

The Royal Society of Edinburgh

Conference and Lecture Reports

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LECTURES

26 November 1996

POLITICS AND MANNERS FROM SIR ROBERT WALPOLE TO SIR ROBERT PEEL

Professor Paul Langford, FBA, Lincoln College, Oxford

The British Academy Raleigh Lecture delivered to the First Ordinary Meeting

Between the careers of two Sir Roberts, Walpole and Peel, Britain invented a form of parliament government that was thought to have no parallel in contemporary experience and no precedent in recorded history. The constitutional consequences were and are much debated. Less attention has been paid to the codes regulating the relationships of the men and women who worked with them. Yet what emerged between the Revolution of 1688 and the Great Reform Act of 1832 was a system of management, and management, as we are often reminded today, is not only a matter of technique but also of style, or as the eighteenth century would have called it, manners. What was the distinctive style required of those who managed the modern British polity in its formative years?

The traditional sources of historians of manners are surprisingly unhelpful in answering this question. Courtesy books and etiquette guides rarely discussed political behaviour. The English literature of manners, epitomised by the eighteenth-century novel, seemed reluctant to depict the effects of a new political structure on the lives of the gentry who people the pages of fiction. In the absence of such help we must turn to the satirical literature of the day, especially the attacks directed against the ruling manners by the Augustan wits of the early eighteenth century. In that literature the emphasis was on the new forms of patronage and clientage generated by a parliamentary state, creating an ever more hierarchical culture in which the traditional independence of the freeborn Briton was submerged by corruption and courtship.

In many ways, Walpole, with his palace in Norfolk, his love of personal finery and his parade of power, seemed to justify such fears. Yet his successors did not follow in his footsteps. Late eighteenth-century men of power shunned such displays even in official portraits. Traditional symbols of office, wands, maces, batons, as well as ribbons and decoration disappeared from representations of statesman. By the early nineteenth century a politician was difficult to distinguish in dress and demeanour from an ordinary gentleman. Patronage itself, the most controversial form of power, became something to be despised and disowned, if only in public.

Here was a transition from one model of statesmanship to another, from the statesman of Walpole's day, courtier and courted, affable to equals and inferiors but not afraid to proclaim his superiority, to the statesman as orator and legislator, discreet in manner, reserved if not cold, devoted to public duty. What accounts for this shift in political sensibilities?

Self-conscious earnestness of both the Evangelical and utilitarian kinds doubtless had an effect. But politicians themselves were aware that they were increasingly open to public scrutiny and censure as much for their behaviour as their principles. From the 1770s onwards a host of publications exposed their parliamentary life and personal conduct to close inspection. Men such as the younger Pitt and Canning became obsessed with their own character as perceived by the genteel public at large. In essence the shift was from a court-based culture to a club-based culture though one that had to appeal to the numerous clubs and associations that constituted the public life of early nineteenth-century Britain. The understated style of management that resulted seems a long way from the hype and hassle of modern management methods, but this particular club survived a turbulent time during which its counterparts in other countries were devastated by social revolution or demoralised by the rise of democracy. Perhaps Georgian politicians knew more about styles of management than their successors have sometimes supposed.

The Lecture was followed by an animated discussion launched by the speaker himself who was anxious to discover the provenance of the robes worn by the statue of William Pitt in George Street, Edinburgh. Sadly the assembled company of Fellows was unable to provide him with an answer! Further topics raised included French influence on English manners after the French Revolution, the change in the dominant influence on manners from 1760 onwards away from the Court to the aristocratic West End families, and the attempts, conscious or otherwise, of politicians to distract public attention from Parliament as the real source of power by employing the Court, George IV in particular, as a showman.

2 December 1996

C₆₀ BUCKMINSTERFULLERENE - THE CELESTIAL SPHERE THAT FELL TO EARTH

Sir Harold Kroto, FRS, University of Sussex

Delivered to the Second Ordinary Meeting

Professor Sir Harold Kroto gave a highly entertaining, highly informative and deeply thought provoking address on the discovery of C₆₀ Buckminsterfullerene by his group over a twenty-year period. He gave

generous acknowledgement to the support of his team and also of other international groups working within the field.

Sir Harold began by emphasising the deep innate need for symmetry with views of the Algonquin National Park radio telescope to detect radio frequencies trained on black holes in the solar system.

He then referred to a historical mass spectrometer reading carried out in Houston on 4th September 1985 where a huge C_{60} surge was recorded.

Sir Harold illustrated his lecture with numerous appropriate 'props' including a stardome which he had made himself for his children and a standard football illustrating the way in which hexagons and pentagons in the correct proportions form a complete sphere.

Sir Harold beautifully emphasised both the excitement and the urgency of his field of research.

The lecture was illustrated with examples of spheres such as the Expo Dome in Canada which was designed by Buckminsterfuller giving rise to the name Buckminsterfullerene.

The content and delivery of the lecture was such that those involved with selecting subjects for the Royal Institution of Christmas Lectures should certainly consider Sir Harold as a candidate.

Items which were considered during the question period included the stability of C_{60} . The commercial use of nanotubes derived from C_{60} and the relative proportions of hexagons to pentagons.

20 January 1997

INDIVIDUAL MIND: THE CASE FOR AN ANTHROPOLOGICAL MORALITY
Professor Nigel J Rapport, University of St Andrews
BP Prize Lecture delivered to the Third Ordinary Meeting

In its broadest conception, 'anthropology' may be defined as the study of humankind in its social, cultural, psychological, biological, and evolutionary entirety. In this paper, Professor Rapport borrowed this definition as licence to range widely over different spheres of human being in pursuit of a characteristic of human consciousness which he called the creation of the random. An appreciation of this randomness, he argued, is essential for an understanding of the workings both of the human mind and of human society and culture.

The original data for the paper derive from a piece of participant-observation research undertaken in the Cumbrian dale of Wanet. Drawing upon his experience of living with one family of pastoral hill-farmers in particular, the Harveys, Professor Rapport examined the ways in which they arrive at a sense of order and meaning in their lives by way of making what he describes as random interpretations of the world around them. From this ethnographic basis, Professor Rapport extrapolates to form a theory of randomness which includes not only individual consciousness but also our general human construction of the world as an 'aesthetic' phenomenon. Finally, he argues, this also gives onto a distinctive moral vantage-point upon the world which he would like his anthropology to promote.

The exercise of the paper is inspired by Gregory Bateson - anthropologist, hospital ethnologist, and a father of cybernetics. Bateson insisted that there were 'patterns which connect' symphonies, albatrosses and ecosystems. At different levels of what he termed (following Bertrand Russell) logical typing, mind, body, society and nature fitted together into a single ongoing biosphere. In a humanistic vein, Bateson spoke of such patterning as a 'sacred ultimate unity' whereby aspects of human consciousness and of the natural world reflected one another.

The patterns which connected different logical types Bateson called 'abductive systems'. Here were lateral extensions of the abstract components of a thing - the relations between its parts - into other things. And, for Bateson, abductive systems seemed to characterise great regions of nature and of human thought. Nevertheless, the appreciation of abductive systems was a matter of aesthetic judgement. However immanent the reality of the connection, and however necessary its human appreciation (for human knowledge and survival), it remained a question not of quantities but of quality: of shapes and forms, of esteeming similar relations between parts.

The paper, then, is an abductive one in Batesonian style. Professor Rapport moves between discussions of human consciousness, a human aesthetic understanding of the world, and a human (and humanistic) morality, adjudging what appears to him patterns which connect three types of discourse: patterns of 'randomness', as he defines it. To appreciate the randomness of the individual mind, Professor Rapport argues, is to afford oneself a vital insight not only into the diversity of human culture but also the singularity of human being. Hence, randomness can also serve as the basis of both explanation and a sense of value and beauty in anthropological analysis.

3 February 1997

HOW HUMAN TUMOUR SUPPRESSOR GENES WORK
Professor David P Lane, FRS, FRSE, University of Dundee
Henry Dryerre Prize Lecture delivered to the Fourth Ordinary Meeting

Progress in understanding the molecular basis of human cancer has been especially rapid in the last two decades as the methods of modern molecular biology and immunochemistry have been applied to the disease. How can these scientific advances be applied to reduce the incidence of the disease in man and to improve the treatment of the disease?

We can see that by the year 2050 substantive improvements will result from improved preventative treatment coupled to the specific identification of individuals at enhanced risk of developing the disease due to genetic predisposition. We may also anticipate important advances resulting from immunisation against viral infections that predispose to malignancy such as Human Papilloma Virus and Hepatitis Virus. We may also expect substantive advances in screening and early detection methods and improved outcome by careful co-ordination of all aspects of clinical care in specialist cancer centres. While these developments can have a great impact on the disease there is still, with 6.5 million new cases a year, an urgent need to develop new treatments.

This is particularly the case with the common solid tumours where existing treatments are not fully effective. In order to develop new treatments we need to exploit our detailed understanding of the molecular biology of human cancer. Many different tumour suppressors have been identified, but one of great interest is the p53 gene, whose function is lost in nearly half of all human cancers. The 53,000 molecular weight monomer assembles into an active sequence-specific tetrameric DNA binding protein. The p53 protein is activated when cells are exposed to DNA damage and then switches on a downstream checkpoint response that blocks the cell cycle and can even trigger cell death. Concentrating on the p53 systems we have sought to identify small molecules that can regulate the activity of these cell cycle control molecules and to create synthetic tumour suppressor proteins. These studies all employ short synthetic peptides to mimic protein-protein interactions and to provide a basis for design and screening of pharmacologically active peptido-mimetics.

A detailed biochemical analysis of the p53 tumour suppressor protein has established that it is produced in a latent inactive form that is activated for DNA binding by modification of a negative regulatory domain at the C terminus of the protein. This domain interacts with other sites within the molecule to trap it in an inactive conformation. Small peptides from the C terminal region of p53 are able to activate the latent DNA binding function of p53 and direct microinjection of anti-C terminal activating antibodies has been shown to activate the transcriptional function of wild type and mutant p53 in vivo establishing the potential therapeutic capability of such small activators which may allow the recovery of function of mutant p53. In some tumours p53 is inactivated because it is complexed to a cellular protein called MDM2. Using synthetic peptide libraries we have localised the active MDM2 binding site within the N terminus of p53 and used Phage display and synthetic peptide libraries to define the interaction in detail. These studies have been developed by NMR investigations of peptide orientation, by X ray crystallography and by the screening of compound libraries. Recently we have extended these approaches to studies of protein-protein interactions involving the cdk inhibitors p21 and p16. The p16 inhibitor is a tumour suppressor gene product in its own right whereas the p21 gene is an important target for p53 activation. We have mapped in detail the PCNA, Cyclin and cdk binding sites on p21 and the cdk inhibitory function of p16. We have used these mini domains as fusion proteins with cell transport peptides derived from the antennapedia protein and shown that they are able to block cell cycle progression when added externally. We have been able to produce externally active entirely synthetic tumour suppressor protein mimics. These approaches are thus not only giving novel insight into protein-protein interactions involved in suppressor gene function but are also leading directly to the design and discovery of novel anti cancer treatments.

17 February 1997

SCIENCE POLICY AND THE UK'S FUTURE
Sir Robert May, FRS, Office of Science & Technology
Joint Lecture held by the Royal Society of Edinburgh,
the Edinburgh Council for Rural Research and the Institute of Biology

In his introduction, Sir Robert indicated that he would address three themes: why the Government should fund science; the current quality of British Science; and the problem of converting strength in basic scientific research to industrial strength.

Governments fund science to advance progress and to fund potentially relevant research, not for the amusement for those applying for grants. He illustrated the importance of industrial application over the past hundred years by considering the mechanisation of agriculture, and the fact that the 1% of the British

population in agricultural employment produce more food than a hundred years ago when approximately 50% of the working population were in agricultural employment.

Sir Robert emphasised the value of curiosity-driven basic research and expressed the view, which he returned to throughout the course of the lecture, that the growing research area over the next century would be that of biomedical research.

Sir Robert then produced several extremely enlightening overheads illustrating the relative state of science research in the UK. The UK does well on many counts, such as the ratio of basic to applied research expenditure, but as far as the percentage GDP on research is concerned the UK currently spends £64 per individual compared with £127 for Japan and £98 for the US.

In studying the comparative figures on science-based funding for 1993 for a number of countries and considering the contributions by business, charity, overseas sources and government, it was noted that the UK already had the largest percentage of private and charity money in the science base, a possible indication that encouraging research to seek private funding might not be successful.

A further comparative overhead illustrated clearly that while the UK currently spends more per capita of all the G7 countries on tertiary education it spends least in primary schools, a cause for considerable concern for the future.

The UK now has over one hundred universities and it will not be possible to fund all to carry out research. Sir Robert cited the example of the USA where, of a thousand universities, a hundred at the most are research active with a recognised postgraduate programme.

Sir Robert then referred to his recent publication in *Science* (7.2.97) where he considered the role of the citation index in assessing research competence. In the percentage share of the world's papers and the percentage share of citations the UK comes fifth with 8% share of the world papers and 9% of citations. Not surprisingly the USA ranks first, Switzerland is second and Denmark fourth indicating the potential power of smaller countries to contribute to the research base.

Sir Robert concluded from this section of his talk that in terms of productivity in relationship to money spent the UK ranks very highly, if not highest, in the world stakes. His opinion was that the best research was done in countries where the irreverent young are curiosity driven and are not concerned with matters of protocol and deference. A further measure of the UK's continuing contribution to high quality research on a world level is the UK's share of 'large' awards (defined as monetary value of greater than £250,000) since 1900. The UK has taken a consistent 10% share of these throughout the century. Further evidence was produced to emphasise that the UK is particularly good at clinical medicine contributing 30% of high quality publications.

The audience were particularly interested in a specific reference to Scotland where material was produced to show that Scotland contributed 12% of the research faculty, 15% of the UK publication but had only 9% of the UK population. Collaboration between institutions and between countries will be the norm rather than the exception. At present there is a trend to high quality collaborative publishing between countries. It is therefore inappropriate to rank research by departments as it is individuals and groups who are research active not departments.

Finally Sir Robert addressed the problem of translating scientific excellence into industrial capability. Here the UK does not appear to be so effective, and one reason could be low R&D spend by many top UK companies. Sir Robert outlined the Technology Foresight programme, which aims to ensure that the UK does benefit from its scientific strengths.

Sir Robert's conclusion was that we are rapidly moving to a smaller, more crowded and more competitive world, and as a matter of urgency we must learn how to translate our excellent scientific research into industrial capability and productivity.

24 February 1997

THE CONTRIBUTION OF ENGINEERS TO THE PRACTICE OF MEDICINE
Eur Ing Professor John P Paul, FEng, FRSE
The 1997 Royal Society of Edinburgh/Royal Academy of Engineering Lecture
Held at the Royal Society of Edinburgh

Bioengineering has a place in many disciplines. Sometimes it is thought of in relation to biotechnology through the utilisation of living processes, sometimes as medical instrumentation - a wide field encompassing electronics, computing and medical physics. Professor Paul's initial training was in mechanical engineering and the aspect of bioengineering that interests him most is the biomechanics and design of orthopaedic implants.

Professor Paul pointed out that materials scientists have always made a great contribution to bioengineering, but, curiously, few of their materials have been developed specifically for medical use. Most were developed for use in an aggressive environment such as sea water or high concentration of chemicals. All materials, with the possible exception of gold, cause some adverse reactions.

Professor Paul went on to talk about extracorporeal treatment of blood. He described the different engineering problems posed by mimicking the functions of the heart, the kidneys and the liver. Finally he described current research into the design of an implanted bioreactor to supplement or replace the pancreas.

Much work has been undertaken in Edinburgh on the development of control systems to artificial limbs. Professor Paul explained that engineers are working on external control systems (which will eventually be the size of a wrist watch) using electrical stimulation to supplement the remaining body control functions after spinal injury. However, there have been few successes as yet because of the muscular complexity of even a simple movement and the exhaustion caused to the patients. Although the technology exists to assist spine-injured patients to walk again, incorporation of the whole system in the body with an appropriate control system is a long way off. Professor Paul believes the current research into using the sensory and proprioceptive information stored in the intact nervous system in the legs looks promising.

Finally, Professor Paul looked at the properties of materials used in bioengineering, describing how they differ from biological materials. He went on to describe in detail the research into load cycles required before designing, for example, joint replacements.

[The full text of this talk is available from the Publications Office of the Royal Society of Edinburgh]

3 March 1997

KNOWLEDGE, EDUCATION AND THE FUTURE - AN OCTOGENERIAN REFLECTS
Baron Dainton of Hallam Moors in South Yorkshire, FRS, HonFRSE
Delivered to the Fifth Ordinary Meeting

Lord Dainton said that the uniqueness of man in the animal kingdom lies in the power and size of his brain together with his curiosity. Curiosity drives him to identify himself in relation to space and time as well as to the world about him and its inhabitants. His brain allows him to memorise what his sense organs have perceived and to detect regularities which he can incorporate into empirical laws of Nature. Such empirical information he often used to devise tools to perform tasks beyond his puny unaided physical strength. His capacity for lateral thinking, i.e. imagination, allows him to construct theories to account for such laws which he can then use to predict the unknown from the known, a process whereby empirical knowledge can become scientific. By this means new and useful materials, e.g. steel and naturally occurring fuels, e.g. coal, put even greater power at man's disposal. This was the basic cause of the Industrial Revolution which began in Britain about two centuries ago transforming it and many other nations from agricultural and rural to industrial and urban societies.

Today the Information Revolution is in full spate. Its base is firmly fixed firstly in the electronic computer which enhances human *mental* capacity for storage, use and manipulation of information, the last giving a further stimulus to the imagination; and, secondly, in knowledge about the regulation of biological processes. Such knowledge gives mankind even greater power to determine its own future but also presents it with both opportunities and dangers. The degree to which wise choices are made and personal and societal development are harmonious and fulfilling, will in great measure depend on the effectiveness of our institutions of education in their future tasks of equipping and re-equipping people of all ages to adapt to the rapidly changing world of work.

The lecture concluded with provocative speculations about the changes which are probably necessary both in educational *content* and *process* and how these might alter, perhaps radically, conventional institutions, especially those of higher education.

EDINBURGH INTERNATIONAL SCIENCE FESTIVAL, 1997

With the Caledonian Research Foundation, Scottish Natural Heritage and the Royal Society the RSE was associated with the presentation of three lectures which were all open to the public:-

24 March 1997

ATMOSPHERIC POLLUTION - FROM ACID RAIN TO GREENHOUSE GASES
Professor D Fowler, Institute of Terrestrial Ecology, Penicuik

26 March 1997

FROM SELBORNE TO SUMMIT
The Earl of Selborne KBE, FRS

2 April 1997

TIDAL POWER - A MAJOR PROSPECT FOR THE 21ST CENTURY
Mr E T Haws FEng, E T Haws Consulting Engineers, Horsham and Pitlochry

Although seemingly disparate, the three lectures focussed on the environment, albeit dealing with different aspects. At the present time, with the emphasis on greenhouse gases and climate change, there is a strong tendency to minimise the continuing problem of acidification now more strongly reflecting the emission of nitrogen pollutants from vehicles (mobile sources) than was the case in the 1970s and 80s when sulphur pollutants from the combustion of coal were centre-stage. In addition to giving a timely warning not to lose sight of acidification of soils and water by these pollutants Professor Fowler discussed the significance of the many other gaseous pollutants considered as greenhouse gases. These are to the forefront at the present time in relation to global climate change but, at our peril, we will overlook the complex interaction of greenhouse gases and those responsible for acidification. Much more needs to be known before the control of emissions can be soundly based.

Selborne is irrevocably linked with the name of Gilbert White where *The Natural History of Selborne* was published in 1788 after 18 years of endeavour. After touching upon his family's connection, Lord Selborne dispelled the myth that White's book was a rural idyll: instead White had a fine understanding of rural economies which came through his obvious fascination with wildlife. As a pioneer White had many assets not the least being his preferences for patient observations and the patient and sober recording of these observations. How else could he have discussed the protective coloration of stone curlews and anticipated by many years Darwin's research on the importance of worms in the formation of soil? However, Gilbert White had no inkling of the impending effects of the accelerating Industrial Revolution on our life-systems: he never countenanced the idea that the human race would be responsible for the extinction of numerable species of plants and animals. With this background Lord Selborne discussed the many recent initiatives to make amends for the past and present 'insults' inflicted upon the environment in the name of progress. He touched upon the report prepared by the Brundtland Commission established to examine the link between economic development and the protection of the environment, the publication of the UK Biodiversity Action Plan in 1994 and *Meeting the Rio Challenge* prepared by the UK Biodiversity Steering Group. Despite the institutional initiatives we still have an inappropriate Common Agricultural Policy and an inappropriate Common Fisheries Policy. Ever a pragmatist Lord Selborne, with Gilbert White very much in mind, reminded his audience that it is in the field, however, that people have been delivering nature conservation, working together on various action plans and making the records on which future policy will be based.

How can the effects highlighted by Professor Fowler and the 'insults' described by Lord Selborne be lessened? Nowadays much is said about alternative sources of energy and for an audience in Scotland familiar with the concept of 'nodding-ducks' the theme of Mr Haws' address - Tidal Power - was particularly apposite. Based upon his varied experience and knowledge of projects in many parts of the world - Canada, China, France and Russia - Mr Haws outlined the technical specifications for the barriers needed to harness tidal power from the Mersey, Severn, the Wyre and Conwy and locations in Kincardine. Although complex practical problems had to be confronted and environmental impacts fully assimilated, the fate of tidal power seemed to be irretrievably linked to financial considerations. Although tidal barrages are being designed to survive for more than 100 years, financial institutions expect their venture capital to be repaid in full in no more than one quarter of that time if not one tenth - the stark reality and a hurdle that, for the present, seems unlikely to be overcome.

12 May 1997

SEALS IN THE SOUTHERN OCEAN: INDICATORS OF ECOSYSTEM VARIABILITY

Dr Ian L Boyd, British Antarctic Survey, Cambridge
Delivered to the Sixth Ordinary Meeting

The Southern Ocean is subject to patterns of physical variability that have temporal scales from the annual changes imposed by the seasonal fluctuations in sea ice extent to larger-scale processes at both sub-decadal and decadal levels. Ocean-atmosphere linkages appear to exist that suggest the variability observed in the ecosystem of the Southern Ocean is driven by the same processes as are responsible for general variability in the climate of the southern hemisphere. In the marine environment, top predators (seals, whales and seabirds) can provide a signal, through their behaviour and changes in their populations, which is a measure of the changes taking place in the marine ecosystem. They are particularly good at this because they integrate environmental variability over a wide range of spatial and temporal scales.

Seals are the major component, in terms of biomass, of the top predator community in the Southern Ocean which contains >50% of the world biomass of seals. Historical data sets from seals in the Southern Ocean show that parameters such as the condition of individuals, population productivity, growth patterns and distribution show variability at scales that are similar to several of those that we observe in physical processes, especially the distribution of sea ice. In particular, variability at a scale of 4-6 years is a frequent feature of data sets that have been compiled since the early 1960s and this conforms to the scale of variability imposed by the Antarctic Circumpolar Wave. However, some of the longer data sets also suggest there is variability at decadal scales.

The mechanisms that link physical environmental variability to variability in predator indices most probably involve variation in food chain structure. Small changes in the route by which carbon flux occurs through the Southern Ocean food chain can result in order-of-magnitude changes in the amount of energy reaching top predators. At South Georgia this is illustrated by the occurrence of years in which there is widespread reproductive failure of predators. Such changes may be driven both by changes in the productivity of their main prey, Antarctic krill, that is affected by patterns of sea ice formation or by the physical effects of large-scale southern hemisphere climate variation on the distribution of oceanic currents and frontal zones which are important locations for feeding. Since sea ice variation and climatic variation are linked then both these factors probably influence the behaviour and productivity of predators. However, amongst Antarctic fur seals, there is evidence that variability in their behaviour predicts climatic variability.

The pattern of variability in predator populations and behaviour in the Southern Ocean provides a general insight into the process of change in marine systems. It is clear that stability is not a normal state even in the absence of human influence. Applied elsewhere and to more complex marine ecosystems, this provides the general conclusion that it may not be possible to derive simplistic interpretations of change in terms of cause and effect. This has implications for the current mechanistic approach to fisheries management.

20/21 May 1997

ARCHITECTURE AS A LIVING PROCESS

Mr Douglas Cardinal

Caledonian Research Foundation Prize Lecture

Delivered at the Royal College of Physicians, Edinburgh on 20 May and at the Western Infirmary, Glasgow on 21 May. Mr Cardinal is a native of Calgary, studied architecture in British Columbia and Texas and returned to Alberta to practise thereafter. Some of his early buildings included St Mary's Roman Catholic Church (1967), the Grand Prairie Regional College (1972) and the Alberta Government Services Centre (1977).

Mr Cardinal then gave his lecture entitled 'Architecture as a Living Process'. Mr Cardinal has Native American Indian roots and has drawn deeply on these in the course of his architectural practice and creative activity.

His philosophy of design includes the view that fear of failure is one of the greatest inhibitors of human creative activity. He draws great strength from consultation with Native American elders, and carries this approach to life into a lengthy consultation process in the design of his buildings.

The lecture was beautifully illustrated with slides of Mr Cardinal's buildings. St Mary's Roman Catholic Church was built to a very small budget with a solid concrete roof to provide the needs for the community, and the Grand Prairie Regional College was built in 1972 after the unusual approach of consultation with both students and staff as to requirements for the internal design.

Mr Cardinal's architecture practice was one of the first in North America to become totally computerised. Some of Mr Cardinal's buildings include domestic dwellings including a tepee-like construction for a jazz musician.

Following cutbacks in his native Alberta and advice from his elders that he should move from being a local to a national architect Mr Cardinal moved to develop buildings in Ottawa (which in Native Indian language means 'the centre of power'). He was commissioned by Pierre Trudeau to build a museum of Canadian heritage and in the process of doing this tried to reconcile the French and English view of American history. This very beautiful building was complete despite changes in political leadership, but following this apparent setback Mr Cardinal won the international Competition to design a new section of the Smithsonian Museum for the Mall in Washington devoted to American history. Designs of this remarkable building were shown. Building will commence in 1998 and will finish in 2002.

After a superb lecture a vote of thanks was offered by Professor Charles McCallum.

9 June 1997

SUSTAINABLE DEVELOPMENT - AN ENERGY INDUSTRY PERSPECTIVE

Dr John S Jennings, FRSE, Chairman of The Shell Transport & Trading Company plc
Delivered to the Seventh Ordinary Meeting

In his talk Dr Jennings discussed the economic, social and environmental pillars of sustainable development. He began his address by considering the notion of sustainable development as defined by the Brundtland Report from a business perspective. His lecture focused on one of its central challenges - how to supply the energy required by an expanding and developing world in a way that is sustainable. In doing so he illustrated his talk with some of the scenarios which Shell planners have developed to assist in the prediction of some of the forces that will shape the future. Dr Jennings described some of the contributions which commercial enterprises can make to sustainable development, primarily in the economic sphere, by providing essential goods and services, creating wealth through employment, and payment of tax and dividends, in a continuing process of innovation and investments. He noted that companies play a vital role in dissemination of technical, commercial and managerial skills which enable individuals and societies to advance, this being particularly important in the developing world where such schools are in short supply and so essential for development. Meeting the energy requirements in an expanding world in an environmentally friendly way is one of the major challenges facing mankind and Dr Jennings discussed some of the ways which energy markets are adapting. While there is rightly increasing focus on environmental challenges his message was that sustainable development must always remain the overall goal.

24 September 1997

THE GROWTH OF WORLD TRADE

Sir Alexander Cairncross, KCMG, FBA, HonFRSE
Delivered to the Eighth Ordinary Meeting

In the late nineteenth and early twentieth centuries, world trade expanded at a rapid rate. The First World War was, however, followed by a period of decline and stagnation of trade. Many experts predicted that this trend would continue after 1945, as import substitution by newly industrialising nations would displace their demand for imports. But this expectation was confounded by the fact that growing prosperity led to increasing demands for all goods, including imports. Indeed, the growth of world trade has outstripped the growth of output in the world over the past fifty years. A major factor in explaining the relative rise in the importance of trade has been the gradual elimination of trade restrictions under the auspices of the General Agreement on Tariffs and Trade (now the World Trade Organisation). An important question, yet to be resolved, is the degree to which international trade actually promotes economic growth.

Sir Alec turned to the role of developing and newly industrialising nations in the world trading system. Except for the phenomena of the oil-price rises of the 1970s, the prices of primary products have steadily declined relative to the prices of manufactured goods. Many developing countries specialised in exporting only one or two primary products. Switching to the production and export of manufactures appeared to be a sensible strategy. The rate of growth of exports of manufactured goods by developing countries has been double that of industrialised countries' exports. This expansion of trade is most pronounced in Asian countries, especially. The composition of these countries' exports has changed over time, but the continued expansion has confounded observers. While many developing countries have been successful in shifting from primary products to manufactures, they remain dependent on demand for these from industrialised countries, as there is still relatively little trade between developing countries.

Sir Alec then addressed the question as to whether growth of trade could be sustained at the present level. The increasing presence of multinational firms, which parcel out their production activities over many countries in the process known as globalisation, has led to continuing growth. Indeed, the growth of foreign direct investment has been even more rapid than the expansion of world trade. He can see no reason that this trade growth should not continue unabated with developing countries further shifting the composition of their exports towards manufactures.

A final aspect considered by Sir Alec was the identification of the benefits of export-led growth to a nation. In his opinion the principal gains arise, not from the more efficient allocation of resources already in employment, but from the increased levels of economic activity and employment associated with a growing economy.

27 October 1997

SCOTLAND'S UNIVERSITIES IN THE 21ST CENTURY
Sir Stewart Sutherland, FBA, FRSE
Delivered to the Statutory General Meeting

(The full text of this lecture appears in the RSE's Occasional Paper Number 6.)

The Dearing and Garrick Committees have now reported: Scots voters have confirmed strong support for a devolved parliament. It is therefore time to take stock.

Universities have experienced dramatic change. There are now thirteen Universities in Scotland plus the Open University and the proposed University of the Highlands and Islands. One impact of the changes and cost-cutting pressures has been loss of vision and perspective.

In order to maximise and indeed to create the opportunities which the new century could bring, strategic thinking and long term planning of a high order is required. The Scottish University system and each University within it must respond decisively to Dearing. Central issues such as widening access, setting and maintaining standards, providing adequate staff training for new patterns of information technology informed teaching and learning need not await further discussion. It is time to act.

Most important of all is that Scotland recognises and accepts that the new university order is diverse in its character. The funding system, the evaluation of the outcomes and the internal practices must promote this.

It is essential that in areas of strength already present in a number of universities Scotland's research profile and its competitiveness is enhanced by adequate and selective use of funds available. In key areas such as computing, electronics, informatics, cell and molecular biology and biotechnology, the competition is for funds outside Scotland and the 'opposition' are Oxford, Cambridge, London and the big civics. Our funding policies must be attuned to this rather than well-meaning but ultimately self-destructive forms of parochialism.

CONFERENCES/SYMPOSIA/WORKSHOPS

WRITING SCOTLAND'S HISTORY: WHAT HAVE HISTORIANS MADE OF THE NATION'S PAST?

2 November 1996

This Conference was mounted by the Royal Society of Edinburgh and the Scottish Historical Review Trust to mark the 200th issue of the *The Scottish Historical Review*, the premier journal in Scottish historical studies. Nearly 100 people attended a very successful event lasting the whole day.

The Conference was split into two sessions, the morning one chaired by Dr Alexander Grant of the University of Lancaster, Editor of the *Review* for the pre-1600 period, and the afternoon one by Professor Jay Brown of the University of Edinburgh, Editor of the *Review* for the post-1600 period. The morning session heard three papers on pre-1600 visions of Scottish history. Dr Dauvit Broun of the University of Glasgow spoke about the 'birth' of Scottish history in the king-lists of the Picts and the Dalriadic Scots, before arguing for the existence of an established narrative of Scottish history by 1300, in the crucial period of the Wars of Independence. Professor Donald Watt FRSE of the University of St Andrews gave the second paper as very much a last-minute substitute for Dr Stephen Boardman of the University of Aberdeen, who had withdrawn the previous day as a result of illness. Professor Watt discussed the work of the fifteenth-century historian Walter Bower, emphasising the Continental (especially French) orientation of his research, and his nationalist and anti-English stance. The third paper, by Dr Roger Mason of the University of St Andrews, discussed the historical writing of John Knox. Knox emphasised Biblical rather than Scottish history; only in 1560 and with the Reformation did Scotland become Scottish and worth writing about. It was left to one of the other great figures of Reformation Scotland, George Buchanan, to create a pre-1560 proto-Scotland.

The afternoon began with an account of the Enlightenment approach to Scottish history by Dr David Allan of the University of Lancaster. This was of necessity coloured by the 1707 Union and by reaction against the perceived brutalities of the feudal and religious battles of the past, raising however the question of how polite learning had emerged and what society was like in its absence. Dr Colin Kidd of the University of Glasgow addressed the problem of the nineteenth-century 'death' of Scottish history, as scholars appeared to lose confidence in the subject by comparison with the perceived glories and imperial destiny of English history. Finally Dr John Stevenson of Worcester College, Oxford, assessed the resurgence of Scottish historical writing in the twentieth century, applauding its range and maturity but pointing out that, with the exceptions of such 'British' periods as the middle ages and the seventeenth century, it had yet to penetrate as widely outside Scotland as for example, Irish history. Each of these papers attracted vigorous discussion.

Professor Christopher Smout FRSE, Historiographer Royal, drew the threads of the day together at its conclusion, observing the tension between the tendentiousness of historians and their need to produce a 'usable past'; the antiquity of the historian's reverence for sources, contrasting with the lack of any perception of a need for balance until the eighteenth century, when it became necessary to bind up old wounds; the need still for histories of Scotland in relation to other countries, alternatives to constitutional history, and popular history addressing issues of material culture and crossing the narrow divide between archaeology and history.

FATTY ACIDS IN EARLY DEVELOPMENT AN RSE/WELLCOME WORKSHOP 12 November 1996

The objective of this Workshop (held in Glasgow) was to bring together scientists with an interest in the role of fatty acids in early development to discuss current research and future directions. Long chain polyunsaturated fatty acids are integral components of biological systems, particularly those of the nervous system. The fatty acids must be supplied to the developing mammal by the mother: before birth via the placenta and after birth in the mother's milk. The meeting focused on the continuity of fatty acid transfer from mother to progeny during intrauterine and extrauterine life, the role of fatty acids in membrane function, and the consequences of dietary deprivation on the structure and function of the infant brain.

Some 40 invited delegates from all over Scotland assembled to hear five speakers. A feature of the Workshops is the ample discussion time, both after each speaker and at the end of the day. Professor Anthony Watt, University of Oxford, spoke about the structural and functional consequences of long chain polyunsaturation in biomembranes; Dr Assim Dutta-Roy, Rowett Research Institute, talked on the placental transfer of fatty acids and their role in fetal development; Dr Ray Noble, Scottish Agricultural College, Ayr, talked about the fatty acid uptake and utilisation by the avian embryo; Professor Lawrence Weaver, the University of Glasgow, discussed methods, using stable isotopes, of measuring the capacity of the newborn to digest and absorb fats; and Professor Forrester Cockburn, University of Glasgow finished off by looking at dietary fats and the infant brain.

SIGNAL TRANSDUCTION MECHANISMS IN HEALTH & DISEASE
AN INTERNATIONAL CONFERENCE ORGANISED BY THE ROYAL SOCIETY OF EDINBURGH AND THE CALEDONIAN
RESEARCH FOUNDATION
14-15 November 1996

Many aspects of the behaviour of cells are controlled by biological signals such as hormones and growth factors. These trigger cellular responses by activating a variety of intracellular signal transduction processes. In recent years, knowledge of the individual molecules involved in these signalling pathways has burgeoned, such that it is now possible to ask specific questions about their roles in the cell and the possibility of intervening in their function. Professor Joseph Avruch who gave the Keynote lecture at this conference posed several questions which he suggested future research efforts should address, some of which it has only recently become possible to tackle. Of the 50,000 cellular proteins which the human genome is thought to encode, (1) how does each function? (2) how are they functionally interconnected? (3) what role does each play in cellular function at each stage of the cell cycle? (4) is damage, mutation or misregulation important in disease? (5) can faulty proteins be replaced or by-passed? We now know that more than 2% of human genes encode proteins involved in signal transduction. No conference could hope comprehensively to cover such complexity; instead the speakers were selected for the significant contributions their work has made to addressing the above questions within their own specialities.

The molecular basis of insulin action has been one of the holy grails of signal transduction for nearly half a century and we now stand on the threshold of learning its most carefully kept secrets. Key components of insulin signalling pathways which control this hormone's major metabolic effects such as glucose absorption by fat and muscle tissue were described by Morris White (Harvard) and Emmanuel van Obberghen (INSERM, Nice). One of these signals is a lipid, phosphatidylinositol trisphosphate (PIP₃), which is synthesised in cell membranes within seconds of the application of insulin to its target cells. Len Stephens (Babraham, Cambridge) showed how the synthesis of PIP₃ is regulated by a wide range of growth factors and inflammatory stimuli as well as by insulin placing it in a pivotal position in the hierarchy of cell signals. This theme of membrane lipids as signals was elaborated by Robin Irvine (Cambridge) who described the varied functions of inositol phospholipids, of which PIP₃ is but one member of a growing family of closely related molecules.

The enormous complexity of cell signalling processes revealed by recent research can be simplified by thinking of the processes as a series of linear, branching and interconnecting networks consisting of related sets of components. The chief participants in such networks, which relay signals from the cell membrane to all parts of the cell, including the nucleus, where gene expression is regulated, were described by several speakers. The networks function like computers with their components switching between two states, on and off. Understanding how these switches operate is an important goal of current research and a beautiful example of what can be achieved was presented by Heidi Hamm (Chicago). A major group of switch proteins which couple cell surface receptors to intracellular events contain bound GDP in the resting (off) state, and GTP in the stimulated (on) state. X-ray crystallography has now revealed the atomic structure of one of these so-called G-Proteins and pinpointed the critical alterations in conformation which form the basis of this molecular switch mechanism.

The cartoon version of a typical cell gives the misleading impression that cell contents are relatively randomly distributed. In fact cells are highly ordered, containing a variety of filamentous structures which collectively comprise the cytoskeleton. One important theme of the conference explored the relationships between the signalling networks discussed above and the cytoskeleton. For example, Charles Rubin (New York) and David Critchley showed how cytoskeletal structures regulate the spatial organisation of signalling networks. Allan Hall (London) showed that this relationship is a mutual one because many signalling networks regulate the assembly of cytoskeletal components leading to alterations in cell morphology, motility and interactions with the extracellular matrix.

One of the most effective ways of subverting any organisation is to break its codes of communication, inserting messages which serve your own purpose. So it is with disease, whether caused by an external agent such as a virus or an internal takeover as in the case of a tumour. It is therefore not surprising that many diseases are caused by malfunctions of cell signalling pathways and it now seems to be a realistic proposition that drugs can be developed which target specific components of such pathways to treat a wide range of diseases including diabetes, heart disease, inflammatory diseases such as rheumatoid arthritis and chronic asthma and cancer. This theme of the conference was introduced by Alex Levitzki whose group has developed a range of selective tyrosine kinase inhibitors which are promising anti-cancer therapeutics. Philip Cohen (Dundee) and Chris Marshall (London) developed the theme further, describing the huge potential of signal transduction therapy.

It is a startling fact that 20% of the world's leading drugs (in terms of gross sales) target specific members of a single gene family encoding hormone receptors which signal via the G-Proteins that were mentioned earlier. It is tempting to speculate that a new generation of drugs whose targets are the pathways and molecules which featured prominently in this conference will soon begin to dominate these markets.

THE PERIODONTAL INTERFACE INTERNATIONAL WORKSHOP
24 January 1997

This Workshop was organised by the Royal Society of Edinburgh with the support of the Scottish Office Department of Health. It was held within the Royal Society of Edinburgh and attracted an enthusiastic audience. The format of the Workshop was one of a series of five 20 minute addresses by internationally renowned experts on aspects of the epidemiology and pathogenesis of periodontal disease. This was followed by interactive workshops whereby the audience was split into five working groups, chaired by five members of the Organising Committee who also acted as Rapporteurs reporting back to the full symposium on completion of the hour discussion session.

In the afternoon session, five 20 minute presentations on periodontal treatment were delivered by internationally renowned experts in these areas. Once again, these topics were subsequently discussed within working groups and again the Chairman/rapporteur reported back to the meeting.

A general discussion then ensued on the whole day's deliberations. The format appeared to work extremely well and this was greatly helped by the excellent addresses given by the speakers and by the hard work of the Chairman of each of the working groups. General Practitioners were less inhibited in this format although they responded afterwards that they would also have liked to have joined in and discussed the other topics which were presented. A future format could be to use half of the time within the working group discussing the specific topic set and then the other half of the time talking generally about the other four presented topics. A very high scientific standard was maintained throughout the Workshop which also attracted the interest of the press.

Professor Papanou, University of Gothenburg, opened the Conference by reporting that advanced periodontal risk assessment was multi-factorial and that cigarette smoking, diabetes, specific genotypes and pre-existing periodontal disease, as well as the microbiology of samples taken from the periodontal lesions, were all relevant in the evaluation of an individual's risk potential.

Dr Penny Hodge from the University of Glasgow went on to discuss the genetic background for periodontal disease and indicated that the studies into the progression of early-onset periodontitis suggest that more than one major gene may be involved and that the transmission of early onset periodontitis from one generation to another is by an autosomal dominant mode of transmission. Dr Chestnutt from the University of Glasgow went on to discuss the impact of smoking on periodontal disease. He concluded that smoking is a major risk factor in the development of periodontal disease and that smoking cessation would be of great benefit in its treatment.

Dr Steven Offenbacher from the University of North Carolina underlined important systemic effects of periodontal disease, namely heart disease and stroke and that periodontal disease was a significant risk factor for pre-term labour and pre-term low birthweight babies. His presentation provided strong support for the concept that periodontal infections can compromise systemic health.

The afternoon session commenced with Dr Lone Sander from Glasgow Dental School presenting on guided tissue regeneration as an effective treatment in restoring previously damaged periodontal supporting structures. Professor Richard Palmer from Guy's Hospital, London, then went on to discuss the use of implants in dentistry and indicated that periodontists were well placed to both provide treatment and to perform the research on this new and exciting area of dentistry. He also underlined the fact that this was a very predictable treatment, much more so than some of the guided tissue regeneration techniques currently performed.

Professor Robin Seymour from the University of Newcastle then gave a dramatic demonstration of the effects of certain drugs on the creation of excessively overgrown gingiva. Approximately 30% of patients using cyclosporin, 50% of patients on phenytoin therapy and 10-15% of patients taking calcium channel blockers are likely to have significant overgrowth of their gingiva such that they require intervention from the periodontist.

Dr Andrea Mombelli, University of Berne, gave an update on the use of antimicrobials in the treatment of periodontal disease. His main point was that mechanical debridement before the application of antimicrobial agents and good preventive regimes practised by the patient after therapy are essential for treatment success.

Dr Marianna Sanz, from the University of Madrid, then discussed the current diagnostic systems available to those practising periodontics. Essentially, there is a wide range of microbial and host based diagnostic systems but these have yet to be fully evaluated such that we can be confident of their utility and use them instead of the standard diagnostic methods which are quite crude and include probing and assessment of bleeding and probing from the periodontal pockets.

The international speakers performed extremely well and had to work very hard to keep within the 20 minutes time-frame allotted to them. It was a measure of their experience and abilities that they were able to deliver their important messages succinctly. By involving such renowned speakers and by incorporating ample discussion sessions, the attention of the audience was maintained throughout. This format also permitted the, at times, reticent general practitioners to be much more involved in debate of the scientific

aspects and how they may relate to their own practice. Overall, this Workshop was quite remarkable in that it satisfied both the experts and the less specialised general practitioners who all responded very positively to the value of this Workshop.

PARTICLE PHYSICS - THE THREE GENERATIONS OF QUARKS
Tuesday, 11 March 1997

Sixty-five scientists attended the meeting at the Society's rooms: most were from Scotland, but with a welcome presence also from Durham and Lancaster.

Dr Chris Bowdery of Lancaster University gave the opening talk on 'The Hadronic Zoo'. 1997 marks not only the centenary of the discovery of the electron, the first elementary particle, in Cambridge, but also the fiftieth anniversary of the discoveries of the pion and the kaon in Bristol and Manchester respectively.

The next twenty-five years saw the discovery of a bewildering variety of new particles. Gradually a pattern emerged and by 1975 we were confident of a description of these as composites of a few fundamental 'quarks', and their corresponding anti-particles. Together with the leptons, (particles like electrons and neutrinos), these form three 'generations'.

Dr Sara Collins at Glasgow University described recent precise calculations of heavy-quark spectroscopy. Although quantum chromodynamics provides a precise formulation of the way quarks interact via the exchange of 'gluons', to turn this into useful predictions is difficult using traditional methods. Instead one turns to massively parallel finite-element ('lattice') computational methods which have been made possible by computer architectures available at the Edinburgh Parallel Computer Centre. Scientists are eager for the increasing computer power that will enable more realistic calculations to be undertaken, and a greater range of problems to be tackled.

Dr Roger Jones (Lancaster) brought the latest news on the electroweak interactions of charm and beauty quarks. The LEP electron-positron collider at CERN has enabled tremendously precise measurements to be made. The theory is so exact that a fractional discrepancy indicates a flaw in our understanding and by summer 1995 a problem was upon us. The outcome of additional data and scrutiny of methods today is increased confidence in present theory, and a hint that it could accommodate a 'supersymmetric' explanation of the energy scale of weak interactions.

Dr Thomas Teubner (Durham) described theories for the production of charmed quarks in high-energy electron-proton interactions at the HERA collider in Hamburg. 'Diffractive' events, in which the proton emerges intact or with very little disturbance, are interpreted as the excitation of gluons within the proton: the process is isolated by looking for charmed quarks as these are not intrinsically present in the proton. Increasing HERA luminosity is providing data progressively to confront theoretical idea.

Dr Steve Playfer (Edinburgh) reviewed our knowledge of rare b-quark decays - a class of events in which the normal beauty-to-charm quark decay sequence is replaced by beauty-to-strange (fancifully called 'penguin' decays after the topology of their Feynman diagrams).

Dr Nick Brook (Glasgow) put this in a world context by reviewing future possibilities in using b-quark factories to pin down the asymmetry between matter and antimatter ('CP'-violation). Starting at DESY in 1998; then in Japan and the USA from 1999 new facilities with high intensities will transform our ability to address this topic. Ultimate precision will come from 2005 at the CERN Large Hadron Collider. The all-purpose Atlas and CMS detectors, and in particular the dedicated LHC-B proposal will bring precision to a field where the basic parameters are not yet clearly known.

Finally, Professor Giorgio Bellettini (Pisa/Fermilab-USA) described the jewel in the crown of quark-theory: the 1995 discovery of the top quark. This completed the three generations of quarks whose elucidation began in 1947: data from LEP strongly suggest that no more such generations exist. Chasing the elusive top quark has been an eighteen year task. Compared to the Heaviest of the other quarks, the top quark is alarmingly massive at around 175 GeV. To produce particles of this mass the world's highest energy collider and prolonged running at high intensity are needed.

The extraordinary high mass of top quark reminds us that the 'standard model' of quarks provides no help whatever in explaining why things have mass. To address this needs the Large Hadron Collider, currently being built at CERN. A key objective is to test ideas first proposed by Professor Peter Higgs (Edinburgh) on the origin of mass - to search for the predicted Higgs Boson. This meeting underlined the vigorous health of the field, and the interest and activity in it in our part of the world. The meeting was organised by Professor David Saxon (Glasgow) and Professor Terry Sloan (Lancaster) and made possible by financial support from SAIC Ltd and from the Italian Embassy.

APPLICATIONS OF ELECTROMAGNETIC RADIATION
27 March 1997

This international symposium marked the retirement of Professor Des Smith, FRS, FRSE, Professor of Physics at Heriot-Watt University. The day was divided into two parts, with the physics and applications of infrared semiconductors being discussed in the morning, and the science of the environment examined in the afternoon.

The first speaker was Professor Angus Macleod, from the Thin Film Center, Tuscon, USA, who spoke about the applications of multilayer interference coatings. There is scarcely a field having some connection with optics where interference coatings are not used, and development of new pigments and the incorporation of biological sensors will ensure that the applications are ever wider. Professor David Miller of Stanford University, USA, discussed optical bistability and optoelectronic computing, concentrating on how optics can solve problems of interconnection which otherwise strangle information processing machines. Professor Carl Pidgeon, from Heriot-Watt University, talked about UK semiconductor experiments with FELIX (the Dutch free electron laser). Professor Tom Elliot, of the Defence Research Agency in Malvern, updated delegates on progress in novel long wavelength IR detectors and emitters.

The afternoon started with Sir John Houghton, Chairman of the Royal Commission on Environmental Pollution, speaking about remote sensing from satellites. Sir John Mason, from Imperial College, London, talked about the role of clouds in the radiation balance of the atmosphere and the complexity and uncertainty of the models which try to predict climate change. Professor Malcolm Slesser, the Institute of Ecology and Resource Management, University of Edinburgh, brought nature into the economic equation by modelling the economy in nature's terms (using energy as a unit of account) and discovered that all economies are moving away from sustainability. Professor Denis Weaire, of Trinity College Dublin, wound up the meeting by looking at how the 19th century search for the ether of space stimulated a surprising number of lines of research.

ROBERT CORMACK BEQUEST MEETING
28 April 1997

The 1997 Cormack Astrophysics Meeting took place in the School of Physics and Astronomy at the University of St Andrews. The meeting was opened by Professor Malcolm Jeeves, CBE, President of the Society.

The meeting brought together young researchers from all over Scotland (and a few more senior ones) for a day packed with short talks and many posters. Further details are available on the Web site: <http://star-www.st-and.ac.uk/astronomy/Cormack.html>.

EVENING DISCOURSE: BUILDINGS IN CITIES OF THE 21ST CENTURY
23 May 1997

A Symposium held in the rooms of the Society, Friday 23 May 1997, the second symposium in a series involving architects, planners, and civil engineers etc. The series started in November 1994 with 'The Challenge of Rehabilitating Old Buildings'.

This symposium was of two parts. The first part was concerned with the regeneration of cities and the second with maintaining quality in cities. Professor P Drewe of the Technical University Delft noted that some post-modern architects claim that the city of the future would be liberated from the 'captivity of the centre' and discussed the effect of information technologies in shaping a 'network city'. He was followed by Professor P Roberts, University of Dundee, who examined the evolution of urban regeneration in the UK between the 1950s, when the emphasis was on reconstruction, and the 1990s when it is on regeneration. He drew attention to the importance of sustainable development and the proper consideration of social, economic and environmental development. The British Urban Regeneration Association has identified criteria for best practice in relation to these factors and examples of awards by this body were described. Finally Dr N Falk (Urban and Economic Development Group, London) reviewed the challenges which have to be met in attempting to regenerate town, and city centres and showed a number of schemes where the problems had been successfully overcome. He pointed out that regeneration has to be promoted by the combined efforts of private and public sector agencies supported by relevant governmental policies.

During the second part of the symposium, focused on maintaining quality in cities, Professor C McKean (University of Dundee) contrasted the growth of the 'edge city', which has been a feature of urban development during the past two decades, with the traditional city centre structure. He drew attention to many of the questions which will affect future trends, for example, the influence of Information Technology on the requirement for office property and whether residential accommodation will move back into the city centre. He opined that the creation of spaces in which human activity can take place is the role of architecture - it is essentially secondary in social terms. Professor McKean was followed by Mr H Liddell (Gai Architects, Edinburgh) who set out the case for holistic ecological design strategies as opposed to 'technical

fix' measures. He illustrated his argument with reference to examples drawn from all over Europe and suggested that a cultural shift was necessary in the construction industry before long term sustainability was likely to be achieved.

THE BICENTENNIAL CONFERENCE: JAMES HUTTON AND CHARLES LYELL
30 July - 9 August

The coincidence in 1797 of the death of Hutton (1726-1797) with the birth of Lyell (1797-1875) was celebrated by this conference, held in London and Edinburgh, 30 July-9 August 1997. These two Scots were seminal in the development of the earth sciences. Hutton argued that an understanding of present processes was the key to those operating in the past, and embodied this in his original *Theory of the Earth* (1785). The view was expanded and popularised in many editions of Lyell's successful *Principles of Geology* (1830). Lyell's contribution, as Rudwick has pointed out, was to emphasise that this was the only proper method for geology to follow, and determined what should count as scientific.

Lyell formed the focus of the first meeting, at The Geological Society of London. The Edinburgh meeting was developed by an RSE committee chaired by Professor Gordon Craig, and held at The Royal College of Physicians. Both meetings took as their starting point the scientific contributions made by these men, and examined them in their historical context. The Edinburgh meeting then used the key concepts of Hutton's Theory as topics for state-of-the-art reviews of current earth science, by current masters in the field. Major sessions dealt with Hutton's theory of the Earth: past and present; Fluxes of the Earth; The relevance of experiment to geology; Catastrophism and Uniformitarianism - Ancient and Modern; Hutton, Lyell and Our Dynamic Earth (the latter a reference to the forthcoming exhibition by the principal sponsor of the conference: LEEL).

A full programme of lectures, poster displays, civic, state and university receptions and a dinner made this a memorable conference, but a delightful fillip was added by integral happenings and publications. A majority of the 170 attending joined the conference excursion to that geological Mecca of Hutton's unconformity at Siccar Point: 'the abyss of time'. Glorious weather ensured that 'On us who saw these phenomena for the first time, the impression made will not easily be forgotten...' (Playfair 1805). En route to the mid-conference visit to Hutton sites in Holyrood Park, a memorial plaque to Hutton was unveiled at the site of his St John's Hill house, the outcome of collaboration between many organisations. The conference ended with day excursions to either Hutton's Glen Tilt or to Lyell's birthplace at Kinnordy, Angus. Delegates received not only specially prepared excursion guides, but also a newly augmented 1996 reprint of Lothian geology and the 1996 *Discovering Edinburgh's volcano*, both published by Edinburgh Geological Society, which also coordinated the excursions. A new edition of the 1785 *Abstract* of Hutton's Theory of the Earth was presented to delegates, who could also purchase, hot from the press, The Stationery Office's *James Hutton: the Founder of Modern Geology*.

Both conferences succeeded in celebrating the achievements of these two key figures in the earth sciences, and in pointing the way forward with often outstanding reviews of the present state of knowledge.