

## SEKTIONEN FÖR DETONIK OCH FÖRBRÄNNING

The Swedish Section for Detonics and  
Combustion

affiliated with *The Combustion Institute*

[www.combustioninstitute.org](http://www.combustioninstitute.org)

**M E D D E L A N D E 2/2013**

2013-05-19



### Seventh International Disposal Conference

Organisationsarbetet fortskrider programenligt. Nja, något "2nd Circular" blev det förstås inte i mars, men här kommer det. Antalet inkomna föredragstitlar är betryggande, så nu är det mest fler anmälningar vi ser fram emot. Ett besök hos webbplatsen

[www.kcem.se](http://www.kcem.se) >

### The 7th International Disposal Conference and Exhibition

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kanske kan underlätta beslutet.

### Professor Peter Gray ur tiden



Professor Peter Gray, MA, PhD, ScD, FRSC, FRS (1926-08-25 – 2012-06-07) has died at the age of 85. He was one of the pillars of strength in the British and international combustion community throughout the latter half of the 20<sup>th</sup> century. Born in Newport, Wales, where he attended the High School, Peter in 1943 (*i.e.*, during the second world war) was awarded a Major Scholarship to study Natural Sciences at Gonville and Caius College, Cambridge. Having taken

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a BA (Hons) 1<sup>st</sup> class, in 1946 Peter began research in the Cavendish Laboratory to investigate vapour phase initiation of explosives, under the supervision of Abe Yoffe (who was present at a celebratory lunch, in Cambridge, on the occasion of Peter's 80<sup>th</sup> birthday.) Thus began a life-long interest in spontaneous ignition phenomena, but which evolved into both experimental and theoretical investigations of a much more diverse range of topics.

Perhaps it was the interdisciplinary background of his early years that spawned the 'intellectual wanderlust'. Still working in conjunction with Bowden and Yoffe on explosives, Peter became a Ramsay Memorial Fellow at Gonville and Caius College (1949-1951) and a University Demonstrator in the Department of Chemical Engineering (1951-1955). Then, departing from Cambridge in 1955 to appointments at Leeds University, Peter held posts in the Department of Physical Chemistry as Lecturer and Reader. A Personal Chair was conferred in 1962. He became Professor of Physical Chemistry in 1965, and remained as Head of Department for 23 years. This was a rich and rewarding period, not just for Peter, but for Leeds University and UK combustion as a whole.

Gas-phase studies were initiated in his early research at Leeds; they included chemical kinetic measurements, Alan Williams being the first associate in that work, with particular interest in reactions of alkoxy radicals. Spherically propagating flame studies also entered the portfolio, at David Smith's hands, using schlieren imaging to a rotating drum camera. The techniques have become very popular again, albeit with different technology and with the important difference that flame stretch effects, of which there had been no appreciation, are now routinely included. There was also a simultaneous attack on thermochemical and vapour pressure measurements and the application of thermal analysis. Measurements of gas-phase thermal conductivity and of diffusion coefficients were also begun in the Department of Physical Chemistry, in a well-rounded attack on the comprehensive understanding of flame propagation. These important investigations carried through into Graham Dixon-Lewis's computations of laminar flame structure, (and subsequent work of others elsewhere), and by this route into Derek Bradley's flamelet modelling in turbulent combustion, both of whom were in other Departments at Leeds.

Within the Department itself, Peter instilled a strong sense of commitment to undergraduate teaching of the highest quality. "Students come first", was a maxim by which he stood. His own lectures were to be savoured and enjoyed – certainly when one was not, eventually, to face an examination of the content. They were peppered with anecdotes about the people behind the illustrious names, which breathed so much life into the subject. When Peter left Leeds he endowed an annual prize in the School of Chemistry, "The Peter and Barbara Gray Prize", to be awarded to the student who had made the most outstanding contribution to the School of Chemistry, taking particular account of non-academic aspects of University Life. How typical!

His conferences presentations were an exercise of clarity and simplicity. They were never heavy going, always light-hearted and invariably tinged with humour, such as (at a Gordon Conference on non-linear dynamics, in the '80s) by reference to Andronov, Vitt and Khaikin, 'Theory of Oscillators', the throw-away line, "800 pages, three dollars, you can't get better value than that."

Also at Leeds University, Peter always promoted links to other researchers and was an architect, in 1967, of the Centre for Combustion – a consortium drawn from the combustion interests within the Departments of Fuel and Energy, Mechanical Engineering, and Physical Chemistry, for the purpose of post-graduate teaching through the MSc course in Combustion, and for joint research. Throughout most of its existence, 20-30 tenured academics were engaged in the Centre's activities. Over the years, Peter also attracted many very distinguished visitors to Leeds on short-term Fellowships, amongst whom, from the combustion and engineering community, were Rutherford Aris, Sidney Benson, Tony Oppenheim, Pierre Van Tiggelen and Heinz Wagner. At Peter's instigation, Philip Bowes enjoyed a long-term Visiting Fellowship, as also did the distinguished physical chemist, Ronnie (R.P.) Bell.

The '60s also heralded an astonishingly prolific four decades of research in Leeds. It began with the measurements of temperature change, using very fine thermocouples, for the direct validation of Frank-Kamenetskii's thermal explosion theory in low pressure gases (<20 Torr). These important studies were linked with contemporary investigations in Manchester, by Sandy Ashmore and his group. Definitive theoretical developments on thermal ignition followed, with a formidable research team including Terry Boddington, Brian Gray and Steve Scott, advancing understanding of thermokinetic phenomena (cool flames and autoignitions) and the spontaneous low temperature combustion of hydrocarbons. Peter was a student and admirer of Russian work, especially that of Semenov, Frank-Kamenetskii, Merzhanov, Sal'nikov and Zel'dovich. How fitting then that, at Peter's funeral service in his Cambridge College, the choir sang a Russian *Kontakion*.

Notable in this seminal work, on the experimental side with John Griffiths, was the development and exploitation of small-scale, well-stirred flow reactors. Important and novel interpretations of the combustion of mixtures of  $\text{CO} + \text{H}_2 + \text{O}_2$  emerged from these investigations. The recognition of how the theory and experiment impinged on the stability issues that were simultaneously exercising chemical engineers' minds in chemical reactor theory, opened up the much wider subject of 'nonlinear dynamics'. Peter's work on the oscillatory nature of cool flames and his knowledge of the chemistry and chemical engineering literature – and in particular of Russian combustion literature – positioned the group at Leeds as a leading centre in the 1980s and '90s in the emerging field of chemical instabilities and chaos through studies of thermokinetic feedback and chemical autocatalysis. Peter was instrumental in the creation of the Centre for Nonlinear Dynamics, at Leeds in 1984, fostering even more interdisciplinary research across a wide range of Departments, with Applied Mathematics at its core.

However, of all Peter's contributions to combustion, and combustion kinetics in particular, the one which has made the widest impact must surely be that of his foresight in establishing a project to assess elementary kinetic rate data. The outcome was published initially as the blue-bound 'Butterworth' tomes (1972, 73 and 76). This project has its lineage from 1967 in the Department of Physical Chemistry, where it was directed by Don Baulch, and continues to be updated periodically by a highly respected team of kineticists from around the world. No combustion kinetics modeller would be able to function without this documentation.

During his distinguished career, Peter was awarded many major prizes, including the Meldola Medal of the Royal Institute of Chemistry (1956), the Marlow Medal of the Faraday Society (1959), the Bernard Lewis Gold Medal of The Combustion Institute (1978), "for brilliant research in the field of combustion, particularly on theoretical and experimental thermochemistry of combustion", and the Italgas Prize (1988). Peter was elected as a Fellow of the Royal Society in 1977.

A founding member of the British Section of the Combustion Institute, in 1954, Peter joined its Committee in 1974, serving until 1982, and was 'Host Chairman' for the 17th International Combustion Symposium, when it was held at Leeds University during that period. He was re-elected to the Committee as its Chairman, in 1986, and held this post until 1992. Peter was then appointed a Life Member of the Committee and contributed to its meetings, almost without exception until 2010 and often with a key mission to find money to enable graduate students to go to conferences. He served on the Editorial Board of *Combustion and Flame* in the late '70s. Peter was also a Member of Council of the Faraday Society from 1965, its Treasurer from 1973, one of its Vice Presidents from 1970 to 1983 and again from 1985 to 1990, and its President in the intervening years (1983-1985). He was an Associate Editor for *The Royal Society* (1983 - 1987).

Peter's first contribution to the International Combustion Symposia was at the 5<sup>th</sup> Symposium, in 1954. He gave an invited lecture at the First Specialists' Meeting of the Combustion Institute ("Colloque International Berthelot – Vieille – Mallard – Le Chatelier"), at Bordeaux (1981), and he presented the Hottel Lecture at the 23<sup>rd</sup> International Symposium, in Orleans (1990). He

enjoyed Visiting Fellowships to a number of prestigious institutions in Europe and elsewhere throughout the world. He was awarded honorary degrees from many overseas universities and received an honorary DSc from Leeds in 1997.

In 1988 Peter was invited to become Master of his old College, Gonville and Caius, in Cambridge. He retired from the Mastership in 1996, but remained as a Life Fellow of the College. These later years at Cambridge were far from easy. Quite early on, Peter's first wife, Barbara, died, so he lived alone in the large Master's Lodge for some time. Happily, as a result of his subsequent marriage to Rachel, this particular cloud lifted just before he retired. In the meantime, given the options, "I can choose either to make an impression or not", there could be only one course for Peter to adopt. He threw himself into being a Committee man in Cambridge. He served on the Council of The Senate and The Financial Board – both very substantial jobs – as well as chairing The Faculty Board of Engineering and The Cambridge Philosophical Society. In all of these roles he promoted the participation of women and young members of staff. He was a great listener and showed huge patience with the young, especially the reformers. He tried hard to make Cambridge less stuffy and daunting, so that those who originated from unusual backgrounds would be able to flourish there.

He liked to think of his College as a friendly, liberal one, which cared about people, intellectual ideas and academic distinction, but could also organise a first-class party. He used the splendid facilities in his College to offer considerable hospitality. That is not to imply that being Master of a well-endowed Cambridge College was a sinecure. All decisions are reached democratically and that creates problems when everyone disagrees about how to spend the College's money. After considerable debate, during Peter's reign, Caius spent a lot of money buying adjacent property from the University, so that its wonderful library could be extended.

In these years he served also as Chairman of Cambridge University's, Schiff Foundation (1989-1995) and Oppenheimer Fund (1988-1995). He was a member of the Advisory Council for the Ramsay Memorial Fellowship Trust (1982–2002) and he was a Trustee of the Edward Boyle Memorial Trust (1989-1998). These responsibilities did not entirely swamp Peter's scientific activity, the main achievements of which culminated in the publication of the text book *Chemical Oscillations and Instabilities* (P. Gray and S. K. Scott). He gained immense pleasure from continued engagement with students, particularly through a final year course that he taught in the Department of Chemical Engineering at Cambridge, whilst maintaining links with Leeds and also combustion colleagues abroad.

The last years were made considerably more difficult by failing eye sight as a result of macular degeneration. Peter remained passionate about science and, with no diminution in his determination, continued to attend as many of the British Section one-day meetings as possible – as is exemplified by his having travelled alone to Leeds by train, in 2008, for the meeting on 'Transportation Biofuels'. Peter did find time for other activities. He was an avid reader – an aficionado of Milton – and, despite his impaired vision, with the same determination he continued to read widely. He loved walking and, throughout the Leeds years, was richly rewarded by easy access to the magnificent Yorkshire Dales, which he so enjoyed.

Clear and acute in thought, Peter possessed the rare skill of being able to anticipate the potential consequences of his actions, perhaps three or more steps further down the line. It contributed to his talent as a supreme leader. But amongst his greatest qualities by far, in this regard, were his ability to inspire individual skills and to foster group fellowship. He engendered the utmost loyalty and respect: anyone within Peter's orbit automatically aspired to his or her very best. His magnanimous apportioning of credit and his generous dispensing of praise were almost to a fault. Peter's friendship was unconditional. There are several generations of colleagues and friends, now dispersed throughout the world, who owe an inestimable debt to this wonderful person. He was much loved by all who knew him.

John Griffiths  
University of Leeds

Allan Hayhurst  
University of Cambridge

### Kompetenscentrum för energetiska material (KCEM)

För information om kurser, möten, seminarier och konferenser – inkluderande D 7 –, gå in på [www.kcem.se](http://www.kcem.se).

### EUExcert

Aktuell information om EUExcert hittar man på webbplatsen [www.euexcert.org](http://www.euexcert.org).

### Kalendarium, konferenser

2013

- 05-25      **10th International Workshop on Pyrotechnic Combustion Mechanisms**  
Valencia, Spanien. [www.ipsvalencia2013.com](http://www.ipsvalencia2013.com)
- 05-27--31      **The 39th International Pyrotechnics Seminar.**  
Valencia, Spanien. [www.ipsvalencia2013.com](http://www.ipsvalencia2013.com).
- 06-25      **2nd Topical Workshop: Kinetic Studies of Flames & 6th European Combustion Meeting**  
Lund. [Alexander.Konnov@forbrf.lth.se](mailto:Alexander.Konnov@forbrf.lth.se).
- 06-25--28**      **6th European Combustion Meeting.**  
Lund. [www.ecm2013.lth.se](http://www.ecm2013.lth.se).
- 06-25--28      **44th International Conference of the Fraunhofer ICT.**  
kommer att bli att handla om *reaction behaviour*.  
[www.ict.fraunhofer.de](http://www.ict.fraunhofer.de).
- 07-14--17      **49th AIAA/ASME/SAE/ASEE Joint Propulsion Conference and Exhibit**  
"Advanced Propulsion Capabilities in a New Fiscal Reality", samkörd med  
**11th International Energy Conversion Engineering Conference (IECEC).**  
I anslutning till konferenserna hålls på torsdagen och fredagen en tvådagarskurs  
om  
– Liquid Propulsion Systems – Evolutions and Advancements;  
– A Practical Introduction to Preliminary Design of Air Breathing Engine;  
– Missile Propulsion Design and System Engineering.  
San José, Kalifornien, USA.  
[www.aiaa.org/jpc2013](http://www.aiaa.org/jpc2013) eller [www.iecec.org](http://www.iecec.org).
- 07-29      **2nd Heat flux burner workshop.**  
Warszawa. [l.m.verhoeven@tue.nl](mailto:l.m.verhoeven@tue.nl).
- 07-29--08-03      **34th International Symposium on Combustion.**  
Warszawa. [office@combustioninstitute.org](mailto:office@combustioninstitute.org).
- 08-12--15      **40th North American Thermal Analysis Society (NATAS) annual conference.**  
Orlando, Florida, USA.  
One of the sessions will be on energetic materials and thermal hazards.  
[www.natasinfo.org](http://www.natasinfo.org).
- 09-24--27      **2013 International autumn seminar on propellants, explosives and pyrotechnics.**  
Chengdu, Sichuan-provinsen, Kina. [www.iaspep.com.cn](http://www.iaspep.com.cn). *Reaktionsmekanismer (under "combustion and detonation phenomena") är ett "main topic"*.
- 10-18--19      **International Congress on Fire Computer Modelling.**  
Santander, Spanien. [www.gidai.unican.es](http://www.gidai.unican.es).
- 11-11--13      **7th International Disposal Conference.**

Eksjö. [www.kcem.se](http://www.kcem.se); [stru.johansson@telia.com](mailto:stru.johansson@telia.com); [hans.wallin@kcem.se](mailto:hans.wallin@kcem.se)

- 11-16--17 **Projektmöte, EUExcert.**  
Katrineholm. [hans.wallin@kcem.se](mailto:hans.wallin@kcem.se)
- 11-26--29 **10th International symposium on rock fragmentation by blasting (FRAGBLAST).**  
New Delhi, Indien. [www.fragblast10.org](http://www.fragblast10.org).

## Utbildning

### Sverige:

#### **KCEM**

Närmare upplysningar lämnas på webbplatsen [www.kcem.se](http://www.kcem.se)

**MSB – Myndigheten för samhällsskydd och beredskap.**  
[www.msb.se](http://www.msb.se). Telefonväxel: 0771-240240.

### UK

För att få veta vad som tilldrar sig i UK kan man besöka den brittiska sektionens webbplats: [www.combustion.org.uk](http://www.combustion.org.uk).

#### **University of Leeds, Leeds**

Webbplats: [www.engineering.leeds.ac.uk/short-courses/](http://www.engineering.leeds.ac.uk/short-courses/). Man finner där underavdelningarna:

- \* Automotive Engineering [www.engineering.leeds.ac.uk/short-courses/automotive/index.shtml](http://www.engineering.leeds.ac.uk/short-courses/automotive/index.shtml)
- \* Civil Engineerin [www.engineering.leeds.ac.uk/short-courses/civil-engineering/index.shtml](http://www.engineering.leeds.ac.uk/short-courses/civil-engineering/index.shtml)
- \* Electronic & Electrical Engineering [www.engineering.leeds.ac.uk/short-courses/electronic-electrical/index.shtml](http://www.engineering.leeds.ac.uk/short-courses/electronic-electrical/index.shtml)
- \* Environmental Engineering & Waste Management [www.engineering.leeds.ac.uk/short-courses/environmental/index.shtml](http://www.engineering.leeds.ac.uk/short-courses/environmental/index.shtml)
- \* Fire Engineering [www.engineering.leeds.ac.uk/short-courses/fire-engineering/index.shtml](http://www.engineering.leeds.ac.uk/short-courses/fire-engineering/index.shtml)>
- \* Medical & Biological Engineering [www.engineering.leeds.ac.uk/short-courses/medical-biological/index.shtml](http://www.engineering.leeds.ac.uk/short-courses/medical-biological/index.shtml)>
- \* Particle Science and Engineering [www.engineering.leeds.ac.uk/short-courses/particles-science/ParticleScienceandEngineering.shtml](http://www.engineering.leeds.ac.uk/short-courses/particles-science/ParticleScienceandEngineering.shtml)
- \* Pharmaceutical [www.engineering.leeds.ac.uk/short-courses/pharmaceutical/index.shtml](http://www.engineering.leeds.ac.uk/short-courses/pharmaceutical/index.shtml)>
- \* Power & Process Engineering <<http://www.engineering.leeds.ac.uk/short-courses/power-process/index.shtml>>
- \* ParticlesCIC [www.engineering.leeds.ac.uk/short-courses/ParticlesCIC/ParticlesCICCourses.shtml](http://www.engineering.leeds.ac.uk/short-courses/ParticlesCIC/ParticlesCICCourses.shtml)

#### **The Royal Military College of Science, Cranfield University (Defence Academy of the United Kingdom).**

Webbplats: [www.rmcs.cranfield.ac.uk](http://www.rmcs.cranfield.ac.uk)

### USA:

**Franklin Applied Physics.** [www.FranklinPhysics.com](http://www.FranklinPhysics.com).

A 3-day training course on explosion effects and structural design for blast will be given 2013-04-09-11. [www.blastdesigntraining.com](http://www.blastdesigntraining.com), [KigerS@missouri.edu](mailto:KigerS@missouri.edu).

Electroexplosives: Functioning, Reliability and Hazards, Oaks, Pennsylvania, USA; en fem-dagars *training course* som äger rum 22-26 juli 2013.

## Litteratur

Enligt Hallands Nyheter kan hudkräm ha orsakat en lägenhetsbrand i Varberg "då en kvinna fick fly ut på balkongen. En kemisk reaktion mellan krämen och textilen kan vara det som ledde till att tyget självantände". Kan det? Någon som kan förklara?



SWEDEC

**THE SWEDISH SECTION FOR  
DETONICS AND COMBUSTION**  
affiliated with The Combustion Institute

and

**The Competence Centre for Energetic Materials, KCEM**

invite you to participate in

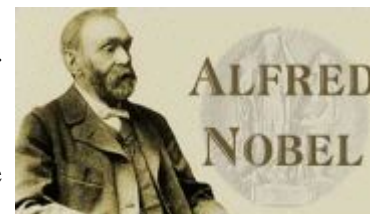
***The Seventh  
International Disposal Conference and Exhibition  
11th-13th November, 2013***

**Hosted by SWEDEC (Swedish EOD and Demining Centre) at EKSJÖ Sweden**

**Second Circular, May 2013**

**Call for (more) papers**

Disposal of waste means environmentally friendly and resource-conserving recovery of material and energy as well as landfilling or volume reduction by burning in the field. The International Disposal Conference Series focuses on reaction zone-related materials (*e.g.*, propellants and explosives in ammunition) and zone reaction-related processes (*e.g.*, waste incineration). Related problems are self-ignition (uncontrolled “disposal”) and remediation of contaminated soil.



**We are now organising the 7th conference in the series and are soliciting papers on:**

- sustainable disposal and recycling of energetic materials;
- recovery of ammunition, demilitarisation;
- handling of energetic waste in the production of explosive materials;
- remediation of contaminated soil, *e.g.*, in the production or use of pyrotechnic items such as propellants, explosives and others;
- detection of buried ammunition and mines, *e.g.*, construction sites or in conflict zones.
- energy recovery from waste: fuel preparation, burning technique, flue gas cleaning, ash treatment and disposal/material recovery, etc.;
- self-ignition-chemistry, case studies, prevention, extinguishing techniques;
- fundamental studies on self-propagating chemical reaction zones. Their creation (ignition), properties, behaviour (*e.g.*, deflagration-to-detonation transition), extinguishing;
- education and training in disposal activities for safe handling of energetic materials.

Since its start in 1997, these conferences have attracted a steadily increasing international attention and have become a “must” for those wanting to be well informed of the technical and scientific development within the realm of environmentally friendly disposal by burning of waste and by recovery of ammunition and related issues.

So far, the following presentation titles have been received:

1. Calorimetric method for stability testing of propellants under field-like ordnance disposal conditions. *Dennis Taylor*.
2. Handbook for ammunition surveillance. *Lars-Erik Pettersson*.
3. Analyse-, identify-, remove-, transport, destroy-integrated response on explosives and chemical hazards. *Holger Weigel*.
4. Plant goes field – mobile solutions for destruction of ammunitions. *Holger Weigel*.
5. Solutions for tricky military materials – smoke, WP, APC, DU – high end environmental solutions. *Holger Weigel*.
6. Best practice in UK commercial EOD. *Ken Cross*.
7. An environmental model for proving grounds. *Ulf Qvarfort*.
8. Biological remediation of soil polluted with explosives. *Emma Nehrenheim*.
9. Challenges for companies which are recovering 2,4 DTN through weapons dismantling under REACH and CLP EU regulations. *Andrea Volpato*.
10. Multiple technologies for safe and environmentally friendly disposal of conventional ammunition. *Reijo Bragberg*.
11. Recycling achievements in ammunition demilitarization. *Ola Pikner*.
12. CDIO: a new paradigm in engineering education – possibilities for the explosives sector. *Matts Karlsson*.
13. A method for detecting land-mines used for detecting leaking district-heating pipes. *Stefan Sjökvist*.
14. Effect of TNT on soil fungi from military land. *Dalia Peciulyte*.
15. Demonstration of simulators for bomb disposal. *Hans Lindgren*.
16. Environmental consideration in design, development, production, use and demil of shoulder launched munitions. *Jacob Kanelbaum*.

### **Registration**

Please register on

[www.kcem.se](http://www.kcem.se) >

### **The 7th International Disposal Conference and Exhibition**

[\\_Read more Day 2 - Demonstration in Field - Register here](#)

### **Travelling**

Eksjö is easily accessed from the airports of Copenhagen/Kastrup and Stockholm/Arlanda by train or bus. More information can be found at <http://www.sj.se/>, <http://www.air-bus.se/>, <http://www.flygbussarna.se/> and <http://www.lindbergsbuss.se/>.



**Accommodation**

900-1200 SEK per night depending on room standard (preliminary).

**Conference fee**

SEK 6000 excl. VAT (ca USD 930 or 700 €). An invoice will be sent to “Final” registrants. The fee includes coffee breaks, lunches, Sunday evening buffet, conference dinner and the proceedings. *There is a reduced fee for speakers, SEK 5000 excl. VAT.*

**Lectures**

Participants are invited to present lectures of about 20 minutes' length. The conference language will be English.

**Abstracts and full papers**

Please submit your abstract at your earliest convenience to [hans.wallin@kcem.se](mailto:hans.wallin@kcem.se). We would appreciate if the size could be less than 400 words. The proceedings of the conference will be available on KCEM's web site for free download after editing.

For further information, you are welcome to contact

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Dr Stig Johansson

Dir. Hans Wallin

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