

TEDS

SPRING 2010

In this issue:

Number sense

Finding differences

Genomic research

THE NEWSLETTER FROM TEDS [TWINS EARLY DEVELOPMENT STUDY]

Another five years!

WE ARE VERY PLEASED to announce that on 4 December 2009 the UK Medical Research Council (MRC) awarded another 5-year programme grant to support TEDS from 2010 to 2015. This new award means that the MRC has provided 20 years of continuous support for TEDS. Typical of the many glowing reviews was this one: 'No other study internationally has been as influential in the field'. Many thanks to you for making this award possible by your help during the past 15 years.

This new MRC award will allow us to invite all TEDS twins to participate in a major follow up at age 16. As in the past, we will have web-based tests about reading and other school skills and questions about how you are feeling in general. We are especially keen to ask you about your experiences in and out of school and to collect your GCSE grades. In addition, we are excited about several more intensive 'special projects' that we will invite a few hundred TEDS twins to join. For example, one of these special projects will study the effects of simple exercises designed to make people more optimistic ●

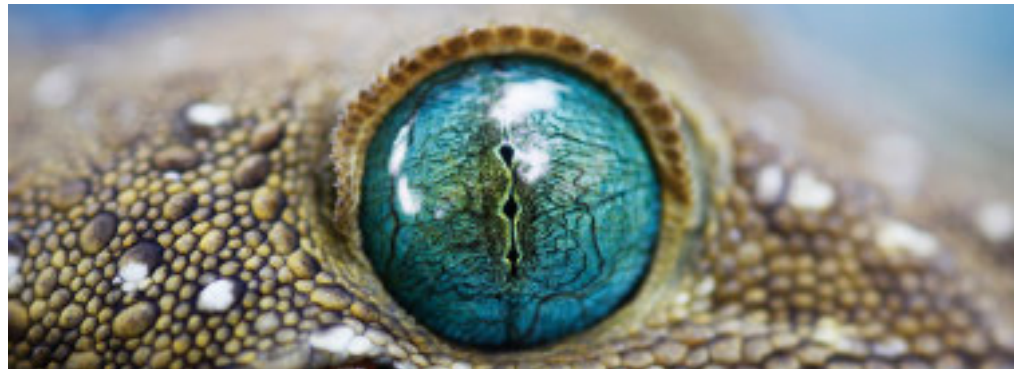


Year of Biodiversity photography competition

2010 HAS BEEN DECLARED the International Year of Biodiversity by the United Nations (www.biodiversityislife.net). Biodiversity is the variety of life on Earth. To tie in with this we have decided to hold a photographic competition with the theme of 'Earth', including Earth's amazing wildlife, people and places. We would like you to send us a photograph that represents this theme, and include a 50 word description of why you chose this

"TEDS Photo Competition" at the TEDS email address: teds-project@kcl.ac.uk. Along with your photo and 50-word description, please include your full name, TEDS id number and your email address.

Prizes will be awarded on the 29th April 2010. 15 runners-up will receive a mug with their image on, the 2nd and 3rd prizes will be a mug and the photography book: "How to photograph absolutely everything". The 1st prize will be a canvas



Close-up of an eye of a gecko. © National Geographic Society

photograph. Be as creative as you like, so long as you can tell us how it fits the theme of 'Earth'!

You must have taken the photograph yourself within the last year. To be included in the competition, your photos need to get to us by the 5th April 2010. Please email the images to us with the subject

print of the winning photograph as well as the photography book and mug! All successful photographers will be contacted by email initially and winners' names will appear on our web site where you will also be able to see all the prize-winning photographs. We will also print a selection in our 2011 newsletter ●

TEDS - making a difference!

Finding differences between identical twins

AN OFTEN OVERLOOKED FINDING in genetic research is that identical twins can sometimes differ in important ways. For instance, we are often told by TEDS' parents that their identical twins have very different personalities, likes and dislikes.

Because identical twins share 100% of their genes, or DNA, these differences are likely to be caused by differences in their environment. In an exciting recent development, TEDS has been funded to conduct a study that aims to better understand how the environment works to make identical twins growing up in the same family different.



The Rigby family who helped us with this project

But how does the environment influence behaviour? Well, we know that certain environments can alter a naturally occurring phenomenon called DNA methylation. DNA methylation acts like a chemical switch to determine when and where genes are 'turned on' and 'turned off' in the cells of our body (a process known as 'gene expression'), which in turn determines when, where and what proteins are manufactured. The quantity and timing of

the proteins produced by a cell determines its function, and so one way in which the environment may influence behaviour is by altering gene expression via the modification of DNA methylation.

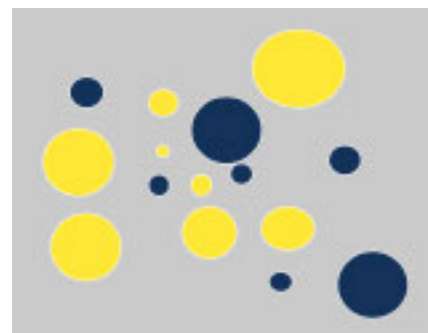
We are using state-of-the-art technology to look at DNA methylation and gene expression across the entire genome for 60 pairs of identical twins in TEDS. Finding differences in DNA methylation and gene expression within identical twins will allow us, for the first time, to pinpoint genes that are influenced by the environment. This is very exciting, as it will provide a vital starting point for understanding ways in which the environment works at the level of the cell to influence behaviour. We're currently analyzing all these data and will update you with our results in the next newsletter and on the TEDS website ●

How good is your number sense?

DID YOU KNOW THAT even small babies can discriminate between different quantities? For example they notice a change from 8 to 4 dots – even if other information (such as the amount of space occupied) is equal on the screen. They can do this long before they have learned anything about exact numbers and long before they have had any experience with mathematics! In other words, even infants have some kind of intuitive sense of approximate quantity – or 'number sense'. There are also people, such as Mundurucu and Piraha tribes in the Amazonian region, whose languages do not have any words for large numbers.

Despite this, even these people, who have never studied any mathematics, would be able to say whether they can see more yellow or more blue dots in this picture

without being able to count them. They can do this even with very large numbers of dots. Non-human animals also seem to be able to use numerical information.



How good is your number sense?

It is possible that differences in the ability to use quantitative information (or how good someone's number sense is) contribute to the development of differences in later mathematical ability. It is also possible that we can find specific genes or specific environments that are involved in these differences. Once we understand the link between number sense and mathematical achievement better, we might be able to help people to learn mathematics in new ways. In order to do so, we have developed several different tasks of number sense that we will ask you to do on the internet. We are very excited about this project and we look forward to many new discoveries that we can make with your help ●

TEDS at the forefront of genomic research

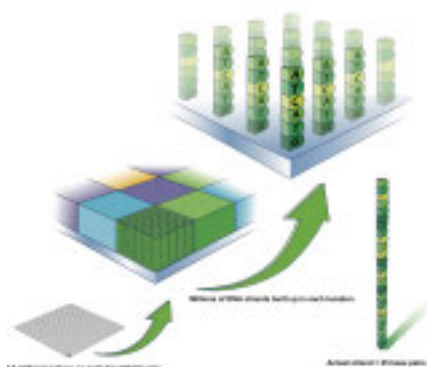
YOU MAY REMEMBER IN the last newsletter we told you about the prestigious Wellcome Trust project that has been using the cheek-swab DNA you provided and the latest technology to look at millions of DNA markers across the

TEDS - making a difference!

genomes of 4000 TEDS twins. Over the past few months, the laboratory work involved in the first stage of the project has been carried out at the Wellcome Trust Sanger Institute near Cambridge.

In the lab, each of the 4000 TEDS twins was assigned their own GeneChip. A GeneChip is a silicon wafer smaller than a postage stamp; it's similar to a computer chip, but each one is covered with a carpet made up of billions of short strands of DNA. The chips were processed in batches. For each batch, the cheek-swab DNA was added to the GeneChips and the chips were incubated in a low oven overnight.

During the night a chemical reaction



took place as the cheek-swab DNA attached itself to the DNA carpet on the chip. In the morning, a computer-driven laser read off the combination of DNA variants, just like the laser in a DVD player, and the genetic information was stored in computerised form. Last month, the Sanger Institute finished working their way through all 4000 twins and the first stage of the lab work was complete.

Now we have the electronic catalogue of DNA variants for each person, we can begin the task of analysing the data to try to identify the sections of the human genome that influence all the different things TEDS was set up to study. As you can imagine, the genome-wide information

from 4000 twins is a vast amount of data, so we need something more than a pocket calculator for the analysis. In fact, if we did try to use a calculator and entered one value per second, it would take us almost one hundred years to enter the three billion numbers involved in the first stage of the analysis.

Luckily, we are instead using one of King's College London's supercomputers to crunch the numbers, so we'll be seeing some results way before next century! In fact, we'll be publishing the first of these studies this year and we'll bring you the findings on the TEDS website, and in the next edition of the TEDS newsletter ●

Links

[Wikipedia on GeneChips – en.wikipedia.org/wiki/DNA_microarray](http://en.wikipedia.org/wiki/DNA_microarray)

[Wikipedia on supercomputer clusters – en.wikipedia.org/wiki/Computer_cluster](http://en.wikipedia.org/wiki/Computer_cluster)

[The Sanger Institute's YourGenome site – www.yourgenome.org](http://www.yourgenome.org)

[King's College London – www.kcl.ac.uk](http://www.kcl.ac.uk)

Give us some TIPS

Your comments and ideas about the future of TEDS are always welcome. Please drop us an email at teds-project@kcl.ac.uk with any ideas you have.

We are currently working on a totally new website for TEDS. If you would like to work with us in making decisions about the website, our newsletters and our research then please get in touch and join one of our TEDS Ideas Panels – TIPS!

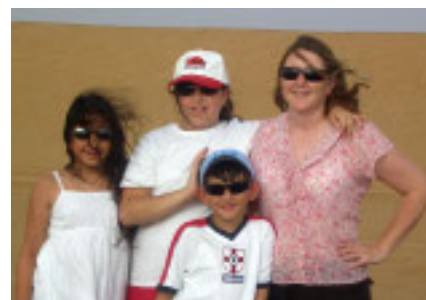
Send us your photographs

KIM SENT THIS PICTURE of four sets of identical twins. "At the top are her twin brothers, next are her twin sisters, then come her daughters who are the TEDS twins, and then their best friends.



Do send in your photographs. We are always happy to receive them and they just might make it into the newsletter ●

HERE IS A PICTURE of the Acharya family who were one of the first families to finish the web studies last year. Thanks to all who completed the 14 year web and booklet studies in 2008 and 2009. There are still a lot outstanding so please go on line and complete the activities. Do call us if you want to be reminded of your login details ●



Stay in touch

Please help us stay in touch with you by letting us know any change of address or phone number.

You can also call us free on
0800 317 029

or e-mail us at
teds-project@kcl.ac.uk

Send to: TEDS, PO83, FREEPOST
LON7567, London, SE5 8YZ

Have you changed your address
or phone number?

Parent's (Guardian's) name:

The twins' names:

New address:

Postcode:

Telephone no:

Mobile no:

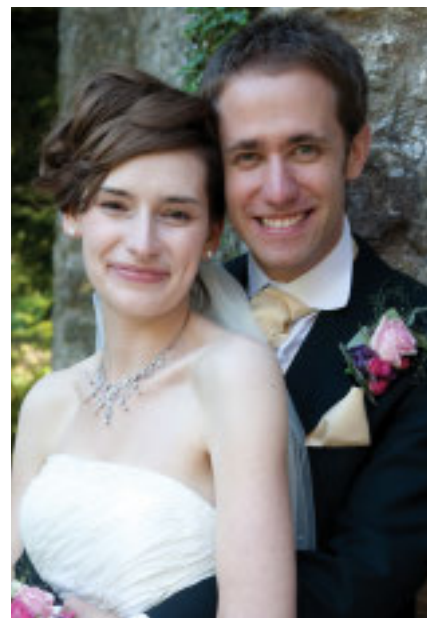
Email address:

The TEDS team

MACIEK: I RECENTLY GRADUATED in Psychology from Birkbeck College, University of London, and have joined TEDS to study for a PhD. My research will focus on the genetic and environmental influences on feelings of anxiety in adolescence. Anxiety is part of normal behaviour and most people experience these feelings at some point in their lives. I would like to find out what drives these behaviours and how they affect school achievement.



IN 2005 OLIVER AND CLAIRE (right) joined the TEDS team as PhD students. In 2009 they both completed their PhDs and as you can see they also got married!



THE FOUNDER AND DIRECTOR of TEDS, Professor Robert Plomin, is programme chair for the 13th International Congress on Twin Studies which will be held in Seoul, Korea in June 2010: www.icts2010.net. This conference is held every three years and brings together twin researchers from around the world. The conference is run by the International Society for Twin Studies (www.ists.qimr.edu.au) which also is responsible for the major journal on twin studies called Twin Research and Human Genetics ●

Articles in press

THANKS TO YOU FOR completing all the activities and booklets. We now have over 240 articles and books in press and our list of publications is growing all the time. There is a complete list on our website at www.teds.ac.uk/information/publications.asp. To obtain a full copy of any of the articles you are interested in please email us ●

We are adopting a more environmentally friendly approach by moving more of our communications to email. Please note we now have a new email address teds-project@kcl.ac.uk



Keep an eye on our website, we'll be updating it as activities arise. You can also find answers to frequently asked questions about TEDS.

Go to www.teds.ac.uk/information/faqs.htm to find out more.

Please don't hesitate to contact us by phone or by email if you have any further questions for us.