



SUMMER ROADSHOW 2010 EDITION



Making science fun!



**Find out what children
thought of CHaOS!**



Meet the team!

What is CHaOS?

Cambridge Hands-On Science, more fondly known as CHaOS, is a non-profit voluntary student group based at Cambridge University. CHaOS believe science is fun and relevant to everyone and are dedicated to transferring our volunteers' enthusiasm for science to the general public through exciting hands-on experiments. We hope to make science more accessible and perhaps even teach people something in the process!

We've built up our experience of engaging the public over the last decade; CHaOS began as a single event at the Cambridge Science Festival, and now reaches visitors all over the country in many types of venues.

The success of our Science Festival event prompted us to take our experiments further afield to reach people who would not usually experience science beyond the school curriculum. From humble beginnings as a week-long tour in 2002, our volunteers have developed the roadshow into the four-week long science extravaganza it is today.

Our events centre around hands-on experiments for children of all ages to try, with each staffed by a lively and knowledgeable student demonstrator. Small groups of children are guided through each experiment, whilst the demonstrator explains the science behind it in an interesting way and at an appropriate level. At some events we also run short talks, enabling us to show off some of our more explosive experiments!



Demonstrating at a secondary school



Some of the CHaOS team during the 2010 roadshow

The summer roadshow

To find out more about the roadshow, we talked to Lia Chappell, this year's CHaOS president.

Q: How does the roadshow work?

Lia: Every summer CHaOS packs all of its experiments into a large van, a group of enthusiastic student demonstrators into a minibus, and sets off around the country. We aim to visit people in different areas of the country each year. The 2010 CHaOS roadshow visited 11 schools and 8 public venues, reaching approximately 4000 members of the public.

Q: Who are the demonstrators?

Lia: The CHaOS demonstrators are a group of student volunteers, from first year undergraduates to final year PhDs (and some who graduated long ago!). This year a total of 57 demonstrators travelled the country, equipped with tents and camping stoves, giving up anything from a couple of days to almost four weeks of their holiday, all in the name of science communication.

Q: What experiments do they demonstrate?

Lia: CHaOS has been designing and building experiments for over ten years. These incorporate the combined understanding of generations of students and cover a wide range of scientific principles, relating concepts to their use in everyday life. A few of our favourites are our big bridges, mini-explosions, extracting DNA from kiwi fruit, and Boris the plastic skeleton.

Q: How is it funded?

Lia: CHaOS is committed to making science accessible to all, so entrance to our public events is free. We ask schools to contribute towards our costs, but our schools visits are heavily subsidised. CHaOS relies on sponsorship to provide funding, and careful budgeting has allowed us to keep our costs below £3 per person.

Read on to find out more about the 2010 summer roadshow...

The roadshow route

The roadshow took place for four weeks from June 28th to July 25th 2010, visiting locations in the South and East of England. Our route was designed to minimise long journeys to keep transport costs low in a year where our budget was very stretched.

CHaOS spent 13 days in schools, demonstrating to groups of pupils mostly in years 5-8. Our eight weekend events were open to the public and were visited by all ages!

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
June 28 St Neots Community college	29 St Felix Middle School, Newmarket	30 Etonbury Middle School, Arlesey	July 1 Travel day	2 Commemoration Hall, Huntingdon	3 Leisure centre, Newmarket	4
5 Travel day	6 Colchester County High School for Girls	7 Earls Hall Junior School, Southend	8 King Edward VI Grammar School for Boys, Chelmsford	9 Travel day	10 Mrs Howard Memorial Hall, Letchworth	11 Eaglestone Activity Centre, Milton Keynes
12 Travel day	13 Stamshaw Junior School, Portsmouth	14 Newbridge Junior School, Portsmouth	15 Warblington School, Havant	16 Travel day	17 Greyfriars community centre, Ringwood	18 Blandford Forum Corn Exchange
19 Travel day	20 Pate's Grammar School, Cheltenham (visiting primary schools)	21 Cirencester Kingshill School	22 Travel day	23 Travel day	24 Corpus Christi Church Hall, Weston-super-Mare	25 The Barn, Clevedon

New this year!

Although the format of the CHaOS roadshow has remained largely similar for the past few years, we continue innovating and improving. This year we had some very popular new experiments, including our trebuchets. These medieval-inspired bean bag bunny launchers demonstrated the ideas of levers and optimisation.

Other new experiments were our plant evolution timeline and pollinator game, a system of pulleys to show the ideas of mechanical advantage and a hugely expanded collection of diverse animal skulls which show adaptations to the animals' environment and place in the food chain. We were also pleased with a prototype experiment which switched the sound heard in your left and right ears- a disorientating experience for everyone!

Another new development for this year were our fun science talks, allowing us to demonstrate experiments that can't be made hands-on to larger groups of slightly older children.

What did schools think of CHaOS?

We ask teachers what they think about our events, with follow up questionnaires. As in previous years, the feedback we received was overwhelmingly positive, with all teachers giving us high ratings for the quality of our visit. Pupils **"really enjoyed having the benefit of small group work with an expert"** according to a teacher in secondary school. Another teacher wrote that **"All abilities and year groups benefitted"**. Pupils benefitted from **"talking to a wider range of scientists of nearly their own age!"**

We aim to get everyone involved during our visits; when asked they thought we'd done that, schools said **"All the pupils seemed engaged throughout. The practical nature of CHaOS was very enjoyable"**.

Our experiments were described as **"very well planned and well timed"**. Our experiments are mainly designed to excite, but also fit well with topics on the school syllabus, with links to the curriculum being **"very relevant"**

The demonstrators enthusiasm and clarity was also valued in our feedback **"Excellent - and very patient!"**. Our explanations were **"very good throughout. Very youthful, enthusiastic approach"**. **"Enthusiasm: 10/10"** **"Excellent- calm but very informative"**

CHaOS charges schools a contribution towards the cost of our visits, with the majority of the cost met by external sponsorship. All of the teachers who'd responded to our survey at the time of going to press gave us 5/5 for value for money.

And finally, a couple of comments that remind us why we put so much time into organising these events. **"Great day, very positive feedback from the kids. Thank you so much!"** (Secondary school teacher). **"The best thing I've ever done in science!"** (A quote from a reluctant year 7 pupil, which amazed all their teachers!)



The new trebuchets experiment in action

The CHaOS roadshow was sponsored by:



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What did visitors think of our public events?

To find out what visitors thought of our eight weekend public events, and help us identify what we can improve, we asked them to complete a short questionnaire. We received 147 completed questionnaires, representing 417 people.

To find out about the demographic spread of our visitors, we ask people to indicate the number of people in their group of different ages and to describe whether they've come with family, friends or on their own. Most people (87%) visited the CHaOS public events as part of family groups. Our visitors varied in age from under 5 to over 60, with peaks around ages 8 to 10 and 31 to 60 (indicative of children accompanied by parents or grandparents). Over half of the people responding to our questionnaire had found out about the event from flyers; we distribute these to local schools (targeting ages 9-13) in advance of the roadshow visit.

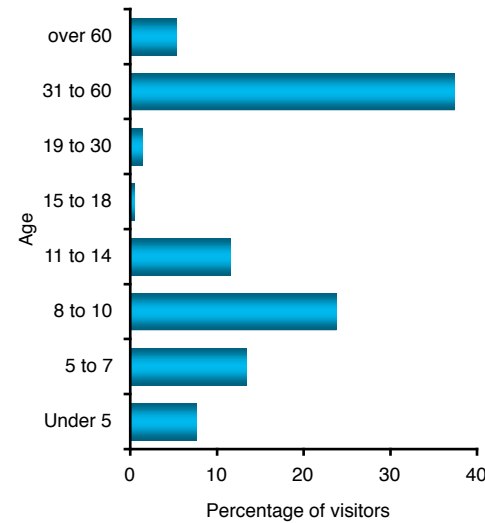
We found that many of our visitors come from the area very local to the roadshow venue, with 52% saying it took them less than ten minutes to travel to our event, and a further 41% travelling for less than half an hour. Once at the CHaOS event, the majority of visitors surveyed (63%) stayed for between one and three hours, with 8% of people staying for more than three hours!

97% of people said that they learnt something, with more than half of people describing the amount they'd learnt from the CHaOS roadshow as "a lot". Most people (80%) said that the level of the experiments was "about right", suggesting that our demonstrators tailored their explanations well to suit different groups.

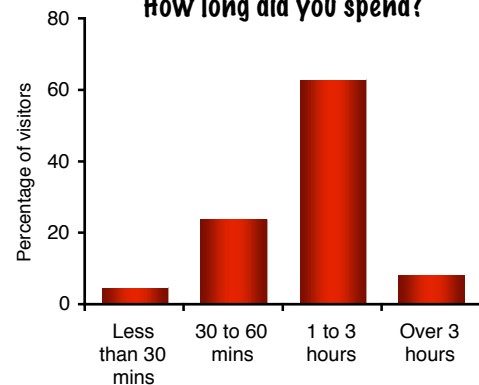
We asked "how much did you enjoy the event", and 70% of people rated us as "fantastic". Nobody said that they didn't like the event, and 99% of our visitors would come to another CHaOS event! Our aim of enthusing people about science and showing why it is fun clearly succeeded.

When given the opportunity to tell us what we could improve, we received many positive comments including "No! It was brilliant for us all. Thank you.", "It was very good - we only had to leave to go and get some lunch." and "No - volunteers were really enthusiastic and great with kids". Several people requested "more experiments", particularly "more messy experiments" and "more bangs"! Some people suggested that we might do more advertising; this was something we'd tried to do this year by contacting local press in the areas we were visiting. Whilst successful in gaining more publicity for our events, the comments on questionnaires indicate that we could try and further improve this aspect of the roadshow next year.

"What are your ages?"



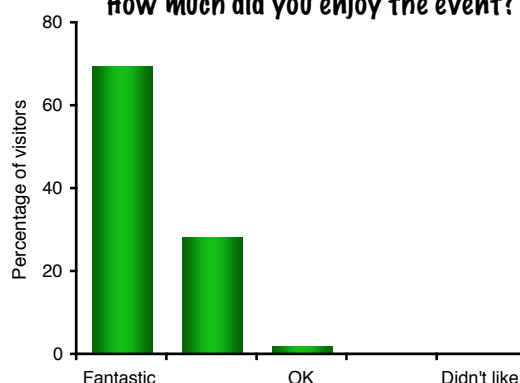
"How long did you spend?"



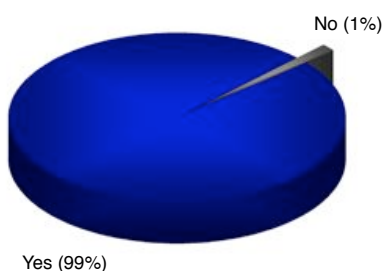
"How much did you learn?"



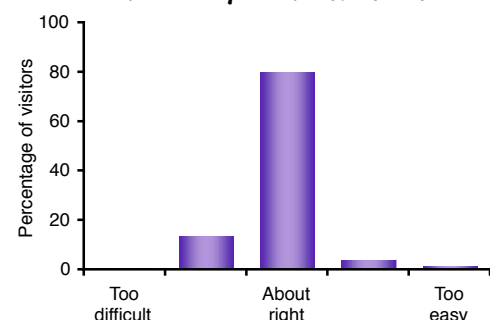
"How much did you enjoy the event?"



"Would you come to another CHaOS event?"



"How did you find the level?"



East Anglia - the first week

In the first week of the 2010 roadshow, CHaOS visited three schools. The first school was **St Neots Community College**, where we spent two days meeting many of their pupils, and those from feeder primary schools. These were fun, busy days, where we tried out of trebuchets experiment for the first time, and gave a talk to a group of about 60 pupils using liquid nitrogen!

St Felix CEVC Middle School in Newmarket was our second venue, on a very hot summer's day! The pupils really enjoyed themselves and were all engaged with the experiments. Our new collection of animal skulls went down really well, even if they were occasionally mistaken for dinosaur bones!

Our final school of the week was **Etonbury Middle School** in Arlesey, where we ran hands-on sessions and a talk for year 8. Pupils got to have a go at experiments including water rockets and arch bridges, and had their photo taken for a local newspaper!

On Saturday we visited the **Commemoration Hall in Huntingdon**, a busy high street location where we brought in many passers by with our eye-catching disappearing pyrex bowl demonstration, and enthusiastic flyer distribution in the market place! On Sunday we went to **Newmarket Leisure Centre**, where we were visited by many of the St Felix pupils we saw earlier in the week who wanted to see more!



Investigating polarisation



Looking down the microscope



Extracting DNA from kiwi fruit!

Essex and beyond

The second week of the roadshow found CHaOS visiting schools in Essex, beginning with **Colchester County High School for Girls**. Here we met year 7 and 8 pupils and showed experiments that we'd set up in two adjacent classrooms. Many pupils were shy at first, but became more chatty as we got them involved, such as with the extracting kiwi DNA experiments we'd set up in our biology zone. Pupils and demonstrators were interviewed for the school magazine, and we chatted to sixth formers about science and university life.

The next day we visited **Earls Hall Junior School**, where rain almost halted plans to run experiments outside! Luckily the sun came out, and we got to show the strange properties of cornflour in the school playground and assemble our large model suspension bridge. After school we ran a session with families, so Boris the plastic human skeleton met some parents too!

King Edward VI Grammar School in Chelmsford was the last of our Essex visits. Electromagnetism kit and many experiments went down well with the boys in year 7 and 8.

On Saturday we moved further west to the **Mrs Howard Memorial Hall in Letchworth**. We had a steady stream of visitors throughout the day, enjoying experiments such as hot air balloons using a toaster and equipment which lets you see the sound of your own voice!

On Sunday we went to **Eaglestone Community Centre** in Milton Keynes, and were visited by both young children and teenagers! Floating beach balls on our airstreams experiment entranced children and parents alike!

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Week 3: Hampshire & Dorset

We visited three schools around Portsmouth in our third week of the roadshow, beginning with **Stamshaw Junior School**. Here we used the school field to fire water rockets, build bridges and show how pulleys work. Inside, children were fascinated to examine specimens using our microscopes and find out about the body using our wearable organ vest.

At **Newbridge Junior School**, lots of classes visited the CHaOS roadshow and were excited by, amongst other things, our demonstrations of the properties of gases using our hot air balloons, mini-explosions and electrolysis experiments.

Our third day this week saw us form part of the science day at **Warblington School**, and mixed groups of years 7-9 came to try our experiments during the day. Kiwi DNA extraction and crisp packet fireworks proved popular.

The next weekend found us in **Ringwood** at **Greyfriars community centre**, then in the **Corn Exchange** in the centre of **Blandford Forum**. Both events were well attended. In Ringwood, our suspension bridge and water rockets drew in the crowds, and even a power cut failed to curtail the fun as we had plenty of experiments that didn't need electricity! Electrolysis of water provided an audible clue to our presence in Blandford Forum, with visitors curious to find out what was going on. Inside they could find out how red cabbage can be used as an indicator of pH, how x-rays can show us broken bones and how the world looks in infrared.



Finding out the strength of a vacuum

Gloucestershire & Somerset

Tuesday and Wednesday of our fourth week were spent at **Pate's Grammar School** in Cheltenham. Whilst we enjoyed meeting some of the Pate's year 7s for one session, most of the time was spent with visiting primary school pupils from nearby disadvantaged schools and small village primary schools, and children from a Primary Pupil Referral Unit. All the pupils enjoyed experimenting with polarisation filters, pulling on the tendons of our giant hand model and being thoroughly disoriented by our specially-designed headphones which swap the direction that sounds come from!

On Thursday we visited **Cirencester Kingshill School**, where an audience mostly of year nine pupils enabled our demonstrators to take the explanations of our experiments to a higher and more complex level. Pupils investigated gyroscope effects using our spinning chair, learnt how magnets are used in MRI scanners to create images of the body, and discovered why the sunset appears red.

On the first Saturday of the school summer holidays we went to **Corpus Christi Church Hall, Weston-Super-Mare**. By the middle of the afternoon the venue was teeming with visitors, both locals and holiday-makers from further afield, who enjoyed making mini explosions with lemon juice and bicarbonate of soda and somewhat louder explosions by recombining hydrogen and oxygen to make water!

On Sunday we were busy at **The Barn in Clevedon**, where the high-ceilinged hall allowed us to set beach balls hovering on airstreams high above the children's heads, and the ample outside space enabled us to put up our traditional favourite, the suspension bridge, as a suitably impressive ending to the 2010 roadshow.



Building an arch bridge

Causing CHaOS... the culprits!

The CHaOS roadshow couldn't happen without our enthusiastic volunteer demonstrators. This year's CHaOS roadshow team were:

Abi Perrin	Frances Rowell	Mike Smith
Alice Draper	Francesca Day	Miklós András Danka
Andrew Norman	Imogen Whittam	Min Hu
Anna Hughes	Jatinder Sahota	Nicola Darling
Anna Kalorkoti	Jiahui Lu	Nicola Love
Ben Layer	Jo Brant	Nina Klein
Caitlin Wylie	Jon Kerry	Oleksandr Poplavskyy
Caroline Sandford	Jonathon Holland	Philip Garsed
Catriona Shearer	Judith Langenick	Rachael Bonnebaigt
Charlotte Anderson	Katrina Soderquest	Rene Boiteau
Dave Ansell	Katy Horder	Richard Ingham
David Bebb	Kristi Beck	Richard Montgomery
Dawn Colyer	Lara Phillips	Rosy Hunt
Dhaarini Raghunathan	Lee Phillips	Sam Chawner
Elizabeth Mooney	Letizia Diamante	Sonja Dunbar
Elizabeth Skinner	Lia Chappell	Thomas Mead
Emilia Bruton	Mark Durkee	Tuuli Grohn
Fiona Hansell	Matthew Smith	Valerie Brandt
Fiona Llewellyn-Beard	Michael Curtis	



Eating school dinner



Explaining science in schools



Camping and barbecuing

Life on the roadshow... what's it like?

The CHaOS roadshow takes place over four weeks, and on average each of our volunteer demonstrators spends between one and two weeks with the roadshow, living on campsites and spending their days explaining how science is both exciting and relevant to everyone.

To find out what it's like to be a CHaOS demonstrator, we spoke to Richard Ingham, and asked how he'd found life wearing a CHaOS blue t-shirt! Richard is at the end of a year away from university after graduating in Chemistry and will be going back to Cambridge in October to start a PhD. This was his second year demonstrating on the CHaOS summer roadshow. He said ***"Having had so much fun last year, I signed up for longer this time around: nine days instead of six"***.

"A relatively relaxed weekend of public events built up the pace before the week of school visits, which were a bit more hectic! Working with the kids was brilliant. They were (in general!) very enthusiastic and engaging, and I was continually impressed by their ability to pick up new ideas."

"Thanks to everyone for such a fantastic week, probably the most fun I've had in the past year!". Thanks to Richard and the other volunteers for their hard work, not just in demonstrating, but helping the whole tour run smoothly.



Showing the public why science is fun

The CHaOS roadshow was sponsored by:



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Thanks

CHaOS would like to thank the following people for their generous help with this year's roadshow:

Alan Forster at St Neot's Community College

Catherine Sampson at St Felix CEVC Middle School

Gillian Wald at Etonbury Middle School

The wonderful caretaker at Huntingdon Commemoration Hall

The staff at Newmarket Leisure Centre

Emma McClelland & Nick Cox at Colchester County High School

Lynn Morris at Earl's Hall Junior School

Stephen Ham & Lynn Mephram at King Edward VI Grammar School

Bobby Singh at the Mrs Howard Memorial Hall in Letchworth

The staff at the Eaglestone Activity Centre in Milton Keynes

Wendy Bolton and everyone at Stamshaw Junior School

Barry Mills at Newbridge Junior School

Kathy Loader, Peter Hurst & Wendy Morgan at Warblington School

Jan Determann and Mimi Parry at Greyfriars Community Centre

Rachael Harding & the Town Mayor at Blandford Forum Corn

Exchange

Ruth Harding at Pate's Grammar School

Jacquie Fair & Sharron Pearson at Cirencester Kingshill School

Everyone at Corpus Christi church hall in Weston-super-Mare

Annie Smith at The Barn in Clevedon

The University of Cambridge department of Physics and Harry Druiff for giving us space to store our experiments.

Sponsors

CHaOS would like to thank the following for their generous sponsorship of the 2010 summer roadshow:



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Showing how tendons move your fingers

Into the future...

As soon as we finish one CHaOS Roadshow we begin planning for the next one. Next year will be the 10th CHaOS summer roadshow!

Many of our requests for visits come from people who saw us in action the previous summer (we always get more requests than we can fulfil, but we'll do our best!). If you're reading this and would like to host CHaOS in your school or town hall please get in touch.

We have shown consistently that CHaOS is a successful and cost effective way of communicating the relevance and excitement of science to the general public. The current financial climate means that we don't have enough sponsorship for next year's roadshow at present. If you know of an organisation that could help provide CHaOS with the funding we need to continue the roadshow, please get in touch.

If there's any way you think we can improve CHaOS do let us know, as we're always happy to hear new ideas!

You can contact CHaOS by emailing
contact@chaoscience.org.uk



A busy town hall event