

HISTORY OF PHYSICS GROUP COMMITTEE MEMBERS

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APOLOGIES

The name of the author of the Gilbert Conference report in issue No. 8 was inadvertently missed out. It was in fact Prof. David Tilley of the Dept. of Physics in the University of Essex at Colchester. We would like to apologise for the error and thank him for producing an interesting account of the proceedings.

ACKNOWLEDGEMENTS

Front cover: John Yarwell's trade card, 1683 from 'The History of Technology' by Holmyard, Hall and Williams, Vol. 3, O.U.P., 1957, P.634.

Mountain illustration: from 'Ascent of the Matterhorn' by Edward Whymper, 1880.

DISCLAIMER

The History of Physics Group Newsletter expresses the views of the Editor or the named contributors, and not necessarily those of the Group nor of the Institute of Physics as a whole. While every effort is made to ensure accuracy, information must be checked before use is made of it which could involve financial or other loss. The Editor would like to be told of any errors as soon as they are noted please.

CALL FOR PAPERS

The title of the Joint meeting in 1996 is 'Historical views of the connection between sunspots and weather'. 1996 is the centenary of the first use of the term 'Greenhouse Effect'. Offers of papers to Dr. A. McConnell, History of Science and Technology Group, Sherfield Building, Imperial College, London, SW7 2AZ ; Dr. A.Q. Morton, Science Museum, London, SW7 2DD or Professor A. J. Meadows, School of Library Studies, Loughborough University, Loughborough, LE11 3TU.

MEETINGS ORGANISED BY THE GROUP

1994 Lord Rayleigh Centenary at I.O.P. Congress, Brighton.

History of Science Education at Clifton College, Bristol

Oliver Lodge Radio Centenary at Liverpool

1995 (Proposed)

Women in the History of Physics at I.O.P. Congress, Telford

Scientific Instruments at Oxford Saturday 13 May.

Includes visits to the Museum of the History of Science
and the Clarendon Laboratory.

Physics, Institutions and Industry at Manchester

Saturday 14 or 21 October (followed by A.G.M.)

1996 (Proposed)

Joint meeting with The Royal Astronomical Society History Group
Science Museum, May.

ADVERTISEMENT

Members who are coming along to the Oxford meeting may like to bring along any old or interesting scientific instrument that they have in their possession. A sort of Antiques Roadshow is envisaged to provide information and entertainment during the course of the day.

ARTICLES OF HISTORICAL INTEREST FROM "PHYSICS EDUCATION"

This is the second part of a listing of all those articles from Physics Education which are of historical interest, and covers the years 1981-1994. The first part, covering 1966-80, appeared in the previous edition of this Newsletter (No.8 Spring 1994). I would still welcome comment on the usefulness of such a listing, and perhaps other readers of this Newsletter may be prompted to undertake a similar task for other periodicals, such as School Science Review, Physics World, American Journal of Physics, Scientific American, etc.

If anyone has difficulty in getting hold of any particular article which may interest them, they are welcome to write to me as follows:

Stuart Leadstone, "Hallyards", South Deeside Road,
Banchory, Kincardineshire AB31 3HX.

- 1981 16 2 112-119 G N Cantor Criticisms of the projectile theory of light
16 3 178-185 J L Hawes Matter for illumination
- 1982 17 2 58-61 C W Kilmister Newton's laws of motion - rules or discoveries?
17 5 224-234 M T Casey Nicholas Callan - priest, professor and scientist
- 1983 18 2 93-97 B Gee Through a hole in the window-shutter - part 1
(Optical investigations of Newton, Wollaston and Fraunhofer)
18 3 140-143 B Gee Through a hole in the window-shutter - part 2
18 4 192-198 D P Newton The sixth-form physics textbook 1870-1980 - part 1
18 5 240-246 D P Newton The sixth-form physics textbook 1870-1980 - part 2
- 1984 19 1 20-23 E H Putley and D E Burgess Rumford and the tea-pots
- a demonstration of thermal imaging
19 2 94-100 J Strnad The second law of thermodynamics in a historical setting
- 1985 20 3 124-131 H Helm and J Gilbert Thought experiments and physics education - part 1
20 5 211-217 H Helm, J Gilbert and D M Watts Thought experiments and physics education - part 2
- 1986 21 3 180-183 A Harpax Trouton-Noble experiment
21 4 220-226 A P French Niels Bohr at 100: his life and work
- 1987 22 1 27-33 C A Russell Some founding fathers of physics
22 2 91-99 J Roche Explaining electromagnetic induction: a critical re-examination
22 2 100-106 J B T McCaughan Capillarity - a lesson in the epistemology of physics

- 1987 22 5 270-273 Y Kirsh and M Meidav The Michelson-Morley experiment and the teaching of special relativity
22 5 274-280 M Shortland That wretched Mr Hooke
22 6 330-336 W A B Evans The principia and its author - a physicist's viewpoint
22 6 337-342 R G A Dolby Three hundred years of Newton's Principia
22 6 342-349 L H Ryder From Newton to Einstein
22 6 350-354 P Drazin Fluid mechanics
22 6 388-389 C Siddons Two excerpts from Principia re-examined
- 1988 23 1 48-50 C T O'Sullivan Impulsive tensions in strings - a century of misconceptions?
23 5 266-271 J C Newby The history of rockets
23 5 272-278 N D McMillan British physics - the Irish role in the origin, differentiation and organisation of a profession
23 5 279-284 S F Adams The ghost of electricity
23 6 366-371 P Strube The presentation of energy and fields in physics texts - a case of literary inertia
- 1989 24 1 36-40 C Hellingman Do forces have twin brothers?
24 3 123-127 D Cardwell James Prescott Joule and the idea of energy
- 1990 25 4 197-201 J H Brooke The Galileo affair: teaching 'AT 17'
- 1991 26 1 46-51 J Teichmann History and historical experiments in physics education with special regard to astronomy
26 3 147-152 G T Jones In praise of Joseph Priestley - the particle physicist!
26 5 278-283 L P Williams Michael Faraday's chemical notebook: portrait of the scientist as a young man
26 5 284-312 J Bradley Repeating the electromagnetic experiments of Michael Faraday
26 5 289-293 G Cantor Faraday's search for the gravelectric effect
26 5 296-300 F A J L James Michael Faraday's work on optical glass
26 5 301-306 R D Tweney Faraday's notebooks: the active organization of creative science
26 5 307-312 D Gooding Faraday was a hands-on scientist
- 1992 27 5 248-249 R T Smith Classical origins of $E=mc^2$
27 6 334-335 M L Cooper Please sir, what else did he do? (E H Barton of "Barton's Pendulums")
- 1993 28 4 204-208 E Crawford A critique of curriculum reform: using history to develop thinking
- 1994 29 2 77-85 A Stinner The story of force: from Aristotle to Einstein
29 5 282-289 N D McMillan Extracts from the 1993 Centenary Tyndall Lecture

MAXWELL AND HIS CIRCLE

A symposium will be held on 8th April 1995 at the birthplace of Clerk Maxwell during the Edinburgh International Science Festival, organised by the James Clerk Maxwell Foundation.

James Clerk Maxwell collaborated with many of the leading scientists of his time. Distinguished speakers will discuss the importance of the following in his life and work:-

Morning Session

FARADAY by Frank James - The Royal Institution

P G TAIT by Chris Pritchard - McLaren High School

Coffee

J D FORBES by C W F Everitt - Stanford University

FLEEMING JENKIN by Rt Hon Lord Jenkin of Roding

Afternoon Session

THE MAXWELL FAMILY by David Forfar - Foundation Trustee

FROM MAXWELL'S THEORY TO SIEMENS' PRINCIPLE by Peter von Siemens -
Siemens A G Munich

WERNER SIEMENS AS ENTREPRENEUR by W Feldenkirchen - The Siemens Museum,
Munich

Tea

SIR WILLIAM THOMSON (LORD KELVIN) by M Norton Wise - Princeton University

MAXWELL AS CAVENDISH PROFESSOR by Simon Schaffer - St John's College,
Cambridge

Saturday 8 April

14 India Street, Edinburgh, birthplace of James Clerk Maxwell

9am - 5pm

Tickets: £25 (with lunch), £8 (without lunch) from:-

Secretary ICMS, 14 India Street, Edinburgh, EH3 6EZ

Tel 031 220 1777: Fax 031 220 1053

BECAUSE IT'S THERE AND I'M CURIOUS



Effet de breuvillard au Cervin
le 13 juillet 1865

CONTINUED

The Matterhorn triumph was bitter-sweet, a broken rope leaving four of the original seven climbers dead on the glacier below. Whymper was deeply affected and the direction of his life changed. His sympathies, he said, were much more with those who employed their brains as well as their muscles, and his later expedition to the Andes was planned with a view to the extended opportunities the range offered for scientific research.

Edward Whymper's reputation was made as a climber - it must be said that it rested on a good deal more than one famous 'first' - but a number of his observations are interesting. He comments, for example, that

"... the glaciers of the Dauphiné (as through the Alps generally) have shrunk very considerably. A notable diminution took place in their size in 1869, which was attributed by the natives to the very heavy rains of that year." ⁴.

This has a familiar ring yet, a century and more ago, there was not the present massive input of carbon dioxide into the atmosphere, nor today's rapid devastation and burning of the rainforest.

On the fateful descent from the Matterhorn, the survivors saw a 'fog-bow' of a curious form, when

"... a mighty arch appeared, rising above the Lyskamm, high in the sky. Pale, colourless, but perfectly sharp and defined, except where it was lost in the clouds, this unearthly apparition seemed like a vision from another world; and, almost appalled, we watched with amazement the gradual development of two vast crosses, one on either side." ⁴.

With the objectivity of the true scientist, Whymper acknowledges that he and his companions were in a traumatised state. However, he quotes an account by the explorer Parry of a similar phenomenon in the Arctic as well as one by an Italian group at the same height on the same mountain, and remarks that a suggestion that the form was, in fact, derived from intersecting ellipses was quite plausible.

Careful observation on Whymper's part may have contributed to the success of the Matterhorn venture. It did not escape his notice that the rise to the east of the geological strata of the mountain was likely to yield much better holds on that side, after weathering, than would be in evidence on the other. The successful ascent was from the east.

Then there is the phenomenon of the diffusion of wine through a cork, found at high altitude. But that is another story ...



Fig. 1.



Fig. 2.

The tragedy of 1865 prompted many to ask how much science could truly advance from further such climbing. Whymper himself turned his attention from conquest to the study of men and mountains. The following year he did return to the Alps, but this time he was concerned with the theory and structure of glaciers.

Further afield

It is Edward Whymper, first and foremost a climber, who leads us from the expeditions of the early scientists to research on higher mountains outside Europe. Apparently, the 50-miles-a-day men, like himself and Tyndall, had little trouble with the reduced density of the atmosphere to be met at heights attainable in the alpine chain. (Of course, their gradual ascent was different from that of today's tourist who is whisked by cable car through nearly three thousand metres to the Aiguille du Midi.) Thus far, then, thin air was no more of a problem than were the ferocious beasts which had been feared in the Middle Ages. However, it was clear that the acid test could only be made further afield, and in 1879 Whymper organised an expedition to the Andes, which rise a further two thousand metres. There, with the Carrels as guides, he ascended first Chimborazo and then Cotopaxi. These huge volcanoes presented a quite different concept of climbing from that familiar in Europe. (The crater lip of 5 452 m Popocatepetl had been reached by a group of Cortes's soldiers many years previously.)

Whymper and his companions were not the first to attempt Chimborazo, nor indeed the first to do so in the pursuit of science. Alexander von Humboldt had explored the region and assembled a mass of scientific data. In 1802 his party reached a height of 5 878 m on the mountain (far higher than anyone had reached nearer home) and had felt the symptoms of mountain sickness - their leader was the first person to ascribe these effects to lack of oxygen. He also noted that the temperature fell by 1° F for every 300 feet of height. The variation of terrestrial magnetism was a particular interest of von Humboldt, and Biot worked on data he collected.

The expedition of Whymper took numerous readings from mercury barometers during their ascents. It was on Chimborazo, when the mercury had fallen to 42 cm, that they discovered that mountain sickness was very much a reality. (This pressure would correspond to a little below 5 000 m. In a modern aircraft, pilot efficiency falls off above about 3 000 m and pressurised oxygen is used above 5 500 m.) Not that this was the only hardship:

"Naturally, we didn't feel like eating, but we did want to smoke, and we found that our pipes practically refused to stay alight since, like us, they were suffering from lack of oxygen." ³

Chimborazo was, though, eventually climbed for the first time, and observations dutifully attempted on its summit:

"A strong north east wind drove snow flurries before it. We were hungry, wet, numb with cold, miserable, and burdened with instruments it was impossible to use. We did manage, with a lot of trouble, to set up the mercury barometer. One man held down the tripod, whilst another tried to protect it from the wind with his poncho." ³.

The mercury stood at 35.8 cm (standard pressure is, of course, 76 cmHg). A reading below at about the same time allowed a later estimate of their height at 6 262 m, five metres below the modern value.

The expedition went on to climb Cotopaxi, which had been climbed before, first by geologist Wilhelm Reiss. Cotopaxi, unlike its higher sister, is still active and, near the summit, the rubber floor of the tent was on the point of melting. A maximum thermometer read 45°C while a minimum thermometer outside recorded -11°C.

The heights accessible in the Andes had been appreciated even before de Saussure began his exploration of the Alps. In 1737, the Frenchman Pierre Bouguer performed a celebrated series of pendulum experiments in Ecuador for (in effect) the acceleration of gravity. Observations near the equator established Newton's theory, that the Earth is flattened at the poles. Bouguer, however, experimented at different altitudes up to that of Pichincha, a mountain which rises above Quito to "2 434 toises" or 4 744 m. It was he who introduced the concept of the invariable pendulum, one of constant length whose oscillation is compared with that of a seconds clock. (Huygens's pendulum clock could be standardised anywhere from stellar observations.) To allow for air damping, Bouguer carried a barometer, and by finding the vertical height through which he had to carry it for the mercury to fall one 'line' (twelfth of an inch) he estimated the density of the air on the summit of Pichincha to be 1/11000 of that of the copper bob of his pendulum, namely 0.81 kgm^{-3} .

Bouguer developed a formula for the acceleration of gravity on a plateau - as distinct from an elevated point in free space where it might be expected to follow the inverse square law. With a firm grasp of Maths, theory and experimental technique, Bouguer was in every sense a scientist, not a mountaineer. However, as von Humboldt and Wymper were to do in the next century, he climbed the slopes of Chimborazo. The stations at which he took his readings were around the snowline,

"... his expedition reached the first station after a most toilsome journey of ten hours over rocks and snow, and when they reached it they had all the time to fight against the snow which threatened to bury their tent. Nevertheless, they succeeded in making the necessary observations, and a few days later they were able to move on to the second station. Here, they hoped for better things as they were now below the snow line. But their difficulties were even greater than before, as they were exposed to the full force of the wind, which filled their eyes with sand and was continually on the point of blowing away their tent. The cold was intense, and so hindered the working of their instruments that they had to apply fire to the levelling screws before they could turn them. Still, they made their observations and found that the plumb line was drawn aside about 8 seconds."⁵

In this case, then, he measured the deflection of a plumb line by a large mass. It is scarcely surprising, in view of the difficulties, that the numerical results were wide of the mark, as Bouguer himself realised. They did, though, show that the Earth could not be a hollow shell, nor was it filled with water, and the experiment is significant in being the first to employ the attraction of a terrestrial mass.

5. Thus Maupertuis, in the northern expedition, found that a certain pendulum clock gained 59.1 seconds per day in Sweden on its rate in Paris, while Bouguer and La Condamine, in the Peruvian expedition, found that at the Equator at sea-level the seconds pendulum was 1.26 Paris lines shorter than at Paris. Bouguer's work, to which we have already referred, was especially important in that he determined the length of the seconds pendulum at three elevations: (1) At Quito, which may be regarded as a tableland, the station being 1466 toises † above sea-level; (2) on the summit of Pichincha, a mountain rising above Quito to a height of 2434 toises above sea-level; and (3) on the Island of Inca, on the river Esmeralda, not more than thirty or forty toises above sea-level. The Equator runs between Quito and the third station, and they are only a few miles from it. In space free from matter rising above sea-level gravity might be expected to decrease according to the inverse square law starting from the earth's centre, so that if h is the height above sea-level and r is

Station.	Above Sea-level in Toises.	Observed Seconds Pendulum in Lines.	Correction for Temperature.	Correction for Buoyancy.	Corrected Seconds Pendulum.	Fraction less than at Sea-level.	Fraction given by Inverse Square Law $2 h/r$.
Pichincha .	2434	438.70	- .05	+ .04	438.69	$\frac{1}{115}$	$\frac{1}{114}$
Quito . .	1466	438.83	—	+ .05	438.88	$\frac{1}{133}$	$\frac{1}{113}$
Isle of Inca	—	439.07	+ .075	+ .06	439.21	—	—

* Airy, "Figure of Earth," *Encyc. Met.*, p. 192.

† The toise is 6 Paris feet, or 6.395 English feet.

Science waited another thirty years before a reasonable estimate of the Earth's density was made using this method, in the more modest mountains of Scotland. Maskelyne used Schiehallion in Perthshire. The mountain is large by British standards, isolated, and has a shape very suitable for such a purpose. (It also offers, incidentally, a splendid view from the summit !) The results pointed to a relative density for the Earth of about $4\frac{1}{2}$, about twenty percent too low. Much of the error could later be attributed to inaccurate survey data.

In 1880, Bouguer's seconds-pendulum experiment was repeated by Mendenhall on Fujiyama. The Japanese volcano is ideal for its size, approaching 4000 m in height, for its regular shape and for its easy, if laborious, ascent. (It was first climbed as far back as 700 A.D.) His results showed that g was greater than would be predicted for an isolated point at that height by 1 part in 5000, and this yielded a figure of 5.77 for the Earth's density.

The Himalayan range contains most of the highest mountains on Earth, and it is doubtless because of their cultural and geographic isolation that they do not loom very large in the present context. The mountaineers did not really begin to penetrate the region until the end of the last century. However, those working on the Indian Trigonometrical Survey easily reached plateau heights comparable with those of the peaks of Europe, and a series of careful pendulum experiments was carried out from 1865. Basevi and Heaviside made observations from sea level to Moré, at 4702 m, using invariable-, Kater's convertible- and Repsold's pendulums.

The Agony and the Ecstasy

Nothing changes. Mountaineering has had its critics for centuries. If many regard the exploits of the 'because it's there' mountaineer with bewilderment there would clearly be those unable to appreciate the motivation of men who not only wanted to get there but even wanted to stay and measure when they arrived. It may be that, for some of the participants, the science was an excuse to indulge in activities armchair observers would never understand. The researchers of the eighteen hundreds were not without their detractors amongst climbers, Leslie Stephen satirising their work:

"On this famous climb, the scientists discovered the temperature by the amount of cold on their fingers, for the thermometer was broken, and found it to be 175 degrees below zero; their height was so great that the mercury in the barometer sank out of sight. 'As to ozone' said Stephen 'if there were any ozone that afternoon on the arête, ozone must be a greater fool than I take it to be.'" ²

Bouguer's and Whymper's heroic efforts at science in the field are well illustrated above; Auguste Dalmat nearly lost his hands to frostbite placing Tyndall's self-registering thermometers in the summit-snow of Mont Blanc. The French astronomer Pierre Janssen was another unwilling to give in to adversity. He was lame and, later in life, suffered ill-health. Unable to walk up to an observatory he had had built on Mont Blanc, Janssen invented a device which allowed him to be carried up, a journey of some thirteen hours. (To observe the solar eclipse of 1870, he travelled to Algeria by balloon - the sun was obscured by cloud ...)

Yet, Tyndall writes of reaching the summit of the Weisshorn:

"I have never before witnessed a scene which affected me like this one. I opened my note-book to make a few observations, but soon relinquished the attempt. There was something incongruous, if not profane, in allowing the scientific faculty to interfere where silent worship seemed the 'reasonable service' ..."

One is reminded of Edison's words, "1% inspiration; 99% perspiration", but inspiration there certainly was. The highest mountain in Britain has a place here, not because of the facilities it offers to the scientist, but for the inspiration it gave. A lover of walks in the Scottish mountains, C.T.R. Wilson was taking a working holiday at the observatory on Ben Nevis when,

"On the cloud surface beyond the shadow of the mountain would then appear a glory, the coloured rings incomplete and rather diffuse. The most striking of all were seen from the edge of the precipice overlooking the great corrie when the observer's shadow (the Brocken spectre) was formed on a thin sheet or wisp of cloud only a few feet below ... This greatly excited my interest and made me wish to imitate them in the laboratory."

Fortuitously, this took place in 1894. X-rays were discovered the following year, radioactivity shortly afterwards. Wilson set to work and finally reproduced the formation of a cloud in his lab. It was puzzling that condensation would take place without dust particles as nuclei, and Wilson deduced that ions - such as those formed on exposure to X-rays - were able to fulfil this rôle.

The year after his experience of the Brocken - noted in one form or another by people like Whymper, as we have seen - Wilson had a further emotive experience on the Ben. He relates:

"Mist hid the top of Ben Nevis; there was a faint muttering of distant thunder. Suddenly I felt my hair stand up; I did not await any further developments but started to run ..."

From 1900, Wilson's attention was devoted to the study of conduction in dust-free air. After eleven years of painstaking effort he produced the first tracks of water droplets. The cloud chamber had been born.

So, have we found all the answers ? More than one dog has climbed high mountains in the Alps; de Saussure was always accompanied by his. Another, belonging to a guide, was on one occasion refused permission to accompany his master's party. Undaunted, he rejoined the climbers soon after their departure.

"He was what is called a Spitz dog, a kind distinguished by a very pointed nose, sharp black eyes, and a tail curling stiffly over the back. The mountain atmosphere had an extraordinary effect on this dog; it made him uncurl his tail! As he went up, this bushy appendage gradually got straighter and straighter, till at last it hung down behind as straight as a broomstick. No Spitz dog's tail was ever before known to uncurl, and curiously enough as he came down his tail curled up again as usual."²

Why ?

References

- 1 Francis Keenlyside Peaks and Pioneers - The Story of Mountaineering (1975)
- 2 Ronald Clark The Victorian Mountaineers (1953)
- 3 Edward Whymper Scrambles amongst the Alps (1871)
- 4 Edward Whymper The Ascent of the Matterhorn (1880)
- 5 } J.H.Poynting & A Textbook of Physics - Properties of Matter (1903)
- 6 } J.J.Thomson

BY PETER TYSON

LECTURES AND MEETINGS

This information has kindly been supplied by the BSHS and is their copyright. Nearly all these meetings are open to people who are not members of the society concerned, sometimes at a slightly higher cost. We remind readers to check before departure that the event has not been cancelled.

Royal Meteorological Society History Group

The Life and Influence of Sir Napier Shaw (1854-1945)

at Imperial College

on 15 March 1995

Details from the Meetings Secretary, Royal Meteorological Society, 104 Oxford Road, Reading, RG1 7LJ.

History of Hydrology in the UK

at Institute of Hydrology, Wallingford

on 17 June 1995

Details from the Group Secretary, R. Lewis, c/o Royal Meteorological Society, 104 Oxford Road, Reading, RG1 7LJ.

University of London

John Dee: An Interdisciplinary Colloquium

at University of London

in April 1995

The purpose of the conference is to reappraise the position of John Dee in intellectual history, and to reflect new directions in Dee studies since the work of Frances Yates and Peter French. Further information from Dr Stephen Clucas, Birkbeck College, University of London, 43 Gordon Square, London, WC1H 0PD

American Chemical Society

* 209th National Meeting

at Anaheim

on 2-7 April 1995

There will be a symposium on Archaeological Chemistry organised by Mary Virginia Orna, College of New Rochelle, New Rochelle, NY 10801, USA.

* 210th National Meeting

at Chicago

on 20-25 August 1995

There will be symposia on the 75th anniversary of the ACS Division of the History of Chemistry (organised by J J Bohring, Chemical Heritage Foundation, 3401 Walnut Street, Philadelphia, PA 19104, USA) and on the centenary of the ACS Chicago Section (organised by J J Doheny, 3625 McCormick Avenue, Brookfield, IL 60513, USA).

Edinburgh Science Festival

* Maxwell and His Circle

at 14 India Street, Edinburgh

on 8 April 1995

This all day symposium will be held in the birthplace of Maxwell. The speakers will be S Ross, Frank A J L James, C Pritchard, C W F Everitt, Lord Jenkin, D Forfar, P V Siemens, W Feldenkirchen, M N Wise, and S Schaffer. Further details from Professor David Ritchie, The James Clerk Maxwell Foundation, 14 India Street, Edinburgh, EH3 6EZ.

Society for the Social History of Medicine

Industrialisation and Public Health: Redrawing the Picture

at Science Museum

on 7-8 April 1995

Further details from and offers of papers to Tim Boon, Science Museum, London, SW7 2DD.

Medicine and the Emergence of Modern Warfare

at Wellcome Institute

on 13-15 July 1995

Further details from M Harrison, Wellcome Institute for the History of Medicine, 183 Euston Road, London, NW1 2BE.

Industrialisation and Medical Practice: The Politics of Health

at University College Swansea

on 15-16 September 1995

Further details from and offers of papers to Anne Borsay, Department of History, St David's University College, Lampeter, Dyfed, SA48 7ED.

* Medicine and the Colonies

at University of Oxford

on 19-21 July 1996

Possible themes might include military medicine and colonial conquest, nursing in the colonies, tropical and temperate medicine. Offers of papers to and further details from Dr Harriet Deacon, The Queen's College, Oxford, OX1 4AW.

The Scottish 'Chemical Revolution': Scientific and Industrial Inheritance

at Heriot-Watt University, Edinburgh

on 10-13 April 1995

This historical symposium, partly in collaboration with the Education and Industrial Divisions, will form part of the Annual Congress of the Royal Society of Chemistry. Further details and offers of papers to H R Jones, 54 Chilbolton Avenue, Winchester, Hampshire, SO22 5HQ.

British Society for the History of Philosophy

* Sixteenth- and Seventeenth- Century Philosophy: Conversations with Aristotle

at Newnham College, Cambridge

on 10-13 April 1995

Topics will include Aristotle and music theory, Aristotle and scientific theory, Aristotle and Descartes. Speakers will include M Ayers, J V Field, A Gabbey, S Hutton, N Jardine, J Rogers and P Weller. Further details from Constance Blackwell, Foundation for Intellectual History, 28 Gloucester Crescent, London, NW1 7DL.

Royal Society of Chemistry, Historical Group

* The Scottish 'Chemical Revolution': Scientific and Industrial Inheritance

at Heriot-Watt University, Edinburgh

on 10-13 April 1995

This historical symposium, partly in collaboration with the Education (Aspects of Chemical Education in Scotland) and Industrial (History of Applied Chemistry in Scotland) Divisions, will form part of the Annual Congress of the Royal Society of Chemistry. Registration forms from Dr John Gibson, Royal Society of Chemistry, Burlington House, Piccadilly, London, W1V 0BN.

* Some Nineteenth Century London Chemistry: The Kings and Birkbeck (UCL) Laboratories

at Burlington House

on 3 November 1995.

Further details from Dr J H S Green, 2 St James's Avenue, Hampton Hill, Middlesex, TW12 1HH.

* T H Huxley: Victorian Science and Culture

at Imperial College

on 20-21 April 1995

Speakers will include Andrew Huxley, David Knight, James Secord, Ruth Barton, Frank Turner, Lynn Nyhart, J Vernon Jensen, Evelleen Richards, Charles Blinderman and James Paradis. Further details from David Edgerton, History of Science and Technology, Sheffield Building, Imperial College, London, SW7 2AZ. A provisional registration form is enclosed with this *Newsletter*.

Wellcome Institute for the History of Medicine

* Symposium on 'Ashes to Ashes': The History of Smoking and Health.

at the Wellcome Building, London

on 26-27 April 1995

Speakers will be J Goodman, M Hilton, S Nightingale, D Harley, H Cockerell, P Bartrip, V Berridge, R Doll, P Taylor, A Brandt, C Booth, R Porter. There will also be a 'Witness seminar' on the anti-smoking movements. Further details from F Houser, Wellcome Institute for the History of Medicine, 183 Euston Road, London, NW1 2BE.

* Bernard Mandeville: Medicine, Morality and Metaphor

at the Wellcome Building, London

on 19 May 1995

Speakers will be R Porter, F McKee, H Cook, J Mullan, C Rawson, C Stevenson, J Hawley, R Bourke. Further details from F Houser, Wellcome Institute for the History of Medicine, 183 Euston Road, London, NW1 2BE.

American Association for the History of Medicine

Annual Meeting

at University of Pittsburgh

on 11-14 May 1995

Further details from Dr Jonathon Erlen, Local Arrangements Chair, 123 Northview Drive, Pittsburgh, PA 15209, USA.

University of Minnesota

The Women and Gender in Science Question

at University of Minnesota

on 12-14 May 1995

This conference will bring together historians, philosophers, sociologists and others interested on current research on women and gender in science. Speakers will include P Abir-Am, E F Keller, S G Kohlstedt, M W Rossiter. Further details from Women and Gender in Science Conference, Professional Development and Conference Services, University of Minnesota, 218 Nolte Center, 315 Pillsbury Drive SE, Minneapolis, Minnesota 55455-0139, USA.

York University

* Contexts of Victorian Science

at York University

on 19-21 May 1995

The conference will focus on the social and cultural contexts of science in England from about 1830 to 1900. Speakers will include A Winter, M Fichman, J Paradis, E Richards, J Richards, M Schabas, H Ritvo, P Fayter, D Lorimer, A Shteir, J Moore, B Lightman, S Schaffer, J Tucker, G Gooday, B Hunt, R Jarrell, J Camerini, F Turner, B Gates and G Levine. Further details from Bernard Lightman, S932 Ross, Office of the Dean of Arts, York University, 4700 Keele Street, North York, Ontario, M3J 1P3, Canada.

* Writing Scientific Biographies
at King's College London
on 3 June 1995

This meeting, to be held in conjunction with the BSHS EGM, will continue the series devoted to important books, focusing on the Blackwell series of scientific biographies. The aim will be to discuss the value of scientific biographies written for a wider audience, from the perspectives of both the authors and readers of such texts. Further details from Frank A J L James, RICHST, Royal Institution, 21 Albemarle Street, London, W1X 4BS.

* Roentgen Centenary Congress
at ICC Birmingham
on 12-16 June 1995

The BSHS is co-sponsoring a historical symposium on 13/14 June; this includes an impressive, transatlantic list of historians. Topics include radiobiology, radiation risk, and radiotherapy, as well as the evolution of radiology. Special reduced congress fees for professional historians. Ask for details of reduced fees when you write for brochure and registration forms to Sally Goodhead (Congress Admin), College of Radiographers, 14 Upper Wimpole Street, London, W1M 8BN, or enquiries to John Pickstone, CHSTM, University of Manchester, Manchester, M13 9PL.

* History of Hydrology in the UK
at Institute of Hydrology, Wallingford
on 17 June 1995

Details from the Group Secretary, R. Lewis, c/o Royal Meteorological Society, 104 Oxford Road, Reading, RG1 7LJ.

University of Sydney

* Science and Civility
at Jemby Rinjah Lodge, Blue Mountains, New South Wales
on 16-18 June 1995

This Summer School/Workshop is designed to explore some of the themes of Steven Shapin's *Social History of Truth* (1994), a study of the culture of science in seventeenth century England. Papers are invited on seventeenth century natural philosophy or which tackle any of the historiographical or methodological issues raised in the book. Bursaries are available for graduate students. Further details from Dr Michael Shortland, Unit for HPS, University of Sydney, Sydney, NSW 2006, Australia.

Newcomen Society

Approaches to the History of Technology
at Merseyside Maritime Museum
on 17 June 1995

Offers of papers on the theme of the meeting to the Executive Secretary, The Newcomen Society, Science Museum, London, SW7 2DD.

* Evolution of Modern Traction
at London Transport Museum
on 4 March 1995

This meeting will be held in conjunction with the London Transport Museum and the University of Sunderland. Further details from Dr M C Duffy, SEAT, University of Sunderland, Chester Road, Sunderland, SR1 3SD.

* Diesel Engine Centenary Conference
at Venue to be announced
in May 1997

This meeting will mark the first successful operation of a Diesel engine. Offers of papers to Denis Griffiths, School of Engineering and Technology Management, Liverpool John Moores University, Byrom Street, Liverpool, L3 3AF.

CHEIRON

* 27th Annual Meeting

at Bowdoin College

on 22-25 June 1995

Offers of papers on any aspect of the history of the behavioural and social sciences should be sent (postmarked no later than 23 January 1995) to Dr Deborah F Johnson, Department of Psychology, University of Southern Maine, Portland, Maine 04103, USA.

University of Vienna

Josef Loschmidt Symposium

at University of Vienna

on 25-27 June 1995

This symposium will mark the centenary of Loschmidt's death. Plenary lectures will be given by P Becker, C Djerassi, E L Eilel, A Eschenmoser, M Perutz and H Spohn. Further details from Committee for the Loschmidt Memorial Year 1995, c/o Natural Science Faculty of Vienna University, Dr Karl-Lueger-Ring 1, A-1010 Wien, Austria.

University of Aberdeen

* Changing Organisms: Organisms and Change

at the University of Aberdeen

on 29 June - 2 July 1995

This meeting on the history of medicine is being held to mark the quincentenary of the Aberdeen University. Further details from Dr J P Wesson, Thomas Reid Institute, University of Aberdeen, Aberdeen, AB9 2UB.

The Seventeenth Century

Christiaan Huygens 1995

at Voorburg and Leiden

on 7-9 July 1995

This conference, organised by the Dutch association The Seventeenth Century in collaboration with the Hofwijck Society and the Museum Boerhaave, will mark the tercentenary of Huygens's death. All aspects of Huygens's life and work will be critically examined. Speakers will include J North, J Dhombres, M Barth, M Blay, H Bos, R Halleux, A W Sleeswijk and J Yoder. Further details from Henk Kubbinga, University of Groningen, Faculty of Philosophy, A-weg 30, NL-9718 CW Groningen, The Netherlands.

Australasian Association for the History, Philosophy and Social Studies of Science

* Annual Meeting

at University of New South Wales

on 8-11 July 1995

Offers of papers to and further details from David Oldroyd, School of Science and Technology Studies, University of New South Wales, Sydney, NSW 2052, Australia.

Universities of Liverpool and Keele

Science Matters: The Role and Achievements of Science in Greek Antiquity
in Liverpool

on 10-13 July 1996 (provisional)

The aim of this conference is to provide a forum which will bring together professional students of ancient science and mainstream classicists/ancient historians. Further details from Dr C J Tuplin, Department of Classics and Ancient History, University of Liverpool, 12 Abercromby Square, Liverpool, L69 3BX.

Visual Culture of Art and Science from the Renaissance to the Present
at the Royal Society

on 12-14 July 1995

This meeting is organised jointly with the Association of Art Historians (AAH) and the Committee on the Public Understanding of Science (COPUS). The purpose of the meeting is to promote greater understanding of the changing boundaries and interactions between what contemporaries called Art (or Craft) and Natural Philosophy/Science in the period from about 1400 to the present day. The meeting will specifically examine the visual culture through which both artistic and scientific endeavours found their expression. It will encompass the full range of visual media, including the printed book and architecture. In today's terms, this is an interdisciplinary study of scholarly concern to the AAH and the BSHS, and of concern to COPUS because it shows science as an integral part of the culture of our time. Speakers will include William Ashworth, Michael Baxandall, Allan Chapman, Sophie Forgan, Stephen J Gould, Helen Haste, Tim Hunkin, Martin Kemp, G M Prescott-Nuding, Eileen Reeves, Martin Rudwick, Larry Schaaf, Albert van Helden and other distinguished Art Historians, Historians of Science, Artists and Scientists. Further details and registration form from BSHS Executive Secretary, Wing Commander G. Bennett, 31 High Street, Stanford in the Vale, Faringdon, Oxfordshire, SN7 8LH.

Medicine and the Emergence of Modern Warfare

at Wellcome Institute

on 13-15 July 1995

Further details from M Harrison, Wellcome Institute for the History of Medicine, 183 Euston Road, London, NW1 2BE.

* Third British-North American Joint Meeting: 'Crossing Boundaries'

at Edinburgh, Scotland

on 23-26 July 1996

Following the two highly successful meetings in Manchester (1988) and Toronto (1992), the third joint meeting of the CSHPS, HSS and BSHS will take place in Edinburgh, Scotland from the afternoon of Tuesday 23 until the afternoon of Friday 26 July, 1996. These dates co-ordinate with the international meeting of SHOT in London on 1-4 August, 1996. Dr John Henry is chair of local arrangements, and participants can be assured of a pleasant and affordable stay in this beautiful, historic and accessible capital city. Registration will be co-ordinated by the BSHS Executive Secretary. See page 18 for full announcement and call for papers.

University of Bath

* Bath 4 - The fourth Bath quinquennial science studies workshop
at University of Bath
on 27-31 July 1995

The theme of this workshop will be "Humans, Animals, Machines", the nature of these entities and how the boundaries between them are established and moved. Offers of papers to and further details from Harry Collins, Science Studies Centre, University of Bath, Bath, Avon, BA2 7AY.

Max Planck Institute for the History of Science

* Fourth International Conference on History of General Relativity
at Max Planck Institute for the History of Science
on 31 July - 3 August 1995

Offers of papers to and further details from Jurgen Renn, Conference on HGR, Max Planck Institute for the History of Science, Wilhelmstrasse 44, 10117 Berlin, Germany.

University of Wales Institute of Classics and Ancient History

* International Conference on Ancient Science and Technology
at Gregynog
on 6-8 September 1995.

Speakers will include I Beavis, S Cuomo, I Freestone, F De Gandt, H Gottschalk, A T Hodge, J Riddle, A Sleswyk, T Waldron. Further details from Dr T E Rihll, Department of Classics, St David's University College, Lampeter, Dyfed, SA48 7ED, Wales.

British Association, History of Science Section

* Annual Meeting
at Newcastle University
on 11-15 September 1995

The Section will include sessions on the diffusion of technology (speakers J Tann, S MacDonald, T Courvish, J Fleck, W Henderson) the history of science and technology in North East England (R Rennison, P David, W A Campbell, J Fauvel), the history of scientific instruments (W Hackmann, B Ford, G Clifton, D Bryden) and the history of X-rays (A Hessenbruch, J Hughes, W M Ross). Further details about the programme from Dr Frank A J L James, RICHST, Royal Institution, 21 Albemarle Street, London, W1X 4BS. Details of registration from British Association, Fortress House, 23 Savile Row, London, W1X 1AB.

* Archives of the Scientific Revolution
at the Royal Society
on 10-12 April 1996

This conference will consider the archives that have come down to us from the Scientific Revolution as artefacts which reveal much about the individuals and institutions who created them. Archives dealt with will include the Collezione Galileiana; the papers of Robert Boyle, Christiaan Huygens, G W Leibniz, I Newton, W Petty; and the collections of the Académie des Sciences and the Royal Society. Further details from Professor Michael Hunter, Department of History, Birkbeck College, Malet Street, London, WC1E 7HX.

* Third British-North American Joint Meeting: 'Crossing Boundaries'
at Edinburgh
on 23-26 July 1996

Following the two highly successful meetings in Manchester (1988) and Toronto (1992), the third joint meeting of the BSHS, HSS and CSHPS will take place in Edinburgh from the afternoon on Tuesday 23 until the afternoon of Friday 26 July 1996. These dates co-ordinate with the international meeting of SHOT in London on 1-4 August 1996. The theme of the meeting can be interpreted broadly to include the historical study of science across, for example, national, regional, community, disciplinary, public-private, professional-lay boundaries. The theme is intended to provide a wide chronological and subject range, and to bridge a variety of approaches and methods, but to ensure coherence around interpretive problems of current interest. Sessions will last for 1.5 and 2 hours and individual papers must last no longer than 20 or 30 minutes. Session organisers are strongly desired to include speakers from more than one country, and to preserve time for good discussion led by a commentator. Offers of organising sessions and offers of individual papers (accompanied by an abstract of about 250 words) should be submitted by 1 August 1995 to one of the following Programme Chairs of the respective societies:

BSHS, Steven Pumfrey, Department of History, Lancaster University, Lancaster, LA1 4YG, England;

HSS, Bob Hatch, Department of History, University of Florida, Gainesville, Florida 32611, USA;

CSHPS, Hannah Gay, Department of History, Simon Fraser University, Burnaby, British

Columbia, V5A 1S6, Canada.

Dr John Henry (Science Studies Unit, University of Edinburgh, 21 Buccleuch Place, Edinburgh, EH8 9JT, Scotland) is chair of local arrangements. Registration will be co-ordinated by the BSHS Executive Secretary, Wing Commander G. Bennett, 31 High Street, Stanford in the Vale, Faringdon, Oxfordshire, SN7 8LH, England.

* Industrialisation and Medical Practice: The Politics of Health
at University College Swansea

on 15-16 September 1995

Further details from and offers of papers to Anne Borsary, Department of History, St David's University College, Lampeter, Dyfed, SA48 7ED.

Southampton Oceanography Centre

The Challenger Legacy
at Southampton University
on 18-19 September 1995

This meeting has been arranged to coincide with the opening of the new Southampton Oceanography Centre and will consist of invited papers on the development of oceanography over the last 100 years. Speakers will include E L Mills, R M Friedman and H L Burstyn. Further details from Margaret Deacon, Department of Oceanography, University of Southampton, Highfield, Southampton, SO17 1BJ.

History of Science Society

Annual Meeting
in Minneapolis
on 26-29 October 1995

Further details from Amy Lanfear, History of Science Society Executive Office, DR-05, University of Washington, Seattle, WA 98195, USA.

Imperial College

Imperial Chemistry
at Imperial College
on 21-23 September 1995

This meeting, organised with the Royal Society of Chemistry, will mark the 150th anniversary of the founding of the Royal College of Chemistry. The historical symposium, organised in association with the Society for the History of Alchemy and Chemistry, will be held on the 23rd. The speakers will be G K Roberts, D Leaback, Frank A J L James and W H Brock. Further details from the Executive Secretary, Royal Society of Chemistry, Burlington House, Piccadilly, London, W1V 0BN.

Ludwig-Maximilians-Universitat

* Symposium on the History of Mineralogy, Petrology and Geochemistry
at Ludwig-Maximilians-Universitat
on 29-30 September 1995

Topics to be covered by this symposium include mineralogical analysis in the eighteenth and nineteenth centuries, experimental petrology, and the institutionalisation of geochemistry. Further details from Dr Bernhard Fritscher, Ludwig-Maximilians-Universitat, Institut für Geschichte der Naturwissenschaften, Museumsinsel 1, D-80306, Munich, Germany.

Gerhard Mercator Universitat

* 4th Duisburg Mercator Conference
at Schloss Krickenbeck
on 30-31 October 1995

The theme of this conference will be on the "Mathematicus", and the development and importance of this new occupational group during Mercator's life. Offers of papers to and further details from Prof Dr Rene Dirven, Gerhard Mercator Universitat, GH Duisburg, Fachbereich 3, D-47048 Duisburg, Germany.

Thomas Harriot Seminar

* Durham Seminar
at University of Durham
on 18-20 December 1995

Further details from G R Batho, School of Education, University of Durham, Leazes Road, Durham, DH1 1TA.

* Historical views of the connection between sunspots and weather
at Science Museum
in May 1996

1996 is the centenary of the first use of the term 'greenhouse effect'. This will be a joint meeting with the Institute of Physics History Group and the Royal Astronomical Society History Group. Offers of papers to Dr A McConnell, History of Science and Technology Group, Sheffield Building, Imperial College, London, SW7 2AZ; Dr A Q Morton, Science Museum, London, SW7 2DD or Professor A J Meadows, School of Library Studies, Loughborough University, Loughborough, LE11 3TU.

LECTURES AND MEETINGS

This information has kindly been supplied by the BSHM and is their copyright. We remind readers to check before departure that the event has not been cancelled.

Mon-Wed 3-5 April 1995

RESEARCH IN PROGRESS

Our first meeting in Wales, at Gregynog (near Newtown), provides an opportunity for all those interested in history of mathematics research—the research students of today, their supervisors, and historians of mathematics at all stages of their careers—to spend some time together talking about current research interests, about the practice of history of mathematics, and learning about the historical tradition of studying history of mathematics in these islands over the past three centuries—from Wallis (*John: 1616-1703*) to Wallis (*Peter: 1918-1992*).

Talks on the historiographical theme so far arranged include • *General survey of the study of history of mathematics in Britain* Ivor Grattan-Guinness, Middlesex University

- *British historians of Greek mathematics* David H. Fowler, Warwick University
- *Historians of mathematics in the eighteenth century* Ruth Wallis, Newcastle upon Tyne
- *Historians of mathematics in the early nineteenth century* John Fauvel, The Open University
- *Augustus De Morgan as historian of mathematics* Adrian Rice, Middlesex University
- *Historians of Newton* Tom Whiteside, University of Cambridge.

The talks on current historical research will be arranged nearer the time. There will be the usual leavening of research historians from abroad, and we look forward to welcoming friends old and new.

The residential cost is expected not to exceed £100 (£80 + VAT) for the three days (two nights) from Monday pm to after lunch on the Wednesday. Flyer enclosed. Further details from John Fauvel or Colin Fletcher.

Saturday 6 May 1995

A CELEBRATION OF TWO LIVES: WILLIAM KINGDON CLIFFORD (1845-1879) AND LUCY CLIFFORD (1846-1929)

A meeting will be held at Rutherford College, University of Kent, Canterbury, to mark the 150th anniversary of the birth of William Kingdon Clifford, organised by the *William and Lucy Clifford Research Group*.

William Clifford and his wife, Lucy, were well known figures in later Victorian intellectual circles and they embodied the spirit of the times when there were no distinct boundaries between science and the arts. In his short life William was recognised as a mathematician of genius, and was an outspoken atheist in the religious controversy following the Darwinian revolution. As a young widow Lucy became a best selling writer of novels, plays and short stories, and up to her death befriended and corresponded with many prominent literary, political and scientific figures; she was particularly close to Henry James.

At this one-day meeting, a biographical commentary on William and Lucy will be interspersed with specialist contributions from eminent academics on topical mathematical, scientific, philosophical and literary subjects including non-Euclidean geometries and subsequent developments of Clifford's mathematical work. The presentations will draw on previously unpublished material to which the Group has recently gained access. The meeting is aimed at a non-specialist, interdisciplinary audience and everyone is welcome.

Further information from Professor J.S.R. Chisholm, Institute of Mathematics and Statistics, University of Kent, Canterbury, Kent CT2 7NF, telephone: 0227-764000, Fax: 0227-475453. Email: j.s.r.chisholm@ukc.ac.uk.

Fri-Sat 12-13 May 1995

THE RECENT HISTORY OF ANALYSIS

The first joint meeting between the BSHM and the London Mathematical Society is to be held at the Mathematical Institute, Oxford. The speakers are as follows:

Paul R Halmos (California): *A century of operators*

Jean-Pierre Kahane (Paris): *Interplay between Taylor series, Fourier series and Brownian motion*

Jesper Lutzen (Copenhagen): *An overture to functional analysis: the beginnings of spectral theory*

S. J. Patterson (Gottingen): *The Riemann-Hilbert problem*

Reinhold Remmert (Munster): *From Riemann surfaces to complex manifolds*

Frank Smithies (Cambridge): *The shaping of functional analysis 1900-1950*

As is customary for LMS meetings, there is no registration fee. *Further details from Peter Neumann or Jeremy Gray.*

July 1995

SCOTLAND'S MATHEMATICAL HERITAGE

The first joint meeting between the BSHM and the Edinburgh Mathematical Society is to be held at the Royal Society of Edinburgh for two days in the second half of July 1995. The precise dates are still to be confirmed, as is the detailed programme. It is hoped that Professor Judith Grabiner will give a talk on Colin Maclaurin, and that there will be talks on aspects of mathematics in Scotland between the seventeenth and late nineteenth centuries. *Further details from Alex Craik or John Fauvel.*

16-17 September 1995

MATHEMATICS IN VICTORIAN BRITAIN

Our autumn residential meeting for 1995 will be at Rewley House, University of Oxford, on the wider British context of the work of Arthur Cayley (died 26 Jan 1895). The mathematical activity in various centres will be discussed: Cambridge, Oxford, London, and in military colleges, schools and societies; as will the work of other mathematicians such as George Boole, William Burnside, William Kingdon Clifford, Augustus De Morgan, Charles Dodgson, William Rowan Hamilton, Thomas Archer Hirst, Thomas Penyngton Kirkman, Charlotte Scott, Henry Smith, James Joseph Sylvester, and others. *Further details from John Fauvel, Raymond Flood, or Robin Wilson.*