Abstracts

**Dan Abramson:** *King's College London Mathematics School: the challenges*

Dan Abramson will explore the challenges of setting up this new school for highly motivated students aged 16-19 with a particular aptitude and enthusiasm for mathematics. The school aims to be a place for the brightest and the best as well as to improve access to high quality mathematics teaching in London. The challenges include recruiting and selecting pupils, developing a successful partnership between school and university, and defining a curriculum that is engaging, challenging and effective.

**Martin Andler:** *Animath*

Animath was created in 1998, on the initiative of the Société mathématique de France, with two roles, to «promote mathematical activities among young people, in all possible forms: science fair, competitions, clubs... in middle and high schools, while developing the pleasure to do mathematics». It would both offer some activities of its own and serve as an umbrella organisation. Since 1998, Animath has grown, fulfilling some of its initial ambitions and adding some new items to its initial agenda.

In the presentation, I will focus on three aspects:

1° how and why we received a 3M€ grant from the government in 2011, under the name «Cap'Maths»;
2° give an overview of what Animath and sister organisations are doing;
3° discuss the goals of our action.

**Michael Davies:** *The Top Few and the Top Fifth*

Is there a discontinuity between the mathematical education of the exceptionally talented and that of other strong students? I will suggest, on the contrary, that the same aims should apply when teaching mathematics to a substantial proportion of, if not all, young people as applies to the exceptional few; discuss what this means in practice and describe the sort of resources which need to be available if one wants to teach in this way.

**Eugenio Hernandez:** *ESTALMAT: An enrichment program to develop mathematical talent in Spain*

ESTALMAT is a program started by Professor Miguel de Guzmán (1936-2004) in 1998 in the region of Madrid with 25 students. Since then, it has extended to several regions in Spain, selecting around 250 students each year. The objective is to detect, stimulate and guide the talent of young mathematically gifted children. I will present the key points of the selection process and the structure of the program.

**Jürg Kramer:** *Interaction between research mathematics, mathematics teacher training, and mathematics education at schools*

In our presentation we will show how our activities for the advancement of mathematical talents reach from the primary school via the lower secondary to the upper secondary school level. These activities find their continuation into the fast track program of the Berlin Mathematical School. This concept enables us to connect our educational work with the manifold projects for research mathematics, as well as with our projects for the education and the training of mathematics teachers.

**Vicky Neale:** *CMEP, NRICH and EGMO*

I'll give a very quick introduction to three projects with which I have been involved: the Cambridge Mathematics Education Project (CMEP), the NRICH project, and the European Girls’ Maths Olympiad (EGMO).
Alice Rogers: *Mathematical Talent and the Regular Classroom Diet*

Most schools will from time to time have an exceptionally talented pupil who they must provide for in a school which, even if selective, will have pupils of average or near average as well as some who are strong but not exceptional at mathematics. I will consider some of the issues faced by schools in providing for those of high talent alongside their general responsibilities for teaching mathematics to all their pupils.

Dierk Schleicher: *The 'Modern Mathematics' International Summer School for Students*

The "Modern Mathematics" International Summer School for Students intends to bring together some of the leading international mathematicians of today and (hopefully) of tomorrow. It takes place some 10 days during the summer, alternating in location between Bremen (Germany) and Lyon (France) and is open to highly talented students from around the world that are old enough to understand serious mathematics and young enough so they are not yet specialized. We try to invite some of the most inspiring active research mathematicians.

This summer school is a joint French-German initiative and funded by the Clay Mathematics Foundation, the German Volkswagen Stiftung, and the French Excellence Initiative.

Geoff Smith: *Mathematical Competitions and Enrichment*

I will give a very brief summary of the history of mathematics competitions, and then focus on current European and British contests. I will outline the associated mathematics enrichment programmes, with a particular focus on the work of the United Kingdom Mathematics Trust and its partners, and elaborate on those current developments and initiatives in which the Trust is directly involved.

Glenn Stevens and David Conlon: *Overview of the 2013 CMI-PROMYS International Alliance Initiative*

We will describe the background leading up to the CMI-PROMYS International Alliance, which will have just completed its first year of activities as our workshop begins. Our presentation will emphasize distinguishing features of the student experience, including: (1) Immersion in significant mathematical activity; (2) Depth over breadth; (3) Experience before formality; (4) The art of questioning answers; (5) Sustained effort and persistence; and (6) A supportive multi-tiered mathematical community. Concrete examples of this summer's mathematical activities will be described. As time permits, we will also discuss logistical issues, including recruitment and selection of participants, as well as strategies for addressing such issues as coordinating timing with students' summer vacations.

Günter Ziegler: *Cannons at Sparrows: Cutting polygons, and what that could lead to …*

The story told in this lecture starts with an innocuous little geometry problem, posed in a September 2006 blog entry by R. Nandakumar, an engineer from Calcutta, India: “Can you cut every polygon into a prescribed number of convex pieces that have equal area and equal perimeter?” This little problem is a “sparrow”, tantalizing, not as easy as one could perhaps expect, and Recreational Mathematics: of no practical use.

I will sketch, however, how this little problem connects to very serious mathematics: For the modelling of this problem we employ insights from a key area of Applied Mathematics, the Theory of Optimal Transportation, which leads to weighted Voronoi diagrams with prescribed areas. This will set up the stage for application of a major tool from Very Pure Mathematics, known as Equivariant Obstruction Theory. This is a “cannon”, and we'll have fun with shooting with it at the sparrow.

On the way to a solution, combinatorial properties of a very classical geometric object, the permutahedron, turn out to be essential. These will, at the end of the story, lead us back to India, with some time travel 100 years into the past: For the last step in our (partial) solution of the sparrows problem we need a simple divisibility property for the numbers in Pascal’s triangle, which was first observed by Balak Ram, in Madras 1909.

But even if the existence problem is solved, the little geometry problem is not: If the solution exists, how do you find one? This problem will be left to you. Instead, I will comment on the strained relationship between cannons and sparrows, and to this avail quote a poem by Hans Magnus Enzensberger.