

HONG KONG MATHEMATICAL SOCIETY

香港數學學會 

Newsletter

2008-09 HKMS Best Thesis Award

In October 2008, the Hong Kong Mathematical Society (HKMS) proposed to establish the HKMS Best Thesis Award, which will be awarded annually.

We are happy to announce the winners of the **first** HKMS Best Thesis Award:

Bangti JIN (CUHK; Applied Math Best Thesis Winner)

Sui Chung NG (HKU; Pure Math Best Thesis Winner)



Prof. Jun Zou (CUHK, JIN's supervisor), Prof. Tao Tang, Dr. Bangti JIN (CUHK; Applied Math Best Thesis Winner), Prof. Ngai-Ming Mok (also NG's supervisor), Sui Chung NG (HKU), Prof. Zhouping Xin (from left to right)

The supervisor of JIN is Prof. Jun ZOU and the supervisor of NG is Prof. Ngaiming MOK. The results are announced in the Annual General Meeting on 25 April 2009 held at Hong Kong Baptist University.

Photographs of the winners and their supervisors have been posted on http://www.hkms.org.hk/?page_id=350

There was a very strong entry of 5 submissions for this year's competition and the Adjudicators had an exceptionally difficult task to decide on the shortlist.

This year's HKMS Best Thesis Award Adjudicators are:

Jian-shu Li (HK University of Science and Technology)

Tao Tang (Hong Kong Baptist University)

Zhouping Xin (The Chinese University of Hong Kong)

Available at

<http://www.hkms.org.hk/>

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The purpose of the Best Thesis Award is to recognize outstanding PhD or MPhil theses which contribute to the fields of mathematics and statistics. All submissions will go through a formal evaluation process by a panel of established scholars of HKMS.

Submissions will be judged on the following criteria:

- Significance of results;
- Originality of work;
- Clarity of presentation;
- Quality of writing

Eligible of the award are postgraduate students who have completed or will complete their PhD or MPhil degrees in the fields of mathematics or statistics in any local universities. The Principal Supervisor must be a regular staff member of a local university to be eligible to nominate his/her students. For next round application, students should have submitted or will submit their theses to the university between 1 February 2009 and 31 January 2010.

Postgraduate students who wish their theses to be considered should submit:

1. a curriculum vitae with a list of his/her publications (no more than two pages);
2. a full thesis written in English
3. a letter of nomination from his/her Principal Supervisor that:
 - i. verifies his/her eligibility for the award
 - ii. describes and evaluates the thesis' contribution to the literature and the student's role in scholarship

Each recipient of the Best Thesis Award shall receive a certificate and a cash prize. Up to three awards will be made each year.

2009-10 HKMS Best Thesis Award *Call for Submission*

Deadline of the application:

Submission must be received no later than 1 February 2010 to be considered for the award. All theses must be submitted, in soft copy, to Prof. Tang Tao, the President of the Society at <ttang@hkbu.edu.hk> .



Announcement of new website for HKMS

We are pleased to announce that a new website is now available at <http://www.hkms.org.hk>. The new site is a great addition to our communication activities. It includes News & Announcements, information on conferences, membership, and publication.

You are welcome to post your announcements relevant to the Society on this website. Your comments and suggestions for strengthening our communications are encouraged and welcome!

HKMS Annual Conference

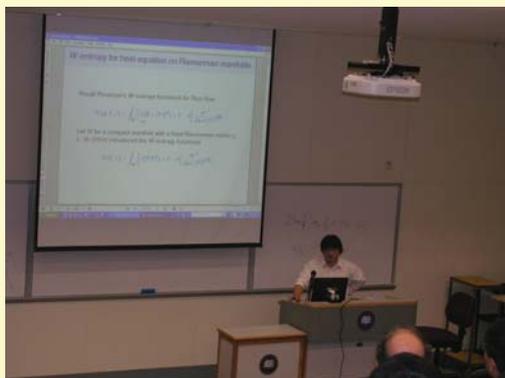


Prof. Tao Tang, President of HKMS, chaired the Annual General Meeting

Speakers:



*Plenary Lecture by Demetrios Christodoulou (ETH Zurich):
Title: The formation of black holes in general relativity*



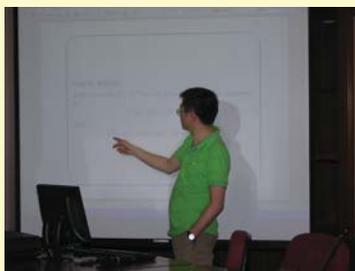
*Plenary Lecture by Li Xiangdong (Fudan U):
Title: Perelman's W-entropy functional and a weight rigidity theorem on complete Riemannian manifolds*

The Society's 2009 Annual General Meeting was held on 25 April 2009, 2:00-6:00pm at Hong Kong Baptist University. The above speakers presented their recent research results in the annual meeting.

The Annual General Meeting was held at 4:00pm. Members from the Chinese University of Hong Kong, Hong Kong Baptist University, Hong Kong Polytechnic University, University of Hong Kong, City University of Hong Kong, and Chu Hai College of Higher Education attended the Annual Meeting.

In the annual meeting, the HKMS Best Thesis Awards are presented.

Invited Talks:



*SUN, Binyong
(Chinese Academy of Sciences)*



*HE, Xuhua
(HKUST)*



*CHAN, Yat-Ming
(HKU)*



*CHERN, I-Liang
(National Taiwan University)*



*DON, Wai Sun
(HKBU)*



*WEI, Juncheng
(CUHK)*

香港數學學會2009年度會議，已於4月25日下午二時至六時，在香港浸會大學舉行。以上的講者正在演說他們最新的研究結果。

下午4時正，來自香港中文大學、香港浸會大學、香港理工大學、香港大學、香港城市大學及珠海學院的會員出席是次年度會議。

【香港數學學會最佳論文獎】亦同時在會議中頒發。

Brunei Conference

The 5th East Asia SIAM Conference

From 8 to 11 June 2009, the University of Brunei Darussalam (UBD) hosted the 5th East Asia SIAM Conference in conjunction with the 2nd International Conference on Mathematical Modelling and Computation. The 5th EASIAM Conference was a regular meeting in the series of conferences organized by the East Asia Section of SIAM. Previous EASIAM meetings took place elsewhere in the region – including Hong Kong, Sapporo, Xiamen, and Daejeon. Each of these meetings has attracted mathematicians working in many areas of applied and computational mathematics, and the conference in Brunei was no exception. There were more than 70 participants from 17 countries, including Australia, Brunei, China, France, Germany, Indonesia, Italy, Japan, Malaysia, Morocco, New Zealand, Oman, Saudi Arabia, Singapore, Korea, UK and USA.



The Conference programme comprised invited talks, contributed talks, and a special session devoted to the EASIAM Student Paper Competition. After a short opening ceremony, Carlos Castillo-Chavez (University of Arizona) presented the first talk on "Travel, mass transportation and emergent diseases: SARS, bioterrorism and influenza". It would be difficult to find a currently more important topic, and his talk drew rapt attention from the audience. Carlos was subsequently invited to the Brunei Ministry of Health, to discuss various issues that he raised in his presentation. Carlos Castillo-Chavez was one of two keynote speakers supported by SIAM, and another was Iain Duff (STFC Rutherford Appleton Laboratory and CERFACS), whose keynote talk was on "Solving very large sparse linear equations from three-dimensional modelling" on the final day of the Conference. Iain discussed the necessity of combining direct and iterative methods, to solve problems that are intractable by one of these classes of methods alone. In addition to these two keynote talks, the conference featured 9 invited presentations given by Alberto Apostolico (University of Padova and Georgia Institute of Technology), Weizhu Bao (National University of Singapore), Raymond Hon-fu Chan (Chinese University of Hong Kong), Les Jennings (University of Western Australia), Sannay Mohamad (UBD), Youngmok Jeon (Ajou University), Robert McKibbin (Massey University) and Yusaku Yamamoto (Nagoya University). The invited speakers discussed modelling of heat and mass transport processes in geothermal systems, simulation of neural networks, simulation of Bose-Einstein condensation, missing data recovery in image processing, option prices, the problem of characterising and detecting surprisingly recurrent sequence patterns, and various aspects of numerical algorithms.

The Student Prize Session was held on the second day of the conference. Initial submissions had been considered and evaluated by a committee chaired by Tao Tang (Baptist University of Hong Kong), with members Victor Didenko (UBD), Hyung-Chun Lee (Ajou University), Mohd Omar (University of Malaya), and Hisashi Okamoto (Kyoto University). Four students, one from China, one from Indonesia, one from Japan, and one from Korea had been invited to present the results of their work at the Conference. The outcome of the 2009 Student Paper Competition was announced at the conference dinner. The committee noted the very high level of all four works presented at the Student Session, so it was decided to award two first and two second prizes. First prizes were awarded to Yucheng Hu (Peking University) for his work "Highly accurate tau-leaping methods with random corrections", and to Hyoseop Lee (Seoul National University) for work on "Laplace transformation method for the Black-Scholes equation". The second prizes went to Takeshi Fukaya (Nagoya University) for "A dynamic programming approach to optimizing the blocking strategy for the Householder QR decomposition", and to Hengki Tasman (Institute of Technology Bandung) for "A model for transmission of partial resistance to anti-malarial drugs".

In addition to the many Conference presentations, there were other activities during or immediately after the Conference. The EASIAM Standing Committee held its annual business meeting. Topics under discussion included the student paper competition, the publication of papers presented at EASIAM conferences and a possible EASIAM Journal, venues for future EASIAM Conferences, and extension of EASIAM activity to further countries in the region. It was encouraging that, for the first time, the meeting was attended by representatives from Indonesia – namely Leo Wirayanto and Hendra Gunawan, both from the Bandung Institute of Technology. On the second afternoon of the Conference, participants visited places of interest in the capital of Brunei and also took a boat ride to see proboscis monkeys, a rare species with natural habitat only on Borneo Island. After the Conference, 24 participants visited the Temburong National Park, and stayed overnight at the UBD Kuala Belalong Field Studies Centre in the midst of the Bruneian jungle.

The next EASIAM Conference will be held at Kuala Lumpur, Malaysia in the second half of June, 2010.

EASIAM acknowledges the generous support from SIAM for the two keynote speakers and for the student paper prizes, and additional support from the University of Brunei Darussalam, Brunei Shell Petroleum and the Rizqun International Hotel.

Victor Didenko
Vice president of EASIAM

EASIAM Student Paper Competition
Call for Submission



Deadline of the application:

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February 15, 2010. Send your submission to Prof. Byeong-Chun Shin, Secretary, Chonnam National University, Korea, at <bcshin@jnu.ac.kr> .

For more information, please visit
<http://jnumath.kr/easiam>

Enhancing U.S. Undergraduate Students' Appreciation of Research in the Mathematical Sciences through International Collaboration

Barbara M. Moskal and Graeme Fairweather



Barbara M. Moskal received her B.S. in Mathematics Education from Duquesne University, her M.A. in Mathematics and Ed.D. in Mathematics Education with a minor in Quantitative Research Methodology from the University of Pittsburgh. She is a Professor in the Department of Mathematical and Computer Sciences at the Colorado School of Mines, and serves as Director of the institution's Center for Assessment: Science, Technology, Engineering and Mathematics. Her research interests include student assessment, K-12 outreach and equity issues.

Graeme Fairweather received his B.Sc. and Ph.D. in Applied Mathematics from the University of St. Andrews, Scotland. He served for fourteen years as head of the Department of Mathematical and Computer Sciences at the Colorado School of Mines before joining the American Mathematical Society as Executive Editor of *Mathematical Reviews* in 2008. Prior to his appointment at CSM, he held faculty positions at the University of St. Andrews, Rice University, and the University of Kentucky. His primary research interests are in numerical analysis and scientific computing.



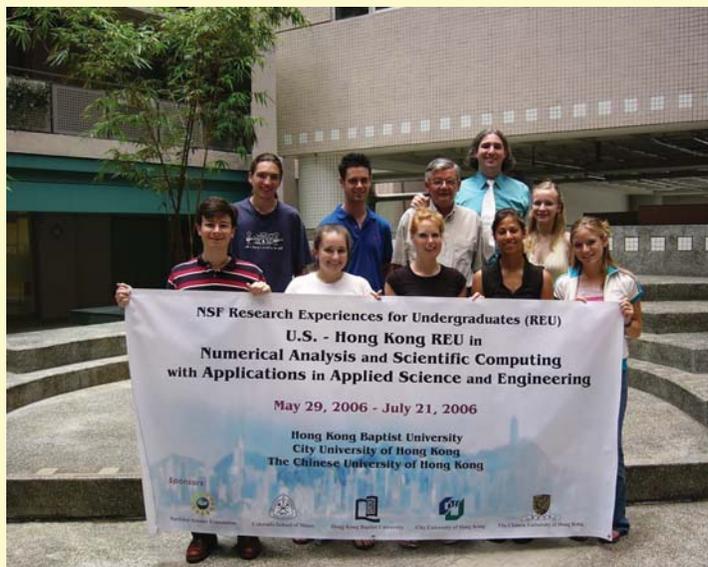
1. Introduction

In 2006, the Department of Mathematical and Computer Sciences (MCS) at the Colorado School of Mines (CSM), located in Golden, Colorado, U.S.A., established a three-year Research Experiences for Undergraduates (REU) program funded by the National Science Foundation (NSF). This program, entitled "United States-Hong Kong REU in Numerical Analysis and Scientific Computing", was held during the summers of 2006, 2007 and 2008, centered at Hong Kong Baptist University (HKBU).

The NSF is a major funding agency in science and engineering supported by the U.S. government. Around 20% of the basic research completed in U.S. colleges and universities is funded through the NSF. A major component of the agency's mission is the support of science and engineering education at all levels, pre-kindergarten through graduate education; the REU program is one example of this at the university undergraduate level. NSF REU programs are designed to support the active involvement of college students in meaningful research endeavors during their undergraduate education. The theory underlying these programs is that early exposure to research will entice more students to complete advanced degrees, and pursue careers in science and engineering including teaching and related educational research.

The purpose of establishing an REU program in Hong Kong was to provide U.S. undergraduate mathematics students with the opportunity to contribute to the exciting research being conducted in numerical analysis and scientific computing at an international level while also affording these students the chance to increase their global awareness. Many students incorrectly assume that researchers in mathematics work in relative isolation. This international REU program was designed to challenge this misconception, encouraging talented students from diverse backgrounds who desire a highly interactive and culturally rich experience to pursue degrees in the mathematical sciences. A growing concern in the U.S. is that there are few students pursuing graduate studies in science and mathematics [4]. In today's world, mathematics students as well as students in other fields must be able to assimilate into different cultures and learn how to function in a global environment [1,4].

Before the Hong Kong REU program, MCS had sponsored REU experiences on its own campus. The impetus for expanding overseas came from support of the NSF's Division of International Programs in the form of a supplement (grant DMS-0206884) to an earlier MCS NSF REU grant (DMS-9912293). The purpose of the supplement was to investigate the feasibility of establishing an REU program in East Asia, an area of strategic importance to the U.S. It enabled Dr. Fairweather and Dr. Junping Wang, previously of MCS, to spend a week in Hong Kong, meeting with representatives from several local universities. As a result of this visit, the new REU program was conceived, and it was subsequently funded by the NSF (grant DMS-0453600).



2006 REU students

Hong Kong was selected as a potential REU site for several reasons. In particular, it has an exceptionally strong concentration of universities with excellence in numerical analysis and scientific computing. Moreover, Drs. Fairweather and Wang had interacted previously with members of the numerical analysis and scientific computing university community from this region, which facilitated communication and comfort among the faculty participants.

In this paper, we provide an overview of this international REU program. For a student perspective of the program, see [2] and the blog established by the 2008 participants at

<http://mathinhongkong2008.blogspot.com/>.

2. Student Participants

During each summer of the program, ten U.S. undergraduates spent eight weeks working on original research projects in teams comprising two or three student members supervised by a faculty member from one of four Hong Kong universities: HKBU, City University of Hong Kong, the Chinese University of Hong Kong and Hong Kong Polytechnic University. Each year, the participants were selected from a pool of approximately fifty applicants, based on their academic performance in the mathematical sciences, career interests and objectives, and readiness to pursue an overseas project. All but five of the 30 student participants were within one year of completing an undergraduate degree and all had a declared major in the mathematical sciences.

The NSF encourages the participation of a) underrepresented groups, b) students from academic institutions where research opportunities are limited, and c) students from institutions other than the host institution. Each year, the program involved five female students and five male students, and two of the 30 participants were Hispanic; of the 24 colleges and universities represented by the participants, only five are Ph.D. granting institutions; and, of the 30 participants, only four were from CSM. It should be noted that, in the mathematical sciences in the U.S., both women and Hispanic students are classified as underrepresented.

3. Program Design

Before the students' departure for Hong Kong, the research teams were formed, and their members began to interact electronically. In preparation for the program, the students were provided background material regarding their project and addressing practical issues, such as cross-cultural understanding, travel arrangements and insurance matters, accommodations and food, and safety and health concerns. Each year, the participating students traveled to Hong Kong during the last week of May. The principal investigator of the NSF REU grant, Dr. Fairweather, accompanied the students, and all were housed in the Ng Tor Tai (NTT) International House at HKBU. Dr. Fairweather acted as a direct resource to the students throughout the program, assisting students when project related difficulties emerged. The host institutions provided the student teams with office space, access to library and computing facilities and, most importantly, faculty research mentors. Since English is an official language in Hong Kong, language barriers were minimal.



2006 group and HKBU staff and students

Fourteen research projects developed by participating Hong Kong faculty members were undertaken over the course of the program. These projects involved topics such as the development of algorithms for high-resolution image reconstruction, subspace clustering methods for high-dimensional categorical data, a spectral analysis of differentiation matrices, numerical methods for solving reaction-diffusion equations modeling various physical phenomena, applications of radial basis functions, and the modeling of the emergent behavior of flocks.

During the program, the student teams presented several oral progress reports to their peers and Dr. Fairweather. These interim reports included a discussion of accomplishments, problems encountered and solutions, and the remaining project goals. At the end of the program, each team was required to prepare a final written report and give a 30 minute oral presentation to their peers and research mentors.



2006 group with Gene Golub of Stanford University



2008 REU students

4. Additional Experiences

Each year there were opportunities for the REU students to participate in activities designed to expose them to a broader scope of international mathematical research, beyond that in which they were engaged. For instance, participants attended Ph.D. defenses, seminars given by visiting speakers, and international conferences in scientific computing and numerical analysis held in Hong Kong. The 2006 REU students further had the opportunity to have an informal discussion over tea with the late Dr. Gene Golub, the renowned numerical analyst from Stanford University; see accompanying photograph. As a result of this meeting, Dr. Golub subsequently presented a seminar at the Chinese University on the history of scientific computing, specifically for the REU students. During the 2007 and 2008 programs, the students visited the University of Macau at the invitation of Dr. X. Q. Jin of the University of Macau's Department of Mathematics.

5. Assessment and Evaluation

Assessment and evaluation were central components of the NSF/REU experience. As part of any NSF funded project, researchers are required to collect and analyze data with the purpose of examining the effectiveness of the project. Various approaches were employed to monitor student progress during the REU program, to collect feedback from the research mentors regarding their teams' performance, and to elicit overall evaluations of the program from both students and faculty. These included pre and post project essays, weekly written reflections on project experiences, group interviews concerning project activities, individual exit interviews at the conclusion of the REU program, evaluations completed by research mentors and end of program surveys. The outcomes of these measures supported the effectiveness of the program. For additional information, see [3].



"US-HK" 2007 REU students

6. Project Outcomes and Post Project Achievements

Additional evidence to support the effectiveness of this program is provided through the project outcomes and the students post project achievements. In total, eight conference presentations which included the participation of eleven REU students were given, and two of the presentations received awards. Several of the students published their collaborative work as journal articles, while others wrote and published accounts of the REU experience itself. Moreover, the authors of the current article presented six conference papers and published two articles concerning the program.

Efforts are also underway to track professional accomplishments of the REU students beyond program participation. As of July 1, 2009, 17 have entered or are about to enter graduate programs, and five of these students have completed master's degrees. Five have received prestigious national fellowships to support their undergraduate or graduate studies. Two students have gone into secondary mathematics teaching in the U.S. following the completion of their undergraduate degrees. One student is currently serving with the Peace Corps, teaching mathematics in Guinea, West Africa. She continues to have a presence at HKBU where she appears in several posters around campus promoting various aspects of a HKBU education; see accompanying photograph.

7. Concluding Remarks

Initially the goals of the program were:

- to increase undergraduate students' interests in pursuing advanced degrees in the mathematical sciences;
- to provide participating students with a high quality international research experience in the mathematical sciences.

As a result of implementing and evaluating the first year of the REU program, the first goal was modified. The participating students did not uniformly display an increase in their interest in pursuing advanced degrees in the mathematical sciences. In fact, most of the students maintained their original intentions, i.e., to pursue an advanced degree and a career in the mathematical sciences. Students entered the program because they already had interests in this area. Participation in this REU experience did help the students to clarify their career objectives. Consequently, we refined the goal as follows:

- to provide students interested in pursuing an advanced degree in the mathematical sciences with a better understanding of the nature of mathematical research and mathematical careers.

Based on our assessment and evaluation activities, the project outcomes and post-program achievements, there is ample evidence to indicate that the revised first goal and the original second goal were achieved. Furthermore, based on the work of [1], the student weekly reflections suggest that the participating students were progressing toward global competency. For the Hong Kong research mentors, however, the benefits were not so obvious. Acting as a student supervisor required a significant amount of time and effort and the Hong Kong faculty did not receive financial compensation nor did they necessarily receive institutional recognition for their efforts. The NSF does not provide funds for foreign faculty participants.

The decision not to apply for additional funding for the continuation of this program beyond 2008 was two-fold. First, the principal investigator, Dr. Fairweather, was retiring from CSM to accept a non-academic position. Second, considerable demands had already been placed on the Hong Kong universities and their faculty. Additional requests for their time did not seem reasonable. For a complete report, see [3].



2007 REU student on a poster at HKBU

Acknowledgments

We wish to thank the Hong Kong research mentors, Drs. Eric Fung, Leevan Ling, Michael Ng (who also served as the Hong Kong REU Director), Tao Tang, and C. S. Tong of HKBU; Raymond Chan, Jeff Wong and Jun Zou of The Chinese University of Hong Kong; Filipe Cucker, Benny Hon and Weiwei Sun of the City University of Hong Kong; and Cedric Yiu and Leong Kwan Li of Hong Kong Polytechnic University. We are grateful to Dr. X. Q. Jin of the University of Macau's Department of Mathematics for arranging the visits to Macau. Special thanks go to the administrative staff of the HKBU Department of Mathematics for assistance, guidance and support during the course of the program. We also thank the NSF for its financial support of this endeavor (grant DMS-0453600).

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牛頓在他的“非典”時期

蔡天新(浙江大學數學系)

(摘自中國數學會通訊)



蔡天新, 1963年出生於浙江台州, 1978年考入山東大學控制理論專業, 讀研時轉為數學方向, 1987年在潘承洞院士指導下獲博士學位, 現為浙江大學數學系教授、博士生導師。既主持數論方向的國家自然科學基金, 也主持外國文學方向的國家社會科學基金, 新近出版的《數學與人類文明》被列入國家級規劃教材, 科學隨筆集《難以企及的人物》也即將問世。

蔡天新也是一位著名的詩人和作家, 有多首(篇)作品入選《中學語文》和《大學語文》新讀本, 曾擔任安高詩歌獎、中國博客網大賽、日本世界俳句大賽、瑞士「中國藝術專案」的評委, 他的作品被譯成英、西、法、意、德和日、韓、阿拉伯語、波斯語, 世界語等18種文字, 有7種外版書籍面世, 先後有20次應邀參加五大洲國際詩歌節和文學節, 包括香港國際文學節, 並在巴黎、康橋等城市舉辦個人朗誦會。

Professor Cai is a professor of mathematics at Zhejiang University. He is also considered to be one of the most active young Chinese avant-garde authors with many publications on mathematics culture.

1.

20世紀最偉大的數學成就被認為是“費馬大定理”的證明, 任何一位知道畢達哥達斯定理的人都能理解這個定理的含義, 簡而言之, 如同費馬本人所表述的, 就是“不可能將一個高於二次的冪寫成兩個同次冪的數之和。”

費馬如今被譽為“業餘數學家之王”, 1601年, 他出生在法國南方, 在方濟各會修道院學習以後, 擔任圖盧茲議會上訪接待室的法律顧問一職。費馬的仕途頗為順利, 很快成為當地有頭有臉的人物, 甚至有資格以德(de)作為姓氏的一部分。可是, 這並非他的雄心所致, 而是因為當時蔓延歐洲的腺鼠疫的緣故, 倖存者被提升去填補死亡者的空缺。

這場鼠疫也被稱為黑死病(Black Death), 大約開始於1346年, 其發源地眾說不一。有人認為起源于美索不達米亞, 因十字軍東征傳播到其他地區; 也有人認為起源于南俄羅斯或中亞, 先是向西經由亞美尼亞到小亞細亞、埃及和北非, 同時由一條遠航黑海之濱克裏米亞的熱那亞商船攜帶到亞平寧半島和西歐, 並多次襲擾英國。稍後, 它又向東傳至中國。據有關文獻記載, 中國的死亡人數多達1300多萬, 其中包括因為社會動盪造成河堤失修和洪水氾濫淹沒的鄉鎮人口。不過, 這還只是歐洲死亡人數的二分之一。當時歐洲的總人口才一億, 其中義大利和英國的人口減少了一半(牛津大學失去了三分之二的學生)。

這場災難的傳播速度非常緩慢並時有反復, 前後持續了3個多世紀, 這與當時的醫學水準、交通媒介和各民族之間的相互疏遠不無關係。鼠疫爆發的時候, 著名的阿拉伯旅行家伊本·巴塔圖已經在中國, 當他返回到大馬士革時才初次遇上。假如我們注意到以下事實, 那麼這一滯緩就容易理解了。16世紀初, 由於美洲貴金屬的發現, 引起了歐洲曠日持久的物價上漲, 將近半個世紀以後, 才波及到利沃夫——基輔以西五百多公里處的烏克蘭城市。即使到了19世紀中葉, 非歐幾何學的創始人之一、俄國數學家羅巴切夫斯基在其伏爾加河畔的故鄉喀山發表了劃時代的工作以後, 由於資訊不流通和語言的障礙, 10多年以後, 這項研究成果才被西歐的同行知曉, 並差點被比他年輕9歲的維也納工程兵中尉鮑耶搶去頭功。



1652年，鼠疫再度在法國南方徘徊，這一回甚至連一向深居簡出的費馬也染上了，他病得如此厲害，以至於一位朋友迫不及待地向他的同事宣告了他的死亡。但沒過幾天，這位朋友在給一個荷蘭人的信中糾正道：

前些時候，我曾通知您費馬的逝世。他仍然活著，我們不再擔心他的健康，儘管不久以前我們已將他列入死亡名單之中……

信中沒有出現任何道歉的字眼，顯而易見，類似的差錯在當時已經司空見慣。

費馬後來又活了13年，直到64歲時，他到鄰近省份的一個小鎮執行公務，不幸染上了另一種疾病後去世。我們可以這樣推測，由於仕途的順利，不必為生計擔憂，以及對社交生活的適時回避，使得費馬能夠安心地從事業餘數學研究，並最終成為17世紀法國最有成就的數學家。

2.

鼠疫（Plague）和天花堪稱對人類危害最大的兩種傳染病，有趣的是，它與歐洲最美麗的城市——捷克首都布拉格（Prague）僅相差一個捲舌的輔音字母。鼠疫主要通過齧齒類動物（特別是野鼠和家鼠）和它們身上的蚤類傳播，它本是一種地方性獸疫，但當病獸大批死亡，蚤類另覓宿主，人被叮咬後即可感染。起初，鼠疫只是散發，時機成熟以後就會造成大規模的流行。鼠疫主要分為腺鼠疫和肺鼠疫兩大類，前者病例較多，也相對溫和，費馬感染上的即屬此類；後者發病很急，傳染性極強，臨床表現為支氣管肺炎、肺水腫、虛脫或腦損傷。



當席捲歐洲大陸的那場鼠疫於1664年通過英吉利海峽上的輪渡再次抵達英倫時，腺鼠疫轉變成了肺鼠疫，危害也達到了頂峰。所幸的是，它被大西洋所阻隔，沒有抵達美洲。當時的歐洲，城鎮受害大於農村，修道院受害又大於居民區。由於鼠蚤出沒無常，即便有權有勢的人也難以倖免。在西班牙，阿拉貢王后和卡斯蒂利亞國王死于鼠疫。在英國，公主在出嫁西班牙途中死於波爾多，坎特伯雷相繼失去了兩位大主教。在法國，阿維尼翁（當時教皇和教廷所在地）的法庭成員減少了四分之一。

當鼠疫抵達歐洲的第一個落腳點——義大利時，人文主義者兼詩人彼特拉克不僅失去了庇護人，也失去了他深愛著的繆斯——蘿拉。但這可能是一場純粹的單相思，至今無人能考證出蘿拉的確切身份，猶如達·芬奇的蒙娜·麗莎之謎。彼特拉克本人後來把自己的抒情詩分成兩卷，即《蘿拉在世時所作》和《蘿拉死後所作》，那是從心靈裏吐露出來的既明晰又意在言外的愛和憂傷，是幾個世紀以來錘煉得最完美、也最有生命力的文學作品。

對歐洲來說，這場鼠疫的後果既是多方面的，又讓人意想不到。首先，它使得戰爭停止，貿易和經濟衰退，但那只是暫時現象。更久遠的影響是，由於大量農民死去而讓耕地荒蕪，勞力的短缺迫使地主通過提高工資等手段挽留佃農，這給長期以來僵硬不化的各社會階層之間的關係帶來一種新的流動性。自那以後，歐洲各國的農民起義便層出不窮，這使得共產主義思想的萌芽有了適宜的土壤，同時也為17世紀的啟蒙運動開啟了方便之門。

其次，黑死病的陰影逼迫阿爾卑斯山以北的人們更多地去思考死亡和來世。這除了充分反映在文學、繪畫作品中以外，還促使人們轉向對生存含意和神秘主義的探索，天主教教會（在義大利以外）也逐漸失去了它在拯救人的心靈方面的權威。這在某種程度上為16世紀馬丁·路德的宗教改革創造了良機，他的理論核心是人的得救只能依靠自己的信仰，他還身體力行地反對牧師不得結婚的教規。

可是，這場鼠疫在歷史上既非第一次，也不是範圍最廣的一次。1894年，鼠疫突然在中國廣州爆發，在隨後的20年間傳遍亞、歐、美、非等60多個國家，死亡達一千萬人以上。在中國當時受波及的主要為南方各省和香港，僅雲南省就有10萬多人死亡。此次鼠疫流行傳播速度之快、波及地區之廣，創造了歷史之最。這次流行的特點是疫區多分佈在沿海城市，家養動物也在其中。不過，控制也比前幾次迅速，因為當時已發現了鼠疫的病原體——鼠疫桿菌，初步弄清了鼠疫的傳染源和傳播途徑，並加強了國際間的合作和檢疫隔離措施，使人類與鼠疫的鬥爭進入到了科學階段，最終比較快地結束了流行。

鼠疫桿菌的學名叫耶爾森氏菌，耶爾森（1863—1943年）是瑞士出生的法國細菌學家，早年就讀于洛桑大學和巴黎大學等名校，後受聘于巴黎的巴斯德研究所。1890年，耶爾森到印度支那開始了4年的探險生涯，恰好遇上鼠疫大爆發，隨即他來到香港，不久即與日本醫師、細菌學家北裏柴三郎（1852—1931年）幾乎同時發現了鼠疫桿菌。次年，他又製成了治療鼠疫的血清。之後，耶爾森返回了越南，把自己的餘生獻給了這個落後的東方國家，據說是他首先把橡膠樹引入印度支那，使天然橡膠成為今天越南的支柱工業。耶爾森在河內創辦了一座醫學院，在中部慶和省的首府芽莊創辦了專攻細菌學和微生物學的巴斯德研究所並自任所長，直到在那裏去世。

2003年，在沒有任何徵兆或警告的情況下，一場突如其來的非典型傳染性肺炎（SARS）迅速蔓延到五大洲30多個國家，尤以中國大陸和香港為甚。雖然一度人心惶惶，但是，有現代科學技術作為保障，在各國政府和世界衛生組織的通力合作下，這場疾病的死亡率和物質、精神方面的損害都降低到了最低限度。時至今日，我仍有兩個疑問想留給流行病學專家和細菌學家：

- 1) 為何在相隔一個多世紀以後，廣東會再次成為世界範圍內流行的傳染病的策源地？
- 2) 為何當薩斯病魔依然在附近地區猖獗的時候，仍屬於發展中國家的越南能夠率先摘掉“非典疫區”這頂帽子？

3.

現在，讓我們回過頭來談談英倫那場空前絕後的災難。據記載，1665年夏天的兩個月間，僅倫敦死於鼠疫的人數就達到了5萬，即使是鄉村，有些地方活著的人都來不及埋葬死者。半個世紀以後，當法國的馬賽再次流行鼠疫時，《魯濱遜漂流記》（1719年）的作者、英國作家丹尼爾·笛福為了滿足國民的好奇心，寫出了《瘟疫年紀事》（1722年），將當年倫敦那場鼠疫的發生、傳播，它所引起的恐怖和惶惶的內心，以及死亡的景象寫得猶如身臨其境。這部小說成為文學史上有關疾病的經典之作，可是，笛福本人出生在1660年，書中有不少素材取自於前人的記憶，這裏我想從當時一位元記者的日記裏摘錄一個真實的片段：

一對母女從外面回到家，女兒說頭有點痛，母親趕緊安頓女兒躺下。她提著油燈看了看女兒的身體，不幸的是她看到了黑死病的標誌——腫大的腹股溝淋巴結。母親瘋了似地奔向大街，兩個小時後女兒死在床上，一個星期後母親也死去。

幾個月後，一場大火（史稱“倫敦大火災”）燒毀了倫敦的大部分建築，老鼠和跳蚤銷聲匿跡，鼠疫流行也隨之平息。

這場大火無疑是一個奇跡，此外，還有另一個奇跡也與鼠疫相關，聽我慢慢道來。1642年的耶誕節，在英格蘭偏僻的小村莊伍爾斯托帕誕生了一個男孩，他的名字叫以撒·牛頓。在他出生前兩個月他的父親就去世了，母親管理著丈夫留下來的農莊。兩年以後，母親改嫁到了鄰村，小牛頓被交給祖母撫養。後來，他在低水準的鄉村學校裏接受教育，除了對機械設計略有興趣以外，沒有顯露出任何特殊的才華。可是，牛頓還是勉強考取了劍橋大學三一學院，儘管他的歐幾裏得幾何答卷有明顯的缺陷。他在大學裏繼續默默無聞地學習，很少受到老師們的鼓勵，有一次，他幾乎要改變方向，從自然科學轉向法律。幸好沒有，他得到了繼續深造的機會。

本來，牛頓可能和其他按部就班的研究生一樣，在教授的指點下循序漸進。可是，因為倫敦流行的那場可怕的鼠疫，劍橋大學放假了，並且一放就是兩年。23歲的牛頓回到了自己的故鄉伍爾斯托帕，那是在劍橋郡北面的林肯郡。牛頓在故鄉安靜地度過了1665年（費馬去世）和1666年，這使得他有足夠的時間進行獨立思考。牛頓開始了數學、力學和光學上的一系列偉大發現，他獲得了解決微積分問題的一般方法，觀察到太陽光的光譜分解，並提出了力學上的重要定律。假如法國哲學家伏爾泰的描述正確的話，牛頓是在自己農莊的果園裏，看見一隻蘋果墜落時發現了萬有引力定律。多年以後，牛頓故鄉的一棵蘋果樹被移植到劍橋三一學院的門外，供遊人瞻仰。

在牛頓的同母異父妹妹的後裔保存下來的一份牛頓手稿裏，有這樣一段描述：

……這一切都是1665與1666兩個瘟疫年份發生的事，在那些日子裏，我正處於創造的旺盛時期，我對於數學和哲學，比以後任何年代都更為用心。

兩年以後，牛頓回到劍橋，順利取得了碩士學位（那時碩士和博士的含義基本上是一致的，只是在不同國家的不同名稱而已），並被選為三一學院的研究員。兩年以後，他的導師巴羅主動讓賢，年僅27歲的牛頓擔任了著名的盧卡斯講座教授。



4.

當牛頓於1664年4月離開劍橋返回故鄉躲避鼠疫時，沒有人意識到，他剛剛完成的大學生活是高等教育史上最有成效的學習階段。這首先歸功於新哲學的影響力。牛頓進入劍橋時，一場被稱為科學革命的運動已經在歐洲進行得如火如荼，開普勒把哥白尼提出的宇宙太陽中心說加以完善，伽利略提出了自由落體運動和慣性定律，而笛卡兒已開始為自然界提供新的概念，他的哲學思想的核心就是：懷疑一切，“我思故我在”。可是，當時包括劍橋在內的大學教授們對這些進步都熟視無睹，他們仍然固守亞里斯多德的頑固堡壘，主張宇宙的地球中心說，同時只是定性而不是定量地研究自然界。也就是說，那個年代的大學尚未成為科學、哲學研究的中心和前沿。

其實，在接受高等教育之初，牛頓和成千上萬的大學生一樣，也沉迷於亞里斯多德的學說。可是不久，他從社會傳聞而不是從課堂上瞭解到了笛卡兒的新哲學，開始相信物理世界是由運動著的物質粒子所組成的。即使在革命性較弱的數學領域，牛頓從學習笛卡兒的解析幾何入門，掌握了用代數方法解決幾何問題的方法，然後又轉回去學習經典幾何學。眾所周知，為了避免伽利略所受的那種牢獄之苦，笛卡兒的《幾何學》是作為他的哲學著作《方法論》的附錄3出現的，因而不在此統的教科書之列。牛頓從中獲得啟示，得到了二項式定理，再借助費馬的畫切線方法，發展了微積分，可以用來求曲線的斜率和曲線下的面積。簡而言之，牛頓的特殊教育和養料是經由大學時代的閱讀閒書和道聽塗說（可否稱之為另類選課？）獲得的，這促使他此後在鄉村度過的兩年時光裏才情勃發。

回顧科學史上那些赫赫有名的人物，相當一部分都是接受了非常規或非典型的教育和思想，並且在相對缺少約束和壓力的情況下成就了自己的事業。以愛因斯坦為例，他早年對嚴厲而又學究式的德國教育感到厭煩和恐懼，幸好他是個有才藝的小提琴手，這有效地保留了他的激情和自信。15歲那年，由於在歷史、地理和語言課程成績太差，愛因斯坦沒有取得文憑就離開了慕尼黑的預科學校，主動放棄了德國國籍。後來，他來到蘇黎世的瑞士聯邦工業大學求學，成績並不十分突出，畢業後在伯爾尼專利局做了一名專利員，利用業餘時間完成了一生最主要的工作——狹義相對論，包括現在人們熟知的質能轉換公式。這是自牛頓以來最重要的科學發現，而愛因斯坦工作的推動力來自於數學家新建立的四維時空結構。

需要指出的是，最早意識到亞里斯多德的三段論法工具(或曰工具論)已經過時，不能滿足科學發展需要的哲學家並非笛卡兒，而是牛頓的英國前輩弗蘭西斯·培根。培根是掌璽大臣的兒子，就讀的恰好也是劍橋的三一學院。只不過他在校期間因為體質孱弱，常有疾患之苦，繼而產生厭學情緒。雖然如此，培根仍是劍橋人的驕傲，在三一學院著名的禮拜堂內，牛頓的塑像立在最中心的位置，在他前面的5位院友中，就有正在打瞌睡的培根。培根畢業以後，很快建立起法學家和政治家的聲譽，後來卻不幸被政敵控告受賄，囚禁於倫敦塔。釋放以後，培根被迫退出政治舞臺，從而過上隱居寫作的生活，並成為享譽世界的散文大家。

與此同時，培根也建立起了他的科學理論和方法，其核心是歸納法推理。他認為，之前所有有關自然的信念體系缺乏嚴格的證明，原因在於對從中做出推論的一般性命題處理不當。它們或者是只憑一兩件事情便匆匆做出判斷，或者是依據眾所周知和普遍認可的事實而不加鑒別地被認為是不證自明的。遺憾的是，這種新工具並沒有被數學家們賞識，因為歸納法畢竟只是其中的一種方法，他忽略了包括演繹法在內的其他工具。培根也不關心當時最重要的自然科學進展，如開普勒的行星三大運動定律和哈威的血液迴圈理論，雖然他本人是這位醫生的一個病人。不過到了19世紀，隨著達爾文的出現和生物學的進展，培根的方法和思想終於有了用武之地。

最後，我想談談牛頓返回劍橋以後的情況。出於幼年時代產生的一種害怕批評的心理（他一直憎恨他的繼父），牛頓並沒有急於公佈他的偉大發現，尤其是在他發表了一篇光學論文之後，立即遭到同行權威的責難和圍剿，這讓他大吃一驚，此後很長一段時間沒有公開發表論文。牛頓在萬有引力定律及其應用方面的工作是在天文學家哈雷的勸告和催促下發表的，而包含微積分學理論在內的數學名著《自然哲學的數學原理》（1687年）則是在哈雷的協助編輯和資助下出版的。這裏必須提及的是，1684年，身為牛津大學教授的哈雷主動來到劍橋，向年輕的牛頓請教行星運動的力學解釋，兩人由此建立起了深厚的友誼。

1701年，牛頓遷居倫敦，此前他已經基本上放棄了學術生涯，擔任不列顛造幣廠廠長（後又擔任局長）。在以後的27年時間裏，他沒有做任何科學研究，而是把時間奉獻給了自己缺乏創造力的神學研究，與此同時，認認真真地做好本職工作。據說，牛頓非常注意防止偽幣，成為偽幣製造者的死對頭，有一些人因此上了斷頭臺。按照女王伊莉莎白一世對三一學院院士所要求的那樣，牛頓終生未婚。事實上，除了母親之外，他與女性接觸很少，而母親當年幾乎遺棄了他，因此母子關係也不是非常融洽。當牛頓去世時，身邊只有與他同住的一個外甥女和她的丈夫。或許，我們可以這樣認為，作為有史以來最偉大、最有影響力的科學家，牛頓一生的主要工作在他學生時代躲避鼠疫的那兩年時間裏就已經完成了。

Mathematics Conferences in 2009



International Conference on Engineering and Computational Mathematics (PolyU, 27-29 May 2009)



International Conference on Asymptotic Analysis and Infinite-dimensional Dynamical Systems (CityU, 19-22 June 2009)



Workshop on Mathematical and Computational Imaging (HKBU, 10 July 2009)

University	Conference	Date
PolyU	<p>Second International Workshop on Successful Strategies in Supply Chain Management http://www.polyu.edu.hk/ama/iwsscm2/</p> <p>Organizers: Chi Kin Chan, Chairman (PolyU) H.W.J. Lee, Co-chairman (PolyU)</p>	<p>8-9 January 2009 Venue: PolyU</p>
CityU	<p>Workshop on Mathematics for Finance and Actuarial Science http://www6.cityu.edu.hk/ma/wmfas/</p> <p>Organizer: Mr. Peter LUK, Founding President of Actuarial Society of Hong Kong</p>	<p>17 January 2009 Venue: CityU</p>
HKBU	<p>ASI Symposium on Bioinformatics and Data Mining http://www.math.hkbu.edu.hk/SBDM09/</p> <p>Organizer: Centre for Mathematical Imaging and Vision, HKBU</p>	<p>26-27 February 2009 Venue: HKBU</p>
PolyU	<p>International Conference on Engineering and Computational Mathematics http://www.polyu.edu.hk/ama/events/conference/ECM2009/</p> <p>Conference Chairs: Xiaojun Chen (PolyU) Liqun Qi (PolyU) Cheong-ki Chan (PolyU)</p>	<p>27-29 May 2009 Venue: PolyU</p>
CityU	<p>International Conference on Asymptotic Analysis and Infinite-dimensional Dynamical Systems http://www6.cityu.edu.hk/rcms/ICAAIDS2009/</p> <p>Organizers: Dan Dai, CityU, H.K. Chunhua Ou, Memorial University of Newfoundland, Canada Jianhong Wu, York University, Canada Xiaoqiang Zhao, Memorial University of Newfoundland, Canada</p>	<p>19-22 June 2009 Venue: CityU</p>
HKU	<p>Workshop in Algebra http://hkumath.hku.hk/MathWWW/event/file/Workshop_in_Algebra2009june.pdf</p> <p>Organizers: Department of Mathematics, HKU</p>	<p>22 June 2009 Venue: HKU</p>
CityU	<p>Workshop on Stochastic Analysis and Finance http://www6.cityu.edu.hk/ma/wsaf09/</p> <p>Organizers: Nicolas PRIVAULT, CityU, H.K. Arturo KOHATSU-HIGA, Osaka University, Japan Chun Wah LI, CityU, H.K. Shuenn - Jyi SHEU, Academia Sinica, Taiwan</p>	<p>29 June-3 July 2009 Venue: CityU</p>
HKBU	<p>Workshop on Mathematical and Computational Imaging http://www.math.hkbu.edu.hk/cmiv/events/wmci09/photo/</p> <p>Organizer: Centre for Mathematical Imaging and Vision, HKBU</p>	<p>10 July 2009 Venue: HKBU</p>
HKBU	<p>International Conference on Preconditioning Techniques for Scientific and Industrial Applications http://www.math.hkbu.edu.hk/precond09/</p> <p>Conference Chairs: Esmond G. Ng, Lawrence Berkeley National Lab., USA Michael K. Ng, HKBU, H.K. Yousef Saad, The University of Minnesota, USA Wei-Pai Tang, The Boeing Company, USA</p>	<p>24-26 August 2009 Venue: HKBU</p>