Cambridge 2006

a special issue of InForum Scientium

Editor: Tobias Ekblad, tobek@ifm.liu.se.

Introduction

This part of InForum is all about the trip to Cambridge that took place on May 21-24 this year. Those of you who were there can hopefully still remember the nice atmosphere and interesting study visits we experienced, and for the rest of you: here are descriptions of all the visits that were made. In case you wonder: Yes, it did rain a little, but there was even more sunshine.

Epson

We started our visit in Cambridge with taking a double-decker to the science park were Epson is located. Tomas Kugler, a Postdoc from LiU who has also been working at Acreo in Norrköping, welcomed us and gave an introduction to the company. Epson has approximately 15 employees in Cambridge. The Japanese company are working with Ink-Jet printers. The office and lab in Cambridge is focused on research to improve the printing techniques and applications while the production is carried out in Japan.

The aim is to print polymers as the functional liquid to construct structures that can be used as field effect transistors, organic displays, colour filters, E-papers and so on. This means that the work includes many material characteristics besides the electronics. The main application of the Ink-Jet is actually to deliver the active material more than printing. The surface energy of the substrate, most often Indium Tin Oxide, ITO, is used to create certain patterns. A cylinder of functional liquid is pressed out from the piezoelectric head but during the distance of flight, which is about 600 μm, one or several small drops build up because of the surface tension.

These droplets of 20 μm in diameter then land on the substrate, and the wettability decide how the droplets are going to behave. The viscosity of the functional liquid as well as the mass, the head of the Ink-Jet and the surface energy of the substrate are some of all parameters that influences the resolution of the printed structure. Photolithography and PDMS-stamps are used to achieve hydrophobic patterns that can restrict the printed polymer to a limited space and hence improve the resolution.

After the introduction and an interesting chat with Tomas Kugler regarding their research and some challenges in the future we got a guided tour in their clean room where a research engineer introduced us to the Ink-Jet shipped from Japan.

I would like to end up with a question. A phenomenon that is important but not wanted during the Ink-Jet process. The coffee stain effect, why does it occur? Most probably, all of you have seen that a coffee spot is more intense in its colour in the edges. That would probably not be that popular on a display.

Written by Maria Bolin

Wellcome Trust/Cancer research UK Gurdon Institute

On Monday morning the 22nd of May, 16 students visited the Gurdon Institute, part of Cambridge University. Our host, Karin Edoff a former PhD student at IBK Cell Biology HU, gave an introduction to the institute and its research areas. She also presented her own project "Embryonic nervous system development: stem cells to synapses".

The Gurdon Institute was founded in 1989 by Sir John Gurdon in order to promote interaction between developmental biology and cancer. Sir Gurdon was actually the first scientist in the world to clone a vertebrate (frog), which he did already in 1962. Approximately 200 persons work in the building and the equipment used is funded mainly by the Wellcome Trust and Cancer Research UK. The institute is an assemblage of independent research groups designed to promote as much interaction as possible. Research is performed on cell organelles, DNA repair and imprinting in several different model systems: yeast, C. elegans, drosophila and mice.

Karin Edoff's main focus lies in neurons of drosophila larvae where she studies size and function of synapses. During her time as a PhD in Linköping, Karin studied the peripheral nervous system and how certain peptides influence the surrounding tissues in rats. The switch in research field has mostly been a positive experience.

One of her wishes when she changed field was to perform genetical studies and her current work in Drosophila gives her a very good model for that. Karin also presented her experiences on how to get a post doc position and gave us some valuable tips. One such tip is to make contact with interesting research groups at conferences but also through the internet. If you already have funding when you apply for a post doc position it is easier to get an interview. Having good references (e.g. from supervisors, collaborators and from teaching experiences) is of course always important.

Two other post docs, Tony and Dave, gave us their view of being a post doc in Cambridge and at the Gurdon Institute in particular. They both enjoyed the friendly atmosphere at the lab and the very well equipped core facility with for example ten confocal microscopes! The institute is well funded, much better than the university, which results in quite a big paycheck. However, it is very expensive to live in Cambridge so about a third of the salary disappears after the rent has been paid.

Our visit ended with a guided tour of the lab. We saw the "Kitchen" where agar plates, medium etc are prepared for the research groups so that they do not need to spend any time with such things. We also saw some of the laboratory environment and equipment e.g. the "Fly lab" and some really nice 3D confocal microscope pictures from the Drosophila larvae brain.

Written by Maria Hedman

The Cavendish Laboratory, Opto-electronics

Visit outline

On Monday at 1.30 pm, we arrived at the Cavendish Laboratory west of Cambridge to visit the opto-electronics labs. We were a group of seven people and were invited as guests to visit their lab. After a general greeting by one of their doctoral students (Sebastian Westenhoff), we were invited to a presentation by Dr. Neil Greenham, followed by a lab tour and a second presentation held by Dr. Henning Sirringhaus. The study visit ended over a cup of tea with graduate students and post docs at the opto-electronics group.

Group hierarchy

There are eight different sub-groups in the opto-electronics group and Sir Richard Friend heads the team investigating conjugated polymers and molecular solids at the new Cavendish labs along with Dr. Neil Greenham, Professor Henning Sirringhaus and Dr. Richard Phillips. There are about 20 members in this group inclusive of Post-doctoral candidates. Not all of them are experimental scientists.

A casual and relaxed atmosphere is apparently encouraged in this group and doctoral and post-doctoral candidates help one another. The group enjoy regular coffee breaks everyday.

Laboratory
Sebastian Westenhoff gave a lab tour where he showed the current measurement setups that were used. He also showed the newer labs that were about to be used for photovoltaic (PV) measurements (solar cells). The focus of their research is switching towards PV since LEDs (light emitting diodes) and transistors are becoming less interesting for fundamental research, due to their extensive commercialization.

The group has three rooms in which they house their femto-second time resolved spectroscopy units (they have two units) and also make use extensively of common facilities. Other equipments used include spin coaters, dust free hoods and high magnification microscopes for characterizing polymers and micro-fabricated devices (e.g. polymeric transistors). Equipments are shared in the Cavendish labs.

Finances
The group leaders are the chief financers for the group's research and money is obtained primarily through scientific grants obtained from the UK government via competitive grants and the formation of consortiums. Groups are also well financed by collaborative and exploratory projects with companies like Epson etc. Individual researchers, especially post-docs, are however encouraged to apply for numerous grants and scholarships. Most graduate students are already affiliated with a college and actively tutor fellow students.

Science
We were able to attend two presentations. The first presentation was from Dr. Greenham who spoke of designing new conjugated polymers and excitonic solar cells. An introductory speech was provided explaining electron-hole migration and interaction in semiconductors and polymers. Dr. Greenham utilizes a 'bottom-up' approach in that he tries to interpret the physics behind the phenomenon before designing the polymers, e.g. they were able to convert a LED into a PV cell by simply introducing a nitrogen atom in the same monomer used to make the LED. Most of his presentation was on the physics and the challenges faced in processing these polymers.

The second speaker was Dr. Henning Sirringhaus and he provided us with an introductory presentation about the theory and applications of plastic semiconductors. He is also involved in understanding the physics of self-assembly of polymers and charge transport. They are involved in analyzing the interface of polymeric transistors. One of the problems with organic components in the past has been its dielectric properties. Although the talks were preliminary, they provided sufficient insight into the nature of their research.

Morale
The interaction between different researchers can perhaps be one explanation for the successful research that has been performed at the Cavendish Laboratory. The average amount of time spent by a doctoral candidate at Cavendish labs is comparable with Linköping; although the expected number of publications for obtaining a PhD is lower. Overall, there seems to be a jovial atmosphere with graduate students like Andrew Campbell, who want to publish three fundamentally distinct articles in major research journals like Nature Materials.

Written by Sabyasachi Sarkar
and Roger Klingvall.

The Department of Zoology, University of Cambridge

At arrival to the Department of Zoology we were greeted by Dr Mathias Landgraaf and Dr Isabel Palacios, both PI's, or team leaders as they called it, and both involved in Drosophila research but with different profiles. Mathias had also recruited a post doctoral fellow, Rob Ewers, to come and talk to us about his research and the daily life of a post doc in Cambridge. Rob represented a different part of the Zoological Department, being a biologist with a "green" profile, investigating the effects of deforestation in the Amazon. Listening to Rob together with Isabel and Mathias gave a clear picture of the Zoological Department being a very diverse institution including areas like Developmental biology, Neurobiology, Animal Physiology, Evolution, Biodiversity, Conservation Biology etc.

After hearing Rob Ewers talk about his exotic research in the Amazon and Panama and about his origin from New Zeeland where he did his PhD, Dr Isabel Palacios told us about her research in developmental biology. Although some people in developmental biology study neurobiology, behaviour etc. in model systems as worms and flies, Isabel mostly deals with body axis development and patterning of the fly embryo. Later on, Mathias held a mini lecture on his research on morphogenesis and patterning of dendrites, also mostly in flies.

All three PIs agreed on that many collaboration projects start over a beer or at teatime.

Interacting with researchers in different areas and different career steps are common and they all expressed a sense of the Zoological Department being quite a relaxed place to work in. No obvious competition between students or groups and no apparent hierarchy patterns. Sharing of methods and equipment is always a matter of course, no one would object if you reach over boundaries for help.

As a graduate student in the Department of Zoology you are not expected to force the production of articles, although a few publications are encouraged to facilitate your career after the dissertation. It can be hard to get a post doc if you have no publications. If you get a postdoc position in Cambridge, you should expect to stay for a while. Most people doing a postdoc stays for approximately 6.5 years, first as postdocs and later as junior researchers. Not so hard to imagine with such a good research environment and the ever present ambiance of science.

After meeting Isabels PhD student and post doc over a cup of coffee we got a nice tour of the labs, which made us all appreciate the lab standard at IFM. Although, it was quite inspiring that such great research can be carried out in such crowded labs… Very pleased and content with the visit we said goodbye and took off for new adventures in the capital of academia!

Written by Isa Lindgren and Anngelica Jarl

The Medical Research Council (MRC) - Laboratory of Molecular Biology (LMB)

Tuesday the 23rd of May at 9:30 when post-doc Björn Granseth (former PhD-student at HU/Cell Biology) welcomed us at The Medical Research Council (MRC) - Laboratory of Molecular Biology (LMB), half of the group was missing. What had happened the same morning a few hours earlier when all Cambridge-visiting Forum Scientium members were enjoying breakfast at Sleeperz hotel, was that a burglar broke into one of the rooms and very sadly stole some valuable things. As a consequence of this unfortunate incident, contacting and waiting for the police to arrive and giving statements delayed half of the group. Due to the delay of the other half of the group we were invited to the coffee room on the top floor from were it was possible to see the nice country surroundings of Cambridge. In Cambridge they want to save an area restricted to being countryside all around. Finally, half an hour later than planned, almost the whole group was having coffee together with Björn, enjoying the view from the top of the high building.

Björn then guided us through winding corridors and labs down to a seminar room and gave a short historical overview about the history of MRC-LMB. The LMB is somewhat a "Nobel factory", which is very obvious when entering the LMB where you are welcomed by all the nobel prize winner busts situated in the entrance hall.

The probably most known discovery is of course the structure of the DNA-molecule discovered by Crick and Watson. Other major LMB discoveries are the basic prototypes for confocal microscopy, principle for production of monoclonal antibodies by Milstein, and also the discovery of vitamin C by Sir Edward Mellanby. Watson once called LMB "the most productive centre for biology in the history of science" and he might have a point there.

The lab's recipe for success, i e the idea behind the so called "LMB culture" is:
- the principal investigators (PI), i.e. group leaders, and all senior researchers should be active on the bench
- keeping the groups small
- providing good technical facilities available for everyone
- time and peace for high risk research
- focus all time on research, no time is spent on teaching since it is not a part of the university
- MRC funding is internal which means that the PIs do not have to spend time on writing grants, you're usually given the money you need.
- the shared economy is of course a good basis for cooperation, since they are paid from the same budget, total sharing of instruments and other equipment is possible
- the scientific work do not have to follow firm hypotheses, you should feel free to go with your ideas.
- perhaps most importantly, the LMB believe in creativity not only in the lab, but put great value on scientific discussions outside the lab - afternoon tea!

Walking through the Great Court at Trinity College.

The Medical Research Council (MRC) - Laboratory of Molecular Biology (LMB), cont.

Björn also gave us a short presentation of his own research regarding synaptic vesical transport in nerve cells. The release of transmitter containing vesicles at the synapse is critical for the rapid communication of the nervous system. The aim of the research done in Björn's group is to understand **the processes that control the release, retrieval and recycling of synaptic vesicles.** In his project Björn uses cultured hippocampal neurons from rats, transfect them and measure electrical activity using patch clamp technique and also study pH-sensitivity with confocal microscopy. Most synapse vesicle transport is thought to be clathrin mediated, the vesicles to fuse with the membrane to release the transmitter, but another theory is the "kiss and touch" theory, where the vesicles do not fuse, but only touch the membrane to release the transmitter. So far Björn and his group have found no evidence for "kiss and touch", and are thereby supporting the total fuse theory instead.

Björn also gave us some good advice about how to become a post doc. First of all it is advisable to have eyes open for groups that produce good and interesting publications and Björn strongly recommended visits to different laboratories and making appointments with the PIs before deciding on a group. In many countries including Great Britain the references (with phone numbers) in the CV is of great importance. When applying for a post doc it is also wise to mention which funds to apply for in the cover letter.

Finally it was time to thank Björn for the nice visit and say good bye to all the Nobelist busts. Who knows, maybe in the future Björn's bust will be in the entrance hall as well!

Written by Git Johansson & Amanda Nordigården

Cambridge institute for Medical Research, Dep. of Structural Medicine

Dr. Anki Brorsson, who was the contact person of this visit, welcomed us at the entrance of the building. She made her Ph.D. at Umeå University under supervision of Prof. Nalle Jonsson (now Professor at Linköping University, IFM). The official part of the visit started in a seminar room, where four talks by Damian C. Crowther (Lomas group), Leila Luheshi (Dobson/Lomas), Susanna Karlsson (Lomas) and Peter Hägglöf (Lomas) were scheduled. Damian, a post-doc in this group gave a talk about his research in autosomal dominant neurodegenerative disorder, where neuroserpin forms amyloids, causing dementia. Mutation G392E is lethal after 30 years, since the polymerization occurs much faster.

Leila Luheshi, a Ph.D. student affiliated mainly to Prof. Dobson is studying Aâ peptide aggregation *in vivo*, using fruit flies as model system. Susanna Karlsson, a young and newly employed Ph.D. student in Lomas' group from Sweden working on neuroserpin gave a talk, where she tried mainly to compare the Ph.D. systems in England and Sweden.

And finally post-doc Peter Hägglöf, originally as well from Sweden, talked about the best ways to get money for a post-doc position in general.

All five, including Anki showed us around in the labs, before we had a coffee break together, where all our answers were replied patiently. This lead to many discussions about research life in general and how it is in Cambridge in particular. Both groups, especially Dobson's are huge compared to the average Swedish research group, with Dobson's consisting of forty people in his immediate vicinity. Thus, it was interesting to learn first hand about the availability of their group leaders. It was a splendid and very informative study visit.

Written by Cissi Andrésen and Janosch Hennig

The Graduate School of Biological, Medical and Veterinary Sciences

The meeting with the Graduate School was this year held in the Queen's College with its rather young ancestry from the 16th century (compared to the upcoming 800th anniversary of Cambridge University). In the old Hall of the Queen's College a splendid lunch buffet was laid and graduate students from the Graduate School of Biological, Medical and Veterinary Sciences were waiting to share the lunch with us.

The afternoon was intended for a few presentations by graduate students from both graduate schools and following discussions. The presentations were held in the old kitchen of the college and Dr Stefan Klintström introduced presenting the Forum Scientium Doctoral Programme and its purposes. Ms Catherine McKiernan, administrative secretary of the Graduate School in Cambridge, said a few words about their school, which in many ways has the same function as Forum Scientium. The school has ~1500 students including postgraduate students.

Nadeem Sawar, PhD student as well as Student Representative, gave us some historical anecdotes before the word was given to Camilla Gullstrand, the first student to present her research. Camilla talked about type-I diabetes and autoantibody positivity in the ABIS-study (all babies in southeast Sweden).

Nadeem Sawar continued and presented his work on finding possible biomarkers for prediction of the most common global causes for death (HIV/Aids, Tuberculoses and Malaria) using meta-analyses based on literature, tabular data and individual participants. Daniel Karlsson continued and gave a talk about cell specification in the Drosophila nervous system. The last speaker, Post Doc Abid Hussein, gave us an insight of biotechnology in the 21st century. He talked about biotechnology in general as a multidisciplinary science including biology, physics, chemistry, engineering and medicine, and purification of factor VIII and holographic monitoring of glucose in flood of tears (for diabetes patients) in particular.

After the presentations, Nadeem Sawar took us for a little tour of Queen's College showing among others the building with non-perpendicular walls constructed by a shipbuilder as well as the ugliest house in the surroundings built by a Frenchman (!). The study visit ended with a stop at the Anchor and a beer or two.

Contact information:
http://www.bio.cam.ac.uk/gradschool/

Written by Torun Berlind

A courtyard at Queen´s College

Department of Biochemistry

We visited Richard Farndale at the Department of Biochemistry. During the visit some members of his research group presented their ongoing projects. Their research is focused on the interaction between the blood platelet and collagen, a very important extracellular matrix protein involved in platelet adhesion. Farndale and colleagues try to find out how collagen expressed in a vessel interacts with collagen receptors on platelets as well as to find out the physiological role of this interaction. They develop peptides as experimental tools for this field of research. Moreover, they try to develop collagen receptor antagonists which may be used as a drug to fight the war against thrombosis. Methods used in the laboratory include platelet aggregometry, platelet adhesion and western blot as well as methods used for peptide synthesis. After coffee, we (Caroline, Ann-Charlotte, Andreas) presented our ongoing platelet research. This was of course a huge success :-). Later on we got a tour in the laboratory and then the study visit ended with a lunch at the local pub.

Written by Andreas Eriksson, Caroline Skoglund and Ann-Charlotte Svensson

The Institute of Biotechnology

The Institute of Biotechnology was established in 1988 "to meet growing demands for highly skilled research personnel, and the new knowledge necessary for continuing expansion of the science platform upon which biotechnology innovations are based" as outlined on the home page.

At present there are five research groups within the institute, directed by prof. C.R. Lowe, prof. E.A.H. Hall, prof. J.A.H. Murray, prof. A. Tunnacliffe and dr S. Bahn.

Our visit began with a thorough introduction of the institute given by its director and founder – prof. Lowe.

Two dates that are worth mentioning is 1996 when the Institute achieved the prestigious Queen's Award for Technological Achievement, and 2002 – since then the Institute is also involved in teaching and having its own, one year intensive Master's Program in Bioscience Enterprise. The study period is fulfilled with 6-8 week of practical training in a company, often situated abroad. Besides making us familiar with ongoing projects, our host showed us also how it in milliseconds is possible to change 10p into £10 with a tuneable polymer hologram sensitive to its environment.

We highly insisted on prof. Lowe to reveal the secret of the great commercial success of the Institute. At present day there are seven well prospering spin-off companies from the institute: Lumora, Cambridge Sensors, Psynova Ltd., Smart Holograms Ltd., Affinity Sensors Ltd., Prometic Biosciences Inc. and Purely Proteins Ltd. According to him there are several factors playing a crucial role in it: highly skilled multidisciplinary teams, easy access to common facilities within the whole university, starting new projects from focusing on potential applications followed by basic research.

After the introduction, that gave us a good background on how the Institute has developed, how it functions and what are the major projects, we were also able to take a closer look at what we are most interested in – the lab work.

We started our tour in the plant lab. Their project focuses on cell cycle regulation and its major control points in plant cells. The model organism is *Arabidopsis thaliana*. In addition to the main working lab, we were also shown the cultivation room and cell culture lab.

Later on, we went through several labs involved in the wide project of hologram biosensors establishment. Initially we were given a short historical description on hologram production, finished by the introduction of presently used methods.

A typical hologram sensor is built from specifically binding, so called "smart" polymer layers inside neutral polymer. When interacting with a specific ligand the binding polymer expands changing the refractive index of the whole sensor, what can be observed as a colour change. So far this technique has been used in producing holometric alcotests for drivers. They impress with really short time response ~40 ms. Future aim is to develop similar testing system for aldehyde. Other examples are pH sensitive hologram or cation-specific hologram, able to differentiate between Na^+ and K^+ ions. One of the new concepts is "biology-on-a-chip" in which the hologram sensor would be used in microreactors as a metabolite monitoring element.

However, the major interest is a development of alternative glucose test for diabetes patients. The concept is to place a hologram sensor in a specially designed lens to measure the glucose concentration in the tear fluid. The polymer used in the lens (boronate) is designed to change the refractive index in the near-infrared region of the spectra. The used reader would automatically calculate the change in wavelength into glucose concentration. Although looking very promising the whole system still needs optimization.

Next stop was the magnetic acoustic resonator sensor (MARS) lab. It is one of the technologies developed in the Institute. It offers the ability of yielding a protein-specific acoustic fingerprint for metals absorbed on metal surfaces.

We finished our tour with visiting another biosensor group. Their work was focused on developing a biosensor for tumour metastasis phase discrimination. The project involved artificial ligand design for binding biomarkers – lectins present in patients peripheral blood during metastasis of some of the tumours and using them in the chip for surface plasmon resonance-based analysis.

Written by Agnieszka Jóskowiak
and Jens Andersson

There was also time for dinner in the busy schedule.

Imperial College, London

On Wednesday, the 24th of May, we made a visit to the Imperial College in London and the Molly Stevens group. Our hosts were Dr Mike Ball, who gave a short presentation of their research group, Dr Reza Ghazanfar, Dr Gavin Jell and Dr Anna Laromaine, who gave us speeches about some of their research topics.

Dr Molly Stevens' group is multidisciplinary and the research is focused on regenerative medicine including bone tissue engineering, cartilage tissue engineering, and design of bioactive scaffolds. The group has close cooperation with the London hospital and the London centre for nanotechnology.

Our first speaker, Dr Reza Ghazanfar, gave a talk about bone and cartilage regeneration in which he discussed treatments that were available using techniques which had been developed in Stevens' laboratory. Common treatments with regenerated tissues included nose prosthesis, regeneration of skin after burn injuries, bone implants and plastic reconstruction for patients suffering from arthritis as well as transplantation of organs such as liver and pancreas. Wanted structures were developed in the laboratory by growing and harvesting cells that were stimulated to form specific tissues that mimic structures and physiological behaviour of natural tissues. The structures could thereafter be put into patients either by injection of cells or by implantation of entire organs. Cell sources included stem cells.

Dr Gavin Jell gave a talk about bioactive scaffolds, which could be bioactive glasses, carbon nanotube re-enforced composite scaffolds or nanofibrous scaffolds. The bioactive glasses could be designed to stimulate gene expression and to be in intimate contact with bone. To understand how cells respond to alien materials, models of nanoscale architectures were created. Raman Spectroscopy was a commonly used technique to monitor cell behavior.

Dr Anna Laromaine talked about nanoparticles that by means of hydrophobic interactions between coupled peptides could be made to aggregate, or "self-assemble" into novel nano-materials. One application for this is localized drug delivery where the nano-material is designed to dis-assemble upon contact with specific proteases characteristic of diseases such as HIV, Alzheimer's or pancreatitis. Another application is calorimetric biosensors with very high sensitivity.

The visit was concluded with a guided tour through the laboratories followed by a traditional English pub lunch with our hosts.

Written by Magnus Baumgardt and Karin Sörgjerd

After the visit at Imperial College, there was just enough time to go to the Houses of Parliament and take a photo of Big Ben and then take the train to the airport.

Ms June Johnson from the Tourist Office in Cambridge guided us for 2 hours through the places of scientific and historic importance in Cambridge.

Cambridge University was founded when scientists moved from Oxford in the early 13th century in order to get more independent of the king and the church. Public unrest in Oxford had made the foreign scientists uncomfortable, and they hoped that the citizens in Cambridge should be more tolerant.

The department with the most distinguished history at Cambridge University is the Cavendish laboratory. This physics department has a history of 49 Nobel Prize winners and the laboratory is associated with many notable discoveries and theories:

- Basic laws of magnetism and electricity and kinetic theory of gases by J C Maxwell
- First crystal structure of a protein, a sperm whale myoglobin, was made by M Perutz
- Structure of DNA by Crick and Watson
- Discovery of the electron by J J Thomson
- Important contributions to the modern atom model, E Rutherford
- Splitting of a nucleus, nuclear fission by Meitner and Frisch

Sir Isaac Newton was probably the greatest mathematician and physicist of all time. He arrived at Cambridge in 1661. His groundbreaking work on calculus underpins all modern scientific activity. Other remarkable legacies include the invention of the first reflective telescope, as well as his celebrated insights into gravity and the operation of planetary forces.

In the Wren Library, completed in 1695, Newton's own copy of the first edition of Principia containing his annotations for the second edition can be seen together with the Epistles of St Paul, produced in the 8th century, and A.A. Milne's original manuscript of Winnie-the-Pooh.

June Johnson also showed us the buildings in which she worked together with Watson and Crick during the later part of the 1950ties. The buildings have now been renovated by Rolls-Royce but you can still see that it was not because of the high quality of the architecture that Watson and Crick had their groundbreaking new ideas.

Two recommended bibliographies:

Crick, F.H.C., *What Mad Pursuit: A Personal View of Science*. Basic Books, New York, 1988.

Watson, J.D., *The Double Helix*. Atheneum, New York, 1968

It is said that Isaac Newton measured the speed of sound by clapping his hands and timing the echo in this arcade at Trinity College.

Women's studies at Cambridge University

The first two colleges for women in Cambridge were founded in 1869 and -72, both built well out of town. Women were however restricted to graduate only as teachers for a long time. In 1881, the women were allowed to make exams but were not awarded degrees. The University did not recognize their right to a titular degree though. Professors also had the right to refuse to give lectures when women were present.

The attempts to make women full members of the university did not succeed until 1947, and that by a short margin. From 1948, women were allowed to receive degrees in the Senate House and were allowed to wear academical dress (gowns, hoods, bonnets, etc). The first woman to take a degree in the Senate House was the late Queen Elizabeth - the mother of the present Queen.

In 1998, there was an interview with an old lady in a London newspaper. The journalist asked the woman what she most of all wanted for her 104th birthday and she replied "My Cambridge University diploma!". The story spread over England and Cambridge University searched their records. Finding out that the lady had records of a degree dated before 1948, the lady was invited to a diploma ceremony at the Senator's hall. The woman was however to weak to travel so the University decided to have the ceremony at her place instead. After this, the University started to investigate if there were more women that were also entitled to degrees and found hundreds of them.

Cambridge University did then arrange a banquet and graduation ceremony weekend for all these women. Nearly a thousand of 70, 80 and 90-year old ladies thus came and roamed the University and college's grounds during one weekend. Rumour says they had a hilarious party.

In the academic year 2004-2005 48% of the under- and postgraduate students were women at Cambridge University.

Study in Cambridge today

In order to study at the Cambridge University it is compulsory to be accepted to one of the 31 independent colleges.

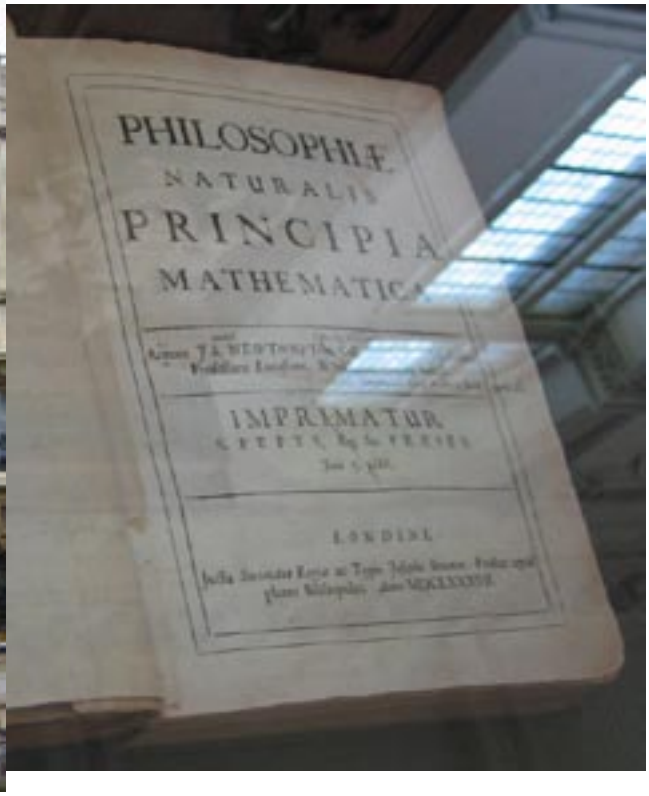
Among those, Trinity, King's and Queen's colleges might sound familiar to you. The rules of how to be accepted at a college are different since the colleges are private and individual institutions. The students have an academic year of 24 weeks, which implies a very tough work pace. The students graduate with a Bachelor of Arts from Cambridge University, independent of which college they enrolled.A typical day in a student's life might begin with a lecture in the morning together with 500 other students. The student then has lunch that is served at the college and may then participate in some sports activities. It is then customary to have a small group meeting with a supervisor to discuss the morning lecture. The student is commissioned to hand in an assay on the chosen subject due the following week. The supervisor is usually a post doc with the task to help students at the college in certain subjects. To make sure that the students study well and behave in a good manner every student has tutor, a peer student, to look after them.

However, in spite of the strict supervision some students try to show their "courage" by performing missions in clubs such as the "night climbing" club where the mission is to climb the chapel of Kings College during night and place a stick in the tower as high as possible. Another mischief is to replace the wooden chalice, in the right hand of Edward the 3rd over the portal to Trinity College, with e.g. a bicycle pump.

At the end of the day

Last but not least, we visited the King's college chapel, to hear the evening songs. The concept has not changed at all for ages, the audience and singers still sit on the specific allotted places even in the 21st Century. One of the reasons for Cambridge success may be the college choir that has given a relaxing time to all scientists at the end of the day. There are not words to explain the beauty of the chapel songs, it is just a feeling, a very good feeling.

Written by Carl-Oskar Jonson, Satish Moparthi and Karin Wermelin



Cambridge has a lot to offer. From top left: The gate at King´s College; a copy of the first edition of Newton´s Principia Mathematica; punting in congested waters.