mobile phone where you control Sergeant Luke O'Cyte as he battles to protect the gut wall from Pat O'Gen and the E. Coli Crew.

Available to download from the Microbe Magic website (<http://microbemagic.ucc.ie/games.php>)

The game was designed by Jonathon Dwyer as part of his MSc in Multimedia in UCC



Pictured here are Jane Aston, Carolyn Murray and David Hackett playing GutBuster mobile

## COMPETITION TIME

Ever wonder what it would be like to be famous? Here is your chance! We would like you to write about a famous scientist, man or woman and how their discovery has changed the world. The prize? You get your photo and essay in the next issue of Microbe Magic and your school wins a fantastic camcorder. Imagine how popular (and famous) that would make you!!!  
Entries due by Monday Dec 18th 2006. Please send to [apc@ucc.ie](mailto:apc@ucc.ie) or to Andrea Doolan, Alimentary Pharmabiotic Centre, BioSciences Institute, UCC

The Alimentary Pharmabiotic Centre is a research centre funded by Science Foundation Ireland and is a partnership between University College Cork, Teagasc (Moorepark) and Industry.



### CONTACT DETAILS:

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Biosciences Institute, Rm 5.12, University College Cork  
Email: [apc@ucc.ie](mailto:apc@ucc.ie) Web: <http://microbemagic.ucc.ie>

## Congratulations

again to Aisling Judge, winner of the BT Young Scientist Exhibition 2006. Aisling was interviewed in our last edition of Microbe Magic and has since gone on to win third place at the 18th European Union Contest for Young Scientists in Stockholm. A jury of 15 distinguished scientists judged 79 winning projects from national competitions. Well done Aisling!

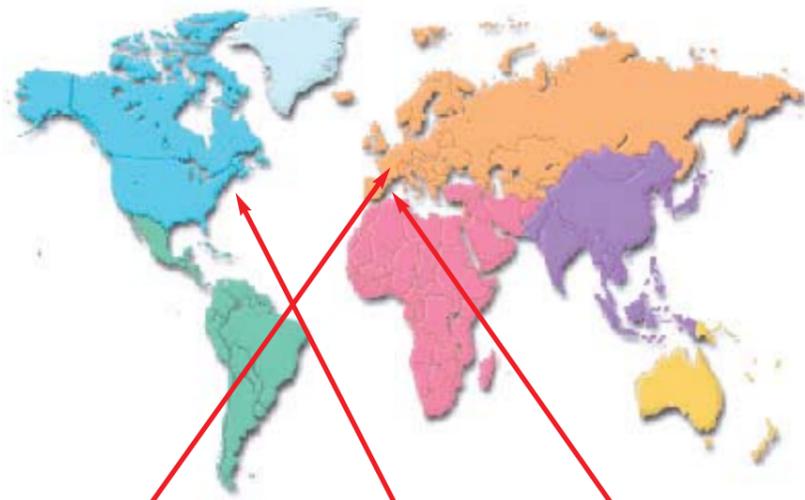


## Discovery 2006

Keep an eye out for the APC stand at Discovery 2006, in City Hall, Cork between November 14th & 16th. Come along and play Gut Reaction, the action packed 3D game where you destroy the bad pathogens and cancers in the gut. Also, enter our fun competition, with a chance to win an MP3 Player. We guarantee you a good time!!!



## GI Jake World Traveller!!!



The Tour de France, Col de Soudet, Pyrénées



Westport, Massachusetts

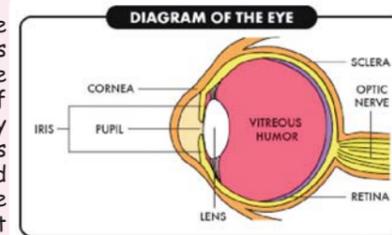


Nou Camp Stadium, Barcelona

## The Eye

Your eyes are pretty amazing. They take in tonnes of information about the world around you, let you cry when you're sad and makes tears to wash away dirt & dust.

The eye is about the size of a ping-pong ball and sits in the eye socket in the skull. The front part of the eye is protected by the eyelid. Blinking helps to keep the eyes clean and moist. Your eyelids have great reflexes. That means they react automatically, without you having to think about it. For example, if your friend clicks her fingers close to your face, your eyes will naturally blink, to protect you from possible danger.



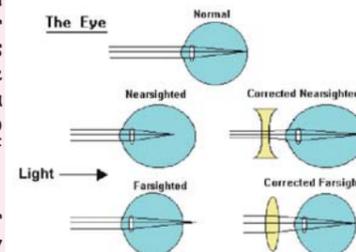
The eye is made up of three layers:

- The Sclera** is a tough white coat that protects the eyeball. The very front part of the sclera is called the cornea. This is completely clear, so light can travel through it.
- The Choroid** is made up of the iris and pupil. The iris is the colourful part of the eye. The iris has muscles attached to it that change its shape to control the amount of light that goes through the pupil. The pupil is the black circle in the centre of the iris.
- The Retina** is at the back of the eyeball. Light enters through the pupil, hits the lens and focuses the light rays onto the retina. The retina converts this light into nerve signals, which travel up the optic nerve. The brain then interprets these signals to understand what the eye is seeing.

### Do You Wear Glasses?

(Here's Why)

People who have blurred vision when they look at objects that are far away are called nearsighted (myopic). For these people, the image is focused in front of the retina. Glasses with a concave lens are needed to correct the vision of nearsighted people.



When the retina receives an image, the image is actually upside down

People who need glasses for reading and who have fuzzy vision for objects close to them are called farsighted (hyperopia). In farsighted people, objects are focused behind the retina. The lens of glasses needed to correct vision in farsighted people is convex.

Astigmatism is a curvature of the lens and is another reason that you might have to wear glasses.

### DID YOU KNOW...?

- Children of certain tribes in Asia called sea-gypsies, spend so much time swimming that their eyes have adapted to seeing clearly underwater.
- In a normal life-span, your eyes will bring you almost 24 million images.
- An eagle can see a rabbit about 1 mile away.
- The Texas horned lizard shoots blood from its eyes as a defense mechanism.
- The brown recluse spider, a native of Midwest USA has six eyes.
- Dolphins sleep with one eye open.

(Teachers, check out

<http://www.ebiomedia.com/gall/eyes/eye1.html> for interesting facts about animals eyes)



## Teacher's Task - Experiment Time!

### The Blind Spot

The blind spot is the area on the retina, where the optic nerve enters the eye. There are no light receptors here, so if an image falls on this region it will not be seen. To find your blind spot, look at the image below or draw it on a piece of paper: (the • and + should be 6-8 inches apart)



Close your right eye. Hold the image about 20 inches away. With your left eye, look at the +. Slowly bring the image closer while looking at the +. At a certain distance, the dot will disappear from sight. This is when the dot falls on the blind spot of your retina. Reverse the process. Close your left eye and look at the dot with your right eye. Move the image slowly closer to you and the + should disappear.

**Aim:** One versus two eyes to judge depth

**Materials:** 2 x Pencils

**Method:**

- Hold a pencil in each hand. Position them so they are horizontally facing each other at arms-length from your body.
- Close your right eye and try to touch the end of the pencils together. Now try with two eyes.

**Results:**

What happens when you try to touch the two ends of the pencil with one eye closed?

What happens when both eyes are open?

**Conclusion:** Two eyes are better than one, especially when it comes to depth perception. Depth perception is the ability to judge objects that are nearer or farther than others. Each eye looks at the pencil from a different angle.

**Aim:** To see how light affects your pupils

**Materials:** Flashlight, Mirror

**Method:**

- Flash the light near your eyes and use the mirror to observe what happens.
- Turn off the light

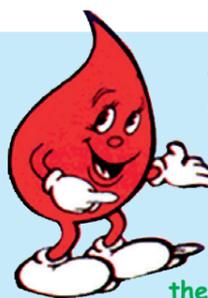
**Results:**

What happens to your pupils when the light is shined close by?

What happens when the light is turned off?

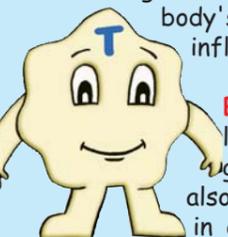
Why do your pupils react this way?

## Immunology Lesson II The second line of defence



Our bodies have a special defence or immune system to protect us against germs and fight infections. In the last issue of Microbe Magic we learnt about **the first line of defence**, which prevents germs entering our bodies. Today we will learn about the **second line of defence** which protects us against germs that have bypassed the **first line of defence**.

Our **second line of defence** is mostly found in **the blood**, but our digestive system is also important, as is our body's ability to use high temperature and inflammation to combat germs.



**Blood** has special white cells called leukocytes which kill pathogens, or bad germs, by eating them. Leukocytes are also called T-cells because they are made in our thymus gland. A single drop of blood contains 20,000 Leukocytes, which travel around our bodies to kill invading germs. Leukocytes are also found in our intestines where they work with GI Jake, our friendly Bifidobacterium to kill germs and keep us healthy.

Our **blood** also contains antibodies which help to kill pathogens. **Antibodies** have a very good memory and travel around our blood for many years protecting us. This is why we only get most infections once in our lifetime.

**Antibodies** also make vaccination work. When you are vaccinated against measles as a baby your body makes **antibodies** against the measles virus. If you ever again meet the measles virus, these **antibodies** recognise it and destroy it before it can make you sick.

High temperature helps prevent germs from growing in our bodies and making us sick. Inflammation or swelling happens when blood travels to a site of injury bringing with it the white blood cells which form part of our body's defence system.

Remember that if your skin is cut, **blood** is also able to make a clot to stop the bleeding and then form a scab to prevent germs from entering. So **blood** is a very important part of our defence system.

If you would like to learn more about blood and how your heart and circulatory system work, why not request a school visit this year.