

# ESA praises PolyU's input for Mars Express Mission

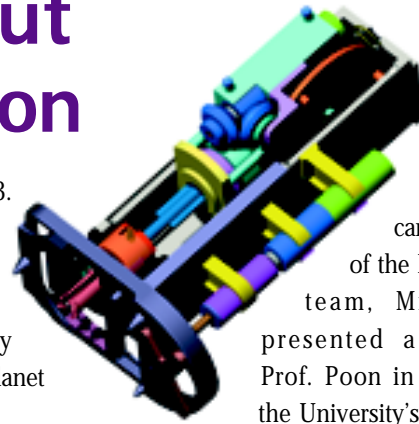
A European Space Agency (ESA) expert flew to PolyU in late February to recognize contributions made by a PolyU project team in the long-awaited Mars Express Mission scheduled for launch this May.

Mr Shaun Whitehead, Chief Engineer in developing the Beagle 2 Lander instrument package (PAW) on the robotic arm of the Mission also took the opportunity to give a talk to PolyU students and staff on the design of the instrument. For the first time in history, the Mars Rock Corer — a Hong Kong-made rock sampling tool — will be on board the Lander. Carried by a Russian-made rocket, the Lander will be launched

from Kazakhstan on 23 May 2003. If Beagle 2 lands on the surface of Mars on schedule on the Boxing Day of 2003, the Mars Rock Corer will be the first instrument made by the Chinese to touch the soil of a planet outside the Earth.

The Mars Rock Corer is a multifunctional tool which can be used to grind, drill, core and grip rock samples, with energy consumption as low as two watts and weighs only 370 gm. This tool has been fully tested and successfully integrated with the Lander.

Prior to the seminar, Mr Whitehead met with PolyU President Prof. Poon Chung-



kwong on campus. On behalf of the Beagle 2 Lander team, Mr Whitehead presented a souvenir to Prof. Poon in recognition of the University's contribution to

ESA's Mars Express Mission through developing the innovative Mars Rock Corer. A letter of appreciation was also presented to the Hong Kong team from the Mission Manager Dr Mark Sims.

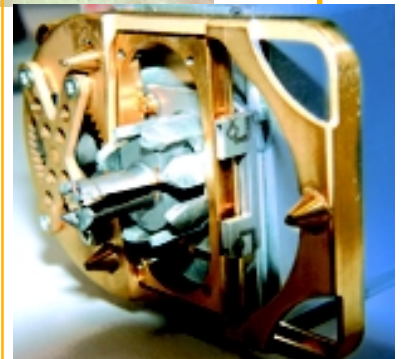
Originated from a piece of dentist equipment by a Hong Kong inventor and dentist Dr Ng Tze-chuen, the Mars Rock Corer has been jointly developed by PolyU researchers. The project team comprises Dr Ng; Prof. Yung Kai-leung, Professor of the Department of Industrial and Systems Engineering; Mr Yu Chun-ho, Engineer of PolyU's Industrial Centre; and Mr Chan Chiu-cheung, an independent engineer. Their work is supported by the Industrial Centre under the directorship of Dr Chris Wong Ho-ching. The team also has the honour to have Prof. Yang Chen-ning, Nobel Laureate in Physics, as the project advisor. ❖



Prof. Poon and PolyU team greet Mr Whitehead during his visit to the University.

## Year Achievements of PolyU project team

<b>1995</b>	Four sets of Holinser Forceps were ordered by the Russian Space Agency for precision soldering on the then MIR space station.
<b>1995–96</b>	The project team was invited by ESA to enter bid for its Mars Express Mission.
<b>1997</b>	A sophisticated device known as the Mars Rock Corer was successfully developed. The team was officially commissioned by ESA to take part in the Mars Express Mission.
<b>1998</b>	The first prototype of the Mars Rock Corer was made and sent to ESA for further enhancement.
<b>1999</b>	The invention earned "The Most Innovative Award" in the "Election of 10 Engineering Wonders in Hong Kong", organized by the Hong Kong Institution of Engineers.
<b>2000</b>	The project team received the "1010 Award for Innovation" in the "Leader of the Year 2000" awards, organized by the Sing Tao Group.
<b>2001</b>	The Hong Kong-made space tool captured a gold medal in the "Brussels Eureka", which was also known as the "50th World Exhibition of Innovation, Research and New Technologies".
<b>2003</b>	With the Mars Rock Corer on board, the Beagle 2 Lander is scheduled to be launched in May as part of ESA's Mars Express Mission.



# Bringing enzymes into life

**Two heads are better than one, says the proverb.  
This explains why two Thomas work better than one.**



**From left: Dr Lo and Dr Leung take pride in their invention of a new enzyme production technology.**

**D**r Thomas Leung Yun-chung, an expert in molecular biology and Dr Thomas Lo Wai-hung, an expert in biochemical engineering, together have invented a new enzyme production technology that is effective, inexpensive and environmentally safe. They are both Lecturers of the Department of Applied Biology and Chemical Technology.

With the application of genetic engineering, biochemical engineering and fermentation technology, a non-pathogenic bacterium known as *Bacillus subtilis* is used as the bacterial strain for enzyme production. This new technology can achieve a much higher enzyme production level and shorten the existing enzyme production process from several days to less than 14 hours.

Unlike other researchers who only focus on the cultivation of new species, the two PolyU researchers have taken a step forward and centred on the issue of yield and optimization.

“This is a new breakthrough among traditional molecular biology,” said Dr Leung. “By optimizing the production level, the new technology produces enzymes on a much larger scale which is highly economical and efficient for the industries.”

Enzymes, which reside in all living organisms, are a natural solution to many industrial and medical problems. They are used in the manufacturing processes of detergents, drugs, sugar, starch and certain food products. Enzymes can also solve complex industrial problems while reducing the use of harmful chemicals, raw materials and energy.

Dr Leung added that compared to *Escherichia coli* (also known as *E.coli*), which is a more widely used bacterium, *Bacillus subtilis* is safe, environmentally-friendly and produces no endotoxins. “As our enzyme production technology requires no antibiotics or other expensive chemicals or media, the new invention helps cut down the production cost,” he said.

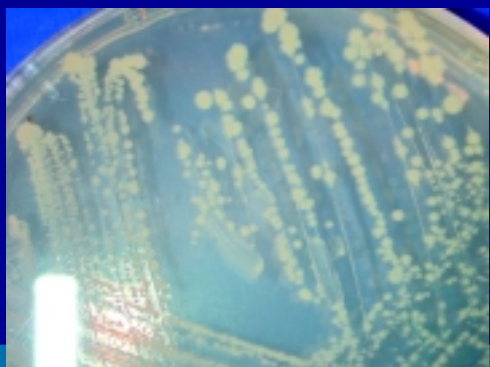
Dr Lo went on to explain how this biotech-based technology works. “The production is made up of two main parts. We first made use of genetic engineering to put the gene of interest in the chromosome of *Bacillus subtilis*. It is then followed by fermentation and purification. For certain type of enzyme, chemical modification will be required to enhance its stability.”



**The computer-controlled fermentor plays a key role in the enzyme production process.**

The invention is now undergoing patent application in the US. First started with departmental funding and grants from the University's Research Grants Committee, this research study has secured a funding of \$3.5 million from the Government's Innovation and Technology Fund. This research is also involved in a UGC-funded Area of Excellence known as "Institute of Molecular Technology for Drug Discovery and Synthesis", jointly run by researchers of PolyU and HKU.

"While the Government is calling for the development of biotechnology in Hong Kong, this new technology has indeed hit a yardstick of success among local researchers and industry professionals. We hope the new technology can offer a better solution for business and trade and provide for us a better, healthy living environment," Dr Leung concluded, with his research partner Dr Lo sitting aside with a gentle but affirmative nod.



Colonies of *Bacillus subtilis*



A very close look at *Bacillus subtilis*.



The non-pathogenic and environmentally-friendly *Bacillus subtilis* is used as the bacterial strain for enzyme production

## Diary of development of the new enzyme production technology

- 1997** Dr Leung and Dr Lo joined hands to work on this project. The enzyme alpha-amylase was used for the development of this new technology. Alpha-amylase can be used in the manufacturing of certain food products, such as soy sauce, sugar, soft drink etc.
- 1998 – present** The new enzyme production technology was successfully developed. This achievement has drawn attention from the industrial sector and the researchers were approached by a few companies for potential collaboration.
- 1998** Another enzyme penicillin acylase which could be used in antibiotic production was tested, based on the same enzyme production technology. The study is on-going and has reported good progress. The successful production of penicillin acylase would be highly beneficial for the pharmaceutical industry.
- 2000** Application for the US patent of this enzyme production technology has been submitted. More patent applications are in plan in Hong Kong and the Chinese mainland.
- 2001** In collaboration with a medical oncologist, a naturally occurring enzyme with anti-cancer potential was produced in a very pure and active form. This is an exciting anti-cancer biotechnology project in Hong Kong, which will generate a new drug pending for FDA approval in the US. Patent applications for this drug have also been submitted in Hong Kong, the Chinese mainland and the US.



# Interactive website to enhance teaching and learning

The Educational Development Centre has recently launched an interactive website entitled “Learning-to-Learn” — [www.polyu.edu.hk/learn-to-learn](http://www.polyu.edu.hk/learn-to-learn) — to provide on-line support for both academics and students to further enhance the effectiveness of the teaching and learning process.

Officially launched in late January, this innovative project was one of the seven PolyU projects sponsored by the Teaching Development Grants of the University Grants Committee (UGC) in 1999 and received an award of \$3.42 million. The Website, as well as the on-line materials, was one of the many deliverables made by a project team formed by representatives from 10 academic departments.



Consisted of a Teachers' site and a Students' site, the Learning-to-Learn website is open to all students and teachers of UGC-funded universities in Hong Kong. The

Students' site, which contains materials on motivational, cognitive and interpersonal aspects of learning, serves to maximize students' learning abilities and to develop attributes of self-regulated learners. Useful student handbooks and videos are also available on-line.

Information of the Teachers' site is grouped under various themes to address concerns of the teachers. Ready-to-use materials including teacher guides can be obtained from the website to integrate learning resources into teaching. Teachers are also encouraged to share their experiences with counterparts on the website. ❖

## Survey indicates mainstream support for Disneyland

A majority of Hong Kong residents have shown support for the development of Hong Kong Disneyland and believed the benefits would outweigh the costs despite concern about potential competition posed by another Disney theme park in Shanghai, according to a recent survey conducted by PolyU.

Led by Dr John Ap, Associate Professor of the School of Hotel and Tourism Management, this annual survey is the third of an on-going research started in 2000. It aims at monitoring general perceptions and attitudes of Hong Kong residents toward Hong Kong Disneyland and its impacts.

Commenting on the results, Dr Ap said the community in general still supported the project three years after the announcement on the construction of a Disneyland in Hong Kong. “New questions were added in the survey and respondents had expressed concern on the unfairness and lack of transparency in the arrangements made between the Government and the Walt Disney Company. They also worried about having another Disney theme park in Shanghai as it might divert the Chinese mainland tourists from Hong Kong,” added Dr Ap.

A total of 514 residents were successfully interviewed during 27 to 29 November and 2 to 4 December last year. A random sampling method was used and telephone interviews were conducted through the Computer Aided Survey Team (CAST) of PolyU's Department of Applied Social Sciences. ❖