



EUROPEAN
COMMISSION

Community Research

LIST OF PARTICIPATING PROJECTS

17th European Young Scientists Contest

1. **AUSTRIA: *Biology***
Using DNA as a molecular computer
DNA, which carries the genetic instructions for all higher forms of life, is exceptionally good at storing, retrieving and processing information. Over the last decade, a new field of interdisciplinary research has come together to harness this capacity – in effect using DNA as a molecular computer to help solve problems in information science and cryptography. This project looks at the chemical aspects of developing a DNA computer.
Participants: *Philip Babcock*
2. **AUSTRIA: *Biology***
An environmentally friendly way of producing hydrogen
As its use in engines and fuel cells grows, demand for hydrogen will increase. The usual ways of producing hydrogen involve oil, natural gas and electricity, but this project looks at a more environmentally friendly way of producing it. The contestants located purple hydrogen-producing bacteria, and designed and built generators that would provide the ideal environment for them.
Participants: *Susanne Cernak, Markus Metz and Felix Faschinger*
3. **AUSTRIA: *Engineering***
A faster, cheaper way of checking computer components
An Austrian technology company needed to check printed circuit boards for mistakes in their manufacture – but their design made it impossible to do it manually or electronically. To solve that problem, this project developed an innovative image-recognition system that also saved time and money.
Participants: *Nikolaus Ederer and Christian Streitwieser*
4. **BELARUS: *Computing***
A new solution to the “travelling salesman problem”
The travelling salesman problem is the name given to a type of complex calculation, illustrated by the difficulty of finding the shortest route for a salesman who has to visit a number of different cities. This project has developed a new way of solving the problem by means of a program that can be run on a standard PC. It has a great number of uses, including – in this case – making a robot welder more efficient.
Participants: *Uladzimir Pashkevich*

5. **BELARUS: *Space***
A new theory of active galactic nuclei jets
One of the main problems in modern astrophysics is how to account for the formation and dynamics of active galactic nuclei jets. No complete theory deals with the problem, but this project aims to do so by explaining it in terms of dark attracting matter. The result corresponds with data from some of the world's largest telescopes.
Participants: *Aliaksei Kazlouski*

6. **BELARUS: *Physics***
Studying tsunamis in shallow water
A tsunami wave is an example of a soliton – a nonlinear solitary wave with a steady structure. In the past there has been no experimental research on the shape of the solitary wave front, but this project proposes a new procedure that will allow such research in a variety of hydrodynamic experiments.
Participants: *Ann Mukhortava and Alena Abramava*

7. **BELGIUM: *Biology***
The influence of gravity on the human heart
Mira, whose great passion is astronomy and the study of space, compares the heart activity of a parachutist during free fall with that of Belgian astronaut Frank de Winne during his stay on the International Space Station. The project demonstrates that heartrate decreases in zero gravity.
Participants: *Mira Van Thielen*

8. **BELGIUM: *Physics***
A home-made Tesla coil
The Tesla coil, invented by Nikola Tesla in 1890, generates an impressive electrical discharge. Science museums around the world exhibit them, but this team decided to build one themselves. With some help from textbooks and the Internet and a great deal of trial and error, they found their own solution for each element, then tested the theory against their own observations.
Participants: *David Eskenazi, Nicolas Innocenti and Antoine Paulus*

9. **BULGARIA: *Chemistry***
A fuel cell based on biochemical reactions
This project presents a new type of fuel cell that allows electricity to be generated in an environmentally friendly way – by using a mechanism found in living organisms. A prototype of the Direct Aluminium Quinone Cell has been produced and tested, with a multimedia presentation to communicate the results.
Participants: *Hristo Nikolaev Kolev*

10. **BULGARIA: *Physics***
Balls with “super bounce”
Sonya analyses two different models of how balls bounce off a hard, flat surface. One, called Walton's model, describes how a hard ball bounces. The other model, developed by Sonya, describes how an elastic ball bounces.
Participants: *Sonya Hadzhieva*

11. **BULGARIA:** *Physics*

Does the star RZ Cassiopeiae have a third companion?

Amateur observations of this variable star suggest that it has a third companion, and the project set out to study this hypothesis. Petar also calculates the characteristics of the third companion, concluding that it must be a red dwarf, almost impossible to observe directly even with the most powerful equipment.

Participants: *Petar Georgiev Todorov*

12. **CHINA:** *Environment*

Using brewer's yeast to treat pollution

Nan Wu was looking for effective, low-cost materials that would remove the heavy metal Cr(VI) from industrial wastewater. She conducted tests on active carbon, pulverised fuel ash, vermiculite, the dregs of honeycomb briquette – and brewer's yeast. She found that using brewer's yeast cost less than traditional methods and produced no secondary pollution.

Participants: *Nan Wu*

13. **CHINA:** *Biology*

Using Chinese mushrooms to treat diabetes

Almost 50 million Chinese suffer from diabetes mellitus, a disease characterised by abnormally high levels of sugar in the blood, and induced by ineffective or insufficient insulin. In this project, Dongyue Huang shows that an extract of *cordyceps militaris* – a mushroom used in traditional Chinese medicine – has an anti-diabetic effect.

Participants: *Dongyue Huang*

14. **CZECH REPUBLIC:** *Biology*

Using plant extracts to protect wheat and barley

This project investigated the use of plant extracts to protect wheat and barley from fungal diseases. It then tested various ways of producing the extracts, determined the optimum concentration and looked at the effect of environmental conditions, including temperature. Zuzana found that treating winter wheat with an extract of wild garlic (mixed with olive oil) protected against leaf rust.

Participants: *Zuzana Tvaruzkova*

15. **CZECH REPUBLIC:** *Environment*

Using small forest ponds to maintain biodiversity

When cultivation forces out certain varieties of plantlife, they can sometimes find a refuge beside ponds in small forests. This project combined historical and botanical approaches, reconstructing the development of vegetation and looking at eutrophication. As a result, Zdenek identified some steps for maintaining biodiversity, and conservation groups have already shown an interest.

Participants: *Zdenek Janovsky*

16. **CZECH REPUBLIC:** *Mathematics*

Solving practical problems by colouring graphs

Many practical problems can be represented by graphs, and graph theory is an important part of discrete mathematics. Connected by lines, the points on a graph are called vertices. This project proposes a way of colouring these vertices that allows relationships between them to be defined.

Participants: *Alexander Kazda*

17. DENMARK: *Biology*

Genetically modified organisms (GMO)

The purpose of this project is to give people a clear understanding of the implications of GMO technology. Helle gives a practical and theoretical explanation of the subject, describing how GMO can be created and backing it up with accounts of experiments with GM crops to illustrate how they could be used to solve practical problems in the production of food and medicine.

Participants: *Helle Roager Jensen*

18. DENMARK: *Medical*

Helping elderly and handicapped people with their stockings

Every day, many elderly and handicapped people are hospitalised by falls while taking off or putting on socks or stockings – a task they often find difficult and arduous. This project presents a device that allows socks or stockings to be put on or taken off while sitting down – so lessening the danger of falling.

Participants: *Gitte Ahlquist Jonsson*

19. ESTONIA: *Biology*

Why do orchids grow in industrial landscapes?

Kaidi's and Mari's interest in orchids began when they heard that the flowers are often found growing on the ash-mountains created by mining and processing oil shale around Kohtla-Järve in Estonia. Their project investigates why and how orchids grow in such landscapes.

Participants: *Kaidi Karu and Mari Saru*

20. ESTONIA: *Mathematics*

Generalisations of the Fibonacci sequence

This project analyses the generalisations of the Fibonacci sequence with the recurrence relation $U_n = pU_{n-1} + qU_{n-2}$. It finds they have much in common with the original sequence, and proves two formulae that allow many others known for Fibonacci numbers to be applied to these sequences too. It also investigates the connection between these sequences and Lindenmayer systems.

Participants: *Margus Niitsoo*

21. ESTONIA: *Social Science*

Do school and social origin influence pupils' beliefs about justice?

The aim of this research is to study the effect of social origin and school on pupils' beliefs about justice. Maarja analysed data he gathered from three secondary schools in Estonia using a questionnaire that includes questions used in several international studies. He finds that school and social origin do indeed influence support for egalitarian principles.

Participants: *Maarja Saar*

22. EUROPEAN SCHOOL: *Biology*

Taking a fresh look at vision

It has been calculated that 80% of all our memories are visual. As children we learn to associate certain shapes and colours with certain objects, and even people with slightly impaired vision can make out the shape of a flower or a ball. The goal of this project was to find out exactly what percentage of an image needs to be shown in order for it to be identified. The study shows that colour and shape are the two main factors involved in sight.

Participants: *Holly Gamble, Laura Marinello and Mothusi Turner*

23. **FINLAND:** *Physics*

Building a spectrometer to analyse light sources

Using everyday materials and equipment, Timo built an emission spectrometer – an instrument that analyses the radiation emitted or absorbed by matter. He then used the instrument to conduct spectral analyses of many light sources, including a fluorescent lamp, an ultraviolet lamp and two fluorescent materials: zinc sulphide and white print paper.

Participants: *Timo Paavola*

24. **FINLAND:** *Biology*

Using bacteria to clean contaminated soil and help plants to grow

The aim of this project was to find bacteria that could be used to help clean contaminated soil. Emma studied bacteria (*Pseudomonad*) in lead-polluted soil taken from a shooting range. This bacteria could be put on a plant's root system to help it to suck lead – or another contaminant – from the soil, enabling it to clean the soil and grow in a difficult environment.

Participants: *Emma Maria Haapaniemi*

25. **FRANCE:** *Physics*

How to win a race – using the laws of optics

This project studies the refraction laws of optics – Snell's laws – in an orienteering race through the woods. Light takes the path of least time, not the shortest distance. When travelling from one point to another in different transparent media, it changes direction (refracts) somewhere near the boundary between the two. This also works for people racing through different terrains.

Participants: *Jacques Bois, Jean Baptiste Guy and Paul De Surmont*

26. **FRANCE:** *Engineering*

A speedometer for rollerblades

Carole, Jonathan and François were frustrated to find that there was no way of knowing how fast they were going on their rollerblades, and, as there were no rollerblade speedometers on the market, they built their own. Not only does it accurately measure the skater's speed, it also transmits it by radiowaves to a handheld LCD screen.

Participants: *Carole Dufour, Jonathan Faugier-Tovar and François Simplex*

27. **GEORGIA:** *Biology*

Recognising cancer cells

By studying the nucleolus, malignant tumours can be differentiated from benign ones. This project focused on spatial rearrangement and 3D modelling of the nucleolar ultrastructure of tumour cells in human mammary glands.

Participants: *Ekatherine Bakradze*

28. **GERMANY:** *Chemistry*

Lab on a chip – an advance in pharmaceutical research and production

This project could enable some pharmaceuticals to be researched and produced more simply, and without using dangerous compounds as catalysts. Using miniaturisation and a method called anodic polarisation, organomagnesium and organolithium compounds can be synthesised more easily and in greater quantities. This has made it possible for the first time to deposit magnesium by electrolysis using inorganic salts.

Participants: *Stephen Schultz*

29. **GERMANY: Physics**

When water has corners

Every day, when we run the kitchen tap, we see a “hydraulic jump” – where the water hits the basin it spreads out thinly, but a little further out the water level suddenly “jumps” and becomes much deeper. This project investigated the phenomenon under laboratory conditions, and found that under certain conditions the border between the shallow and the deep water was not circular but polygonal: the water had corners.

Participants: *Igor Gotlibovitch and Renate Landig*

30. **GERMANY: Physics**

The physics of ventriloquism

A ventriloquist needs to make all the sounds involved in everyday speech without visibly moving his lips or jaw – but how? This project shows that it is physically possible for two sounds that are perceived to be identical to be produced in completely different ways. Jorg and Marcel use a computer program to model speech, analysing and simulating the sounds ventriloquists use.

Participants: *Jorg Metzner and Marcel Scmittfull*

31. **HUNGARY: Medical**

Minimising the suffering of animals when testing new heart drugs

Cardiovascular diseases are becoming more common, but it is difficult for medical research to examine the factors involved. Long-term testing of new medicines is also difficult and often involves the death of hundreds of laboratory animals. In this project, a model was developed that allowed drugs to be tested on living, conscious animals with minimal pain and harm.

Participants: *Adrienn Nikoletta Kocsis*

32. **HUNGARY: Medical**

What does the brain have to do with stomach ulcers?

This project is a long-term effort to identify the neural regulatory pattern of the two most important regions responsible for ulcer formation, the antrum of the stomach and the duodenum of the intestine. The aim is to discover the overlap between antrum- and duodenum-specific neurons as well as their neurotransmitter pattern in the brain.

Participants: *Peter Kurucz and Timea Micsko*

33. **HUNGARY: Computing**

Tracing burglars and monitoring your home – by remote control

There are a lot of machines in homes and other buildings that can break down. This project developed three systems for controlling these machines, relaying warnings to their owners and even tracing burglars. The Computational Supervisory System monitors sensors in a house, and sends an SMS when an error occurs. There are also Mobile and Telephone Supervisory Systems.

Participants: *Akos Kapui*

34. **ICELAND: Social Science**

Cuddle-me clothes – a massage bodysuit for children

Massaging children has been shown to strengthen the bond between parent and child, help with physical problems such as stomach aches, and make the child calmer. Parents are more likely to massage their children if they are reminded to do it, and shown how. This team designed a bodysuit for infants to do just that.

Participants: *Una Guolaug Sveinsdottir, Lily Erla Adamsdottir and Valdis Osp Jonsdottir*

35. IRELAND: *Computing*

Croma: a new web programming language

Writing sophisticated programmes that run on the web is notoriously difficult and complex. Croma is a new programming language, based on Lisp, designed to make web programming easier. It uses an integrated web-server, and its programmes are much shorter than ones written in other languages, making them cheaper to develop.

Participants: *Patrick Collison*

36. ISRAEL: *Biology*

Preparing DNA libraries for directed evolution

The aim of this work is to prepare gene libraries that will be used to direct the evolution of a new DNase (an enzyme that cuts DNA) inhibitor. In directed evolution we mimic the natural evolution of proteins, in order to study how evolution occurs in nature and to understand the connection between the protein's structure and its function.

Participants: *Fowad Hasona*

37. ISRAEL: *Medicine*

Can fish oils help control Parkinson's disease?

Parkinson's disease is a disorder of movement, caused by a loss of neurons containing a neurotransmitter called dopamine. This study investigates the influence of DHA, an omega-3 fatty acid most often found in fish oil. The results suggest that a diet with enough DHA can help to prevent damage to the dopamine-producing system.

Participants: *Ronit Shapira*

38. ISRAEL: *Engineering*

A more accurate way of monitoring satellites

A new type of satellite is appearing in space. Pico-satellites are the size of a mobile phone and weigh less than a kilogramme, yet they can perform several important tasks. They are especially useful for monitoring larger satellites, but it is difficult to accurately control the direction in which their cameras point. This project found a new way of improving accuracy, opening a new field of space engineering.

Participants: *Yonatan Winetraub, San Bitan and Yuval Nativ*

39. ITALY: *Mathematics*

Genes and games

This project uses the processing power of computers to determine which genes are responsible for which illnesses. By creating an enormous spreadsheet, with genes listed in rows and people listed in columns, the team was able to analyse an enormous amount of data.

Participants: *Valentina Ceriani, Daniela Monza and Sara Villa*

40. ITALY: *Engineering*

Designing intelligent speed bumps

One of the problems with road humps or "speed bumps" is that they are uncomfortable to cross even if you are within the speed limit. Is it possible to design an intelligent hump to prevent this? This project analysed what happens when a car goes over a road hump, and created a computer-based "virtual lab" to quantify the driver's discomfort at each of a hundred different speeds.

Participants: *Michele Bolzoni and Marco Riccio*

41. **ITALY:** *Environment*

Practical ways of powering a building using renewable energy

Fabio calculated how much energy a large building such as a conference centre uses at its period of peak demand in summer, when it is running air conditioning systems and refrigerators. He then looked at ways of producing that power from renewable sources, coming up with two possible solutions: geothermic and hydroelectric.

Participants: *Fabio Colletta*

42. **JAPAN:** *Computing*

An easy way to analyse stones

This software, based on Microsoft Excel, helps scientists who study stones, particularly igneous rocks or granite. When you study stones, it is very important to know what they are made of, and this software analyses a sample to indicate the mineral elements of which it is composed.

Participants: *Shiori Yamashita and Tomoe Hanaki*

43. **LATVIA:** *Mathematics*

Arranging particles by means of networks

Roads, electronic circuits and even the human brain can be conceived of as networks, made up of elements that can be connected in various different ways. This project explores how particles can be rearranged by means of networks, and posits a way of calculating the number of different ways in which a network can be crossed by a single particle.

Participants: *Arturs Kanepajs and Rudolfs Kreicbergs*

44. **LATVIA:** *Engineering*

Building and using a small-scale aerodynamic wind tunnel

The odd wings and plates that festoon Formula 1 cars all have an aerodynamic function, but it is almost impossible to see what it is – never mind design them – without a wind tunnel. Kristaps has developed and built a small wind tunnel that allows flow patterns and aerodynamic forces to be accurately analysed.

Participants: *Kristaps Dambis*

45. **LATVIA:** *Chemistry*

Preventing oil leaks – with clay

Organoclay is a means of preventing oil leaks, which pollute the environment. This project demonstrates that Trias clay, which is plentiful in Latvia but not suitable for industry, is especially suitable for use in organoclay – allowing Latvia to take advantage of its raw materials while improving the environment.

Participants: *Inese Sarcevicha*

46. **LITHUANIA:** *Physics*

New applications of the isospin method

The isospin method allows all the main atomic theory quantities to be determined. This project shows that the isospin method can be used to analyse highly charged ions, which has applications in many branches of physics, such as thermonuclear plasma diagnostics. The project also involved using the programming language Maple 9.0 to calculate the main atomic quantities.

Participants: *Gediminas Kirsanskas and Erikas Gaidamauskas*

47. **LITHUANIA:** *Biology*

How cranberries adapt

The aim of the project was to investigate the physiological and morphological changes that happened as American cranberries adapted to the acidity of different substrates – both in a test tube and outside. The investigation was carried out with three cultivated varieties of cranberry: 'Bergman', 'Black Weil' and 'Bain 10'. The first two are more adaptive to acidity than the last.

Participants: *Rugile Stanyte*

48. **LITHUANIA:** *Environment*

Do magnetic fields influence radiation? A post-Chernobyl study

After the accident at the Chernobyl nuclear power plant in 1986, a radioactive cloud passed over iron ore fields in Lithuania. This project studied the influence of deposits of ore on the distribution of caesium-137 – a radioactive pollutant. The hypothesis is that natural magnetic fields influence the levels of caesium-137, and the team propose setting up artificial magnetic fields to protect sensitive areas and prevent leaks at power plants.

Participants: *Vytautas Zarauskas and Atajeva Gulera*

49. **LUXEMBOURG:** *Biology*

Gall builders

Galls are proliferations of cell tissue in plants, and they are often very organised structures. This project investigated galls found in the autumn in two areas of Luxembourg. It asked what caused galls in these areas and what species of animal are encouraged by the galls produced by *Diplolepis rosae* wasps.

Participants: *Eric Dele and Pierre Haas*

50. **MALTA:** *Environment*

DBG – Domestic Biogas Generator

The aim of this project is to produce biogas from ground-up waste organic matter. The matter is preserved in a black-sprayed plastic container, which absorbs heat from its surroundings, encouraging decomposition. An extractor creates pressure so that the gas enters a container and is kept there by one-way valves. When a valve is opened, the flammable biogas is ignited, generating renewable energy. The sludge in the containers can then be dried and used as compost.

Participants: *Daniela Bartolo, Mark Abela and Andrea Micallef*

51. **NORWAY:** *Biology*

Spices: natural ant repellents?

Ants damage food and property, but they are notoriously difficult to keep away. This project evaluates the ant-repellent properties of certain household spices – many of which have traditionally been used in India for the purpose. It is believed that the plants from which these spices come may have evolved ways to repel ants. The aim is to find natural products that are effective at repelling ants, safe for home use, biodegradable, and easily available.

Participants: *Shilpa Narula*

52. **POLAND:** *Biology*

If music be the food of dogs...

Shelters for homeless dogs help to keep them alive and healthy, but dogs find them very stressful. This project evaluates the use of classical music for relieving dogs' stress. They were observed with and without music, and the effect of varying the volume was analysed. While the dogs had their own preferences, most became calmer and less aggressive when music was played.

Participants: *Kaja Gizewska*

53. **POLAND:** *Physics*

Discovering a variable star

Agata has always been interested in variable stars. Unlike ordinary stars, their brightness varies in a regular way, in periods of hours, days or years. Every weekend for the past two years, Agata has made the long journey to a university observatory, scanning the skies for variable stars. She has investigated one of them and come to some interesting general conclusions about such stars.

Participants: *Agata Karska*

54. **POLAND:** *Biology*

Do artificial herbicides kill natural ones?

Herbicides, along with artificial fertilisers and other chemicals, are routinely used in modern agriculture. This project evaluated the influence of a new herbicide on an important insecticidal fungus. Kamila found that the herbicide inhibited the fungus's growth, but even the highest concentration didn't kill it. She concludes that herbicides change ecosystems and may impede natural insecticides.

Participants: *Kamila Zapalowicz*

55. **PORTUGAL:** *Biology*

The algae of Serra da Gardunha

This project aims to contribute to our knowledge of the algae in Serra da Gardunha, linking its diversity and abundance to environmental conditions. It also investigates the role of algae in maintaining the trophic chains of the local aquatic ecosystems.

Participants: *Ana Ines Rondao, Andreia Raimundo and Dora Henriques*

56. **PORTUGAL:** *Medical*

Heather: a natural antioxidant?

Heather is a common shrub and its flowers are used in folk medicine. The project assessed its antioxidant properties by studying an extract of the plant. This showed significant antioxidant capacity, protecting well against lard peroxidation, very probably as a result of the flavonoids it contains.

Participants: *David Medroa*

57. **PORTUGAL:** *Physics*

Make holograms the easy way: in a sand box

The usual way of making holograms requires heavy and expensive equipment. This project describes and tests Alexandre's "sand-box system", proving that despite its low price, its results can be just as good as with professional equipment. Alexandre hopes to use this to interest people – especially at school – in science in general and physics in particular.

Participants: *Alexandre Lopes*

58. **RUSSIA: Engineering**
Protected network messaging system
This project is a software package for protecting and transferring confidential data. It makes it much more difficult to crack the ciphers used to encode data, and it allows low-capacity networks to be used. This stand-alone software also allows an administrator to control the way it works.
Participants: *Oleg Strikov*
59. **RUSSIA: Engineering**
My answer to terrorism
Alexander's project aimed to find technical solutions for use in the struggle against terrorism. These solutions include a device for restricting the explosive effect of bombs on vehicles, a device for clearing mines, and an explosion-proof dustbin. All have been recognised by specialists and two have been patented. One is now in production, the other two are being prepared for manufacture.
Participants: *Alexander Petrenko*
60. **RUSSIA: Biology**
Do mobile phones damage human cells?
The debate rages over whether electromagnetic radiation – especially in mobile telephones – damages health. This study proves that mobile telephones using high radio frequencies have a negative influence on the morphological and physiological properties of cells. The project also includes a tape, offering some rules on safe ways of using mobile telephones.
Participants: *Igor Yaroshevich*
61. **SLOVAKIA: Mathematics**
Fractal algebra
Fractal geometry is the branch of mathematics that studies the properties of fractals. However, the fractal algebra that should accompany it does not yet exist. Matej's treatise proposes appropriate mathematical functions for fractal algebra on the basis of theoretical models such as the set theory.
Participants: *Matej Korbek*
62. **SLOVAKIA: Physics**
How to remove gases from water – and use them to breathe while diving
Using Henry's and Dalton's laws, this project explains the physical mechanism of extracting gases from natural water and looks at uses for that mechanism. Frantisek explains how to build an efficient machine to supply a diver with breathable air by using the gases dissolved in the water. He also looks at uses for water which has had its gases extracted.
Participants: *Frantisek Malina*
63. **SLOVAKIA: Chemistry**
Household cleaning that doesn't harm the environment
Cleaning agents can be bad for the environment, but new kinds of surface-active agents can solve that problem. Juraj and Julia designed and tested an environmentally friendly cleaning product that could be used in the bathroom and kitchen. ProLit, their "cleaning paste" is a mixture of organic, biodegradable components, and it contains no phosphates or inorganic salts.
Participants: *Juraj Ohradzansky and Julia Hvojniskova*

64. **SLOVENIA: Engineering**
Doubling the power of a petrol engine
This project shows how to double the power of a car engine by remodelling the compressor turbine and the intercooler and adjusting the car's electrics. Jure tested the whole procedure on his Nissan car, and found that the biggest problem he had to overcome was installing the compressor turbine.
Participants: *Jure Krof*
65. **SLOVENIA: Biology**
Teenagers, education and antibiotics
An increasing number of bacteria have become resistant to antibiotics because doctors prescribe them improperly. This research investigates the extent to which education influences teenagers' knowledge of antibiotics and prevents bacterial infections. It concludes that antibiotics, bacterial infections and standards of hygiene should all be part of the curriculum.
Participants: *Tina Bizjak and Katja Zalokar*
66. **SPAIN: Biology**
Sonchus leptacaulis: a new species in Gran Canaria
The purpose of this research was to find out whether some plants discovered in 1998 belonged to a new category that had not yet been described. It also investigated whether similar specimens were to be found in other places around the Canary Islands.
Participants: *Javier Lopez Martinez Fortun, Carlos Machado Carvajal and Eliecer Perez Robaina*
67. **SPAIN: Environment**
Urban solid waste in the town of Salou
Mariona studied the way urban solid waste (USW) is managed in the Salou municipality. She analysed the way residents separated USW from other waste, and their attitudes to it. She also analysed the collection of USW in Salou between 1997 and 2003, comparing it with data for the whole of Catalonia, and has used the results to draw up guidelines for improving performance.
Participants: *Mariona Boix Surroca*
68. **SWEDEN: Biology**
Examination of an eco-friendly fuel
This study compares regular diesel fuel with the eco-friendly fuel EcoPar. Experiments were conducted to show how EcoPar and diesel affect the human metabolism, the health of worms, and the growth, cell division and health of plants. It looks particularly at the effects of residues, fuel vapour and spills on animals and plants.
Participants: *Nina Kallin, Emma Klintbo and Nordstrand Runsvik*
69. **SWEDEN: Engineering**
Engines, emissions and fuels
Fuel consumption experiments were conducted with four Volvo cars with different engines and transmissions and one Volvo truck. The measurements were conducted at constant speeds and accelerations between 0 and 100 kmph.
Participants: *Joel Svensson*

70. **SWEDEN:** *Biology*

Adventures with tropical orchids

Orchids are fascinating plants with a remarkable variation of species. They also have an interesting biological and ecological function as well as being successful survivors. In this project, Markus and Martin focused on experiments, biology and ecology – including how to take care of orchids, potting methods, their history, and the threat of extinction hanging over wild orchids.

Participants: *Markus Axelsson and Martin Axelsson*

71. **SWITZERLAND:** *Medical*

Preventing urinary tract infections from catheters

When Silvana's grandmother went to hospital with a urinary tract infection, Silvana resolved to prevent it from happening again. Post-operative urinary tract infections are caused by the use of catheters, but the standard treatment (oral antibiotics) is often ineffective because a film develops on the catheter's surface, protecting the bacteria. Silvana's solution was to use a high-tech polymer to impregnate the catheter itself with antibiotics, which is also better for the patient.

Participants: *Silvana Konermann*

72. **SWITZERLAND:** *Physics*

Construction of a low-cost wing-in-ground effect craft

Wing-in-ground effect (WIG) vehicles take advantage of the fact that flying very close to the ground gives an aircraft extra lift – thus making them more efficient. Dominique and Christoph made a detailed investigation of the conditions necessary for a stable and controlled WIG flight – even building their own wind tunnel. Having done this, they built and tested two vehicles, and are now investigating the use of WIG design elements in water-skis and wakeboards.

Participants: *Dominique Alain Seuret and Christoph Wangler*

73. **SWITZERLAND:** *Engineering*

Tom & Jerry: the robots

Matthias and Stefan meticulously designed and built two robots that mimic the behaviour of a cat and mouse. The mouse robot uses its sensors to detect and evade anything within range, while the cat robot has video-camera eyes which it uses to find and track the mouse. Both robots act entirely independently, using artificial intelligence that was programmed and modelled in advance.

Participants: *Matthias Raphael Bühlmann and Stefan Dahinden*

74. **TURKEY:** *Physics*

The speed of light in a moving medium

This project studies the behaviour of light in moving material and uses a new method to find out how much of the speed of the medium is added to the speed of the light in it. Another goal is to prove Einstein's addition of velocities formula, stated in his special theory of relativity.

Participants: *Serdar Karatekin and Bilkan Erkmen*

75. **TURKEY:** *Chemistry*

Preventing gas poisoning

Using materials readily found in the electronics industry, this project combined the principle of a vacuum water pump with the fact that heat causes gas to rise, and that gases create homogeneous mixtures among themselves. These principles combined to create a suction force that draws gases out of the environment. Once he had proved the idea, Rudi applied the system to a scale model to show that it could be used in daily life to prevent gas poisoning.

Participants: *Rudi Ruben Maca*

76. **UKRAINE:** *Medical*

A new way of measuring the effects of smoking

Although smoking always causes people serious harm, some substances in tobacco smoke can be partially neutralized and excreted by kidneys. This research determined the effect of tobacco on the surface tension (ST) of urine, in order to use it as a measure of the kidneys' functioning. It also investigated the relationship between ST and the state of the lungs.

Participants: *Mariya Paliyenko and Kateryna Kotenko*

77. **UNITED KINGDOM:** *Biology*

How fishy are prawn crackers?

It was suspected that some prawn crackers contain very little actual prawn, so electrophoresis was used to analyse prawns and prawn crackers. Although slightly inconclusive, experimental results confirmed the initial suspicion. Qualitative protein analysis also suggested that the "prawn" used in prawn crackers may be of questionable origin.

Participants: *Andrew Adam, Katy Steel and Emma Lindsay*

78. **UNITED KINGDOM:** *Engineering*

A pre-failure warning system for oil-lubricated bearings

The aim of the project was to create a device that warned of potential failure in a large plain bearing. The requirements of the device were broken down into power, input, process and output, to enable all the components of the model to be tested individually and as a complete system. The final design monitors the condition of the lubricating oil in the bearing – a reliable indicator of imminent failure.

Participants: *Naomi Wheeler and Claire Fugill*

79. **USA:** *Engineering*

Using the thermoacoustic effect to cool electronic devices

Microelectronic devices, such as the components of computers, create a great deal of heat, which can cause them to break down unless they are constantly cooled. Today's computers use mini-fans to do this, consuming more power. Pen-Yuan and Wei-Kang realised that microelectronic devices create enough heat to trigger the thermoacoustic effect. They then designed a way of using this effect to create convection currents that have a significant cooling effect, thus *using* the problem to solve the problem.

Participants: *Pen-Yuan Hsing and Wei-Kang Huang*

Further information about the EU Young Scientists Contest may be found at:
<http://europa.eu.int/comm/research/youngscientists> and <http://www.euro2005.ru/>