Editorial.

Welcome to the Bulletin of the EPG, from your new editors!

We all agree that the environmental sciences are important. However, mere agreement on a vague principle is not going to achieve much, unless environmental scientists act to promote their fields of research, in a pro-active manner. The complexity and convoluted feedbacks of environmental systems are increasingly recognised; thus we should promote the understanding and, where required, preservation or careful management of environmental systems, within the community of scientists and to a wider audience, including the lay public. As individuals, and members of groups and institutes, we can have a beneficial effect not only on our environments, but also on mundane but important issues such as career opportunities for emerging environmental scientists.

We, the editors of this journal, and you, the potential contributors, can play a small but significant role in this process. We see this as part of a means by which the members and Committee of the EPG can form a more coherent unit, largely by encouraging greater communication between members, and between members and the Committee. We think that the EPG can evolve into a more active and useful organ, and that we may be able to catalyse this change by means of this publication. Thus we want to open a dialogue – we want you to write to us, and tell us what you think of the EPG, and how it could and should change. Please be frank in your criticisms! We also encourage you to supply articles on your research work. If your research may have social or policy implications, and you feel confident to discuss them, then this Bulletin can provide a forum.

So much for the future of the Bulletin. It would not, however, have a future if it did not have a past – our first task in our role as editors is the pleasant one of thanking the outgoing editor, Geoff Hassall, for making the Newsletter of the EPG what it is, and providing a platform for us to continue from. However, now that there are two editors, we are able to explore more options.

This first issue of the Bulletin is not very different in content from the last issue of the Newsletter, although the layout has clearly changed. However, we want to initiate the changes suggested above, as soon as possible. Thus we want the next issue, three months from now, to contain letters from members of the group, and at least one research article written by a member. If you would like to submit an article, please contact Ranjeet Sokhi (address on the back page). The deadline for all articles and other items is Friday 31 May 1996.
Another change in progress is to put the text of this Bulletin on the World Wide Web. This will enable us to reach a wider audience, and to put ‘clickable’ links in the text, e.g. in the section that refers to other parts of the WWW. This issue of the Bulletin is currently available at:

http://www.nerc-essc.ac.uk/~dwpct/htmls/epg_top.html
but it will ultimately reside on the Institute’s server at

Please note that all the old newsletters will henceforth be referred to as Volume I of the Bulletin.

Ranjeet Sokhi (editor), David Pearson (assistant editor).

The views expressed in this editorial are those of the editors, and do not necessarily reflect those of the Institute of Physics or of the Environmental Physics Group.

Annual General Meeting of the Environmental Physics Group and Plenary Lecture by Professor John Monteith,
24 April 1996.

The fifth Annual General Meeting of the Environmental Physics Group will be held on 24 April 1996 during the meeting “Physics and the Environment: Processes and Applications”, the Group’s contribution to the Institute of Physics Annual Congress, 23-25 April, Telford International Centre (see Meetings, Conferences and Events, page 8). The meeting will start at 2.40pm prior to the start of the afternoon session and following the plenary lecture “What is Environmental Physics?” given by Prof. John Monteith (2pm).

Nominations for Committee members (two vacancies) and for Group Officers (Chairperson, Vice-Chairperson and Honorary Secretary) should be sent to the Honorary Secretary no later than seven days before the AGM. Nominations must be proposed by not less than two Members of the Group and should be accompanied by the written consent of the nominee.

For further information contact: Alastair McCartney (EPG Honorary Secretary), Department of Crop and Disease Management, Institute of Arable Crops Research, Rothamsted, Harpenden, Herts. AL5 2JQ, UK. Tel: 01582 763133, Fax: 01582 760981.

A Personal View.

Alastair McCartney - The Scope of Environmental Physics: Plant Pathology.

At first sight plant pathology, the science of plant diseases, and physics would seem to have little in common. However, I, a physics graduate who has had no formal training in biology (apart from learning about frog spawn in first year science at school), have spent the last seventeen years working with plant pathologists. How did this happen? In my final year studying physics at Strathclyde I went to a lecture given by John Monteith, on “Environmental Physics”, a subject new to me. This prompted me to take up a Ph.D. studentship with John’s group at Nottingham University’s School of Agriculture, and so to become an “environmental physicist”.

My Ph.D. research work was on solar radiation and crops, work that I continued at Brighouse Polytechnic before going to work on air pollution at Lancaster. As the air pollution work involved atmospheric dispersal I applied for and got a post in the Physics Department at Rothamsted Experimental Station (now the Institute of Arable Crops Research) to study the dispersal of fungal spores. Many plant diseases are caused by fungi, which are spread by microscopic spores with effective diameters between about 3–100µm. When the Physics Department closed I was transferred to the Plant Pathology Department (now Crop and Disease Management) to become a bona fide plant pathologist (I am even a member of the British Society for Plant Pathology).

How can physics help in plant pathology? Part of the plant pathologist’s job is to try and understand how disease epidemics develop in crops. This requires an understanding of the processes that determine the interactions between the pathogen and its host. Environmental factors play a crucial role in the life cycles of most plant pathogens. For example, many fungal pathogens require liquid water to be present on the host surface before their spores will germinate and infect the plant. The fungus Pyrenopeziza brassicae, the cause of the most damaging disease of oilseed rape in the UK, requires leaves to be continuously wet for about thirteen hours before infection can take place. Other processes such as sporulation and spore release can be mediated by environmental factors. Changes in relative humidity appear to control the release of spores of Sclerotinia sclerotiorum, a pathogen that can cause severe losses in a wide range of broad-leaf crops, including oilseed rape and sunflower. Spores are ejected from apothecia, small mushroom-like fruiting bodies, in response to a drop in relative humidity, although the exact physical mechanisms are unknown. Temperature also plays a crucial role in disease development. At low temperatures the pathogen may stop growing or grow too slowly to damage its host, but the pathogen may also stop growing or even die at high temperatures. Thus the temperature response of pathogens determines their geographical range. The optimum temperature for pathogens of temperate crops usually lies between 15°C and 20°C, Environmental factors are also largely responsible for the dispersal of plant pathogens. This is especially true for fungi, where wind is the dominant mechanism for the dispersal of their spores. Plant viruses are usually spread by insects, but wind may largely control where the insects go, and when they land can be temperature dependent. Bacterial pathogens, for example the black leg of potato (Erwinia spp.), can be spread in water droplets produced by rain splash, a mechanism which is also important in dispersing many fungal pathogens (Pseudocercosporella herpotrichoides, an important pathogen of winter wheat, for example). Physics can help us to
understand and measure crop environments and can contribute to the study of the interaction between pathogen, host and environment.

Fungal spore dispersal is a good example of the application of physics to a plant pathological problem. Most fungal spores are dispersed either by wind or in water droplets caused by rain drops splashing on infected leaves. Both processes are purely physical in nature. Dispersal models, similar to those used for atmospheric pollutants, can be adapted to describe the dispersal of fungal spores by wind. However, modelling the dispersal of fungal spores in crops has its own challenges. Air flow within crops is highly turbulent and non-homogeneous, which causes problems, especially with diffusion type models. Most fungal pathogens do not have specialized spore release mechanisms, and their spores are simply blown off infected leaves. Wind tunnel experiments at Rothamsted have shown that for this type of organism spores are only released in wind gusts (depending on the strength of attachment of the spores). Accounting of such intermittent sources further complicates dispersal models. Such problems lead us to believe that pseudo-random walk models may prove useful in modelling spore dispersal in crops.

Rain-splash is the second most important mechanism for dispersing fungal spores and plant pathogenic bacteria. Indeed, many species of fungi have evolved to be spread exclusively by rain. Spores of these species are usually held in mucilage (a kind of glue) on the leaf surface preventing them from being blown off. When the leaf becomes wet the mucilage dissolves releasing spores into a water film on the leaf surface. Spores are dispersed when the film either runs off the leaf or when a rain drop strikes the leaf carrying the spores away in the droplets produced by the splash. Studies of rain splash on leaves have shown that only rain drops greater than about 1mm in diameter are capable of causing splash and that the potential for splash dispersal is related to the force of impact of the droplet on the leaf. This type of information can be used to identify the types of rainfall that will cause spore dispersal. For example, experiments at IACR Long Ashton have shown that in the summer Septoria, a disease of wheat, only up to the top of the crop, where it does most damage, after intense rain showers.

Knowledge of the physical environment of crops and its interaction with pathogens is of great benefit in developing an understanding of how and when disease epidemics will occur in crops. This, in turn, allows pathologists to devise disease control strategies that reduce the use of chemicals by applying them only when it is necessary to maintain an economic yield. Alternatively, knowledge of the interaction between pathogen, host and environment may suggest methods for growing the crop that avoid or much reduce the chances of disease epidemics. Physics has, then, a useful contribution to make to our understanding of, and ability to control, crop disease – one of the biggest threats to food production worldwide.

For further information contact: Dr. Alastair McCartney, Department of Crop and Disease Management, IACR, Rothamsted Experimental Station, Harpenden, Herts AL5 2JQ. Tel: 01582 763133, Email: alastair.mccartney@bbrc.ac.uk.

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Research Funding News.

EPSRC Sustainability Cities Programme.

The second call for research proposals has been issued with a closing date for outlines (4 pages) of Wednesday 6 March 1996. The aim of this research programme is to understand the city as a system by stimulating interdisciplinary collaborative research that can, in the long run, be said to make cities more sustainable. Examples of priority areas include:

- Materials and waste flows;
- Use and re-use of buildings in the urban environment and strategic research into planning and design;
- New technological approaches to urban transport and energy use and their interaction with land use planning, urban air pollution, economic viability and quality of life.

For further information contact:

Scope and content of programme:
Dr Steve Milson, Programme Manager, Sustainability Cities, Polaris House, North Star Avenue, Swindon SN2 1ET. Tel: 01793 444237, Email: s.milson@epsrc.ac.uk.

Finding partners:
Mr Charles Allison, Programme Coordinator, ERM, Eaton House, Wallbrook Court, North Hinckley Lane, Oxford OX2 0GS. Tel: 01865 204994.

Programme Administrator:
Miss Tracy Burberry, Built Environment Support Group, Polaris House, North Star Avenue, Swindon SN2 1ET. Tel: 01793 444050, Email: t.burberry@epsrc.ac.uk.

NERC Thematic Programme: Urban Regeneration and the Environment (URGENT).

Four important areas of scientific understanding have been identified:

- The shallow sub-surface;
- Atmospheric dynamics and chemistry;
- Hydrological balances;
- Urban ecology.

Deliverables and user interactions will include survey information, research products, decision support, technological tools and methods, skill development, public awareness and networking. At this stage no calls for proposals have been issued but it is expected that by April a definite date will be known.

Bull. EPG 2, No. 1, 1996.

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Realising Our Potential Awards (ROPA).

This scheme covers all six Research Councils and ‘rewards researchers of proven ability to attract funding from industry for basic/strategic research through the awards of grants to support curiosity-driven research of their own choosing’. The closing date for receipt of applications is 19 April 1996.

For further information contact:

- BBSRC Mrs. Pat Fry 01793 413331
- ESRC Mrs. Vanessa Laverick 01793 413200
- EPSRC Dr. Geoff Richards 01793 444304
- MRC Mr. Aria Martene 0171 6365422 x6274
- NERC Mr. David Brown 01793 411797
- PPARC Dr. Guy Richett 01793 442082

EU Framework IV: Non-Nuclear Energy (Joule).

The objectives and the research, technological development and demonstration activities covered by this call for proposals relate to the following areas described in the work programme:

Area 3: Renewable energy resources.

3.2.A. R & D projects on solar photovoltaic energy;
3.2.A.1. R & D on PV cells in thin film and of other promising materials;
3.2.A.4. R & D design of low cost PV systems, etc.;
3.4.A. R & D projects on wind energy;
3.4.A.3. R & D on newly developed design principles and machine-oriented components for improved performance and cost of wind turbines. Flexibility of design (fine tunable for local wind, turbulence and grid regimes and needs);
3.5.A. R & D projects on energy from biomass;
3.5.A.2. R & D on combined heat and power production based on gasification of biomass.

Meetings, Conferences and Events.

Visit to National Power's DRAX Power Station, Selby, North Yorkshire.

Date of visit: Thursday 20 June, 1996.
Time of visit: 2pm to 4pm approximately.

DRAX is Europe’s largest coal-fired power station and the first in the UK to be fitted with Flue Gas Desulphurisation (FGD). It utilises the limestone/gypsum process to remove over 90% of sulphur dioxide from its release to the atmosphere. The overall environmental impact of the station is much reduced when compared to conventional coal-fired stations, and it will play a large part in reducing the overall UK production of sulphur dioxide.

To take part in this visit, please fill in the form on page 15 of this Bulletin.

Visit to AEA Technology/JET fusion reactor, Culham, Oxfordshire.

Date of visit: Friday 17 May, 1996.
Time of visit: 10am to 4pm approximately.

The first (morning) part of the visit will comprise some aspects of the atmospheric monitoring programme of the National Environmental Technology Centre, where automated systems provide on-line results of air pollution measurements in selected UK cities. In the afternoon, the party moves across the site to the JET (Joint European Torus) experiment, a major international facility for the development of nuclear fusion power. Environmental aspects of JET and nuclear fusion will be included in presentations, and there will be an opportunity to visit parts of JET, according to operational constraints.

To take part in this visit, please fill in the form on page 15 of this Bulletin.

The Institute's 4th annual Congress will again see an attractive conference programme consisting of plenary talks, courses and meetings and will cover areas such as environment physics, music, sensors, raising the profile of women in physics, vacuum, electronics and medical diagnosis. A major attraction will be the Physics in Action programme which will involve local schools and members of the public in activities aimed at proving that physics is fun. The Physics World Exhibition will be run in parallel to the Congress; it has attracted over 100 of the world's leading scientific suppliers.

For further details on the Congress contact: The Conferences Department, The Institute of Physics, 76–78 Portland Place, London W1N 4AA.
Tel: 0171 470 4800, Fax: 0171 470 4848, Email: congress@iop.org.


Professor Edward Youngs, representing the Environmental Physics Group, has organised a one-day meeting on Physics and the Environment: Processes and Applications as a part of the of the Congress' activities. Professor John Monteith will present a plenary lecture on "What is Environmental Physics?" after lunch, followed by the annual general meeting of the Environmental Physics Group at 2.40pm (see item on the AGM on page 3).

The full programme for the day will be:

1000 Registration
1020 Processes of Atmospheric Dispersion, Professor F. Smith, Imperial College for Environmental Technology.
1100 Exchange of Substances between the Atmosphere and the Surface, Dr. J. Garland, AEA Technology.
1140 Water Flow in the Soil-Plant-Airmosphere Continuum: A Simple matter of Plumbing, Dr. L.P. Simmonds, Department of Soil Science, University of Reading.
1200 Transport Processes in Soil: Applying Soil Physics to Some Environmental Problems, Dr. P. Leeds-Harrison, School of Agriculture, Food and Environment, Cranfield University.
1300 Lunch
1400 Plenary, What is Environmental Physics?, Professor J. Monteith, Natural Environment Research Council.
1440 AGM of the Environmental Physics Group
1500 The Development of a High Resolution Model of the Global Ocean, Dr. D. Webb, Southampton Oceanography Centre.

Urban Air Quality – Monitoring and Modelling, 11–12 July 1996, University of Hertfordshire, Hatfield, UK.

Organised by the Environmental Physics Group of the Institute of Physics in collaboration with the Royal Meteorological Society (RMS), The National Society of Clean Air and Environmental Protection (NSCA) and the Royal Society of Chemistry (RSC).

The topics of the conference will include: monitoring of pollutants, sampling techniques and instrumentation, analysis of air pollutants, emission inventories, theoretical and physical modelling, model validation and sensitivity studies, source apportionment studies and physical and chemical processes.

For further information contact: The Conference Department, The Institute of Physics, 76–78 Portland Place, London W1N 4AA, UK.
Tel: 0171 470 4800, Fax: 0171 470 4848, Email: iop@mailbox.ulcc.ac.uk , Internet: http://www.iop.org.


The Summit will aim to provide an opportunity for ecologists to interact with engineers, economists, modellers, habitat restorers, health professionals, policy makers and members of other professions in order to explore areas of common concern and avenues for collaboration.
Royal Society of Chemistry Symposium on Air Pollution in the United Kingdom, 23 September 1996, Lancaster University, UK.

For further information contact: Professor Nick Hewitt, Institute of Environmental and Biological Sciences, Lancaster University, Lancaster LA1 4YQ, UK. Tel: 01524 593931, Fax: 01524 593985, Email: n.hewitt@lancaster.ac.uk.


For further information contact: Liz Kerr, Conference Secretary, Wessex Institute of Technology, Ashurst Lodge, Ashurst, Southampton SO40 7AA, UK. Tel: 01703 293223, Fax: 01703 292853, Email: cmi@ib.r1.ac.uk.

Third International Symposium on Traffic Induced Air Pollution - Emissions, Impact and Air Quality, 29-30 April 1996, Graz, Austria.

Organised by the Technical University Graz, Institute for Internal Combustion Engines and Thermodynamics.

The main sessions will cover air pollution caused by traffic, pollution dispersion in rural and urban areas, air quality values and impact on the environment, calculation methods and traffic planning.

For further information contact: Dr Peter Sturm (Tel: +43 316 873 27584) or Sabine Minarik (Tel: +43 316 873 x7596), Technical University Graz, Institute for Internal Combustion Engines and Thermodynamics, A-8010 Graz, Inffeldgasse 25, Austria. Fax: +43 316 462175.

4th Workshop on Harmonisation within Atmospheric Dispersion Modelling for Regulatory Purposes, 6-9 May 1996, Ostend Belgium.

The workshop will include sessions on validation and intercomparison of operational models, practical use of atmospheric transport and dispersion models, harmonisation in the pre-processing of meteorological data and modelling in the urban canopy.

For further information contact: Guido Cosman, Energy Division, VITO, Boeretang 200, B-2400 Mol, Belgium. Fax: +32 14 32 11 85. Email: d.charm96@vito.be.

5th International Conference on Atmospheric Sciences and Applications to Air Quality, 18-20 June 1996, Seattle, USA.

For further information contact: Professor Gregory R. Carmichael, Centre for Global and Regional Environmental Research, 204 IATL, University of Iowa, Iowa City, IA 52242, USA. Tel: +1 319 335 1399, Fax: +1 319 335 1415, Email: gcarmich@cas.us.illinois.edu.

Atmospheric Pollution - New Solutions for Monitoring and Control, 23 April 1996, University of Reading, UK.

For further information contact: Dr Billie Bachra, Atmospheric Monitoring Research Group, University of Reading, JJ Thomson Physical Laboratory, Whiteknights, Reading RG6 6AF. Tel: 01734 318334, Fax: 01734 750203, Email: B.Bachra@reading.ac.uk.

Books, Reports and Publications.


Air Quality A to Z: A Directory of Air Quality Data for the United Kingdom in the 1990s.

News and Information.

Environmental Science Across the Internet.

BP has pioneered an international environmental science programme for schools. After registering, a school can access the Internet and search a database to contact a school in another part of the world, which is also working on the same environmental science unit. BP's "Science Across the World" covers the following regions: Asia Pacific, Europe, Africa and America.

For further information contact Evelyn Van Dyk, Association for Science Education, College Lane, Hatfield, Herts. AL10 9AA. Tel: 01707 267411, Fax: 01707 266532, Email: science.across@herts.ac.uk.

Physicists Required to Speak at Schools.

If you are interested in speaking at schools please contact Leila Solomon, Education Department, Institute of Physics, 76-78 Portland Place, London WIN 4AA. Tel: 0171 470 4800, Fax: 0171 470 4948.

European Network.

The ESRC has provided support to the Inter-disciplinary Network on Global Environmental Change (IRNES) to establish a European Environmental Network. IRNES, which was established in 1990, has organised four annual conferences so far and holds bi-monthly meetings. The new network will encourage contact between European environmental researchers.

For further information contact IRNES Development Officer, Penny Law, Department of Geography, LSE, Houghton St, London, WC2A 2AE. Tel: 0171 405 7666 x2613, Fax: 0171 955 7412, Email: Lawnp@lse.vax.ac.uk.

Surfing the Internet.

Here is a selection of some useful addresses, or URLs (Uniform Resource Locators).

- GENIE – Global Environmental Network for Information Exchange in the UK: http://www.genie.mrrl.lut.ac.uk/

- Central European Environmental Data Request Facility: http://pan.cedar.univie.ac.at:80/

- EnviroLink – environmental links with a 'green' slant: http://www.envirolink.org/

- Environmental and Global Change Research at the National Science Foundation: http://www.nsf.gov/stratere/egch/

- International Geosphere-Biosphere Programme (IGBP): http://www.igbp.kva.se/

- UNEP Information Unit on Climate Change: http://www.unepl.ch/lucc.html


- European Community Research and Development Information Service (CORDIS): http://www.cordis.lu/

- NERC Environmental Systems Science Centre (ESSC), University of Reading: http://www.nerc-essc.ac.uk/

- Department of Soil Science, University of Reading: http://www.reading.ac.uk/AcaDepts/ass/home.html
Forms.

National Power's DRAX Power Station

I wish to visit DRAX on 20 June 1996. Please send me more details.

Name: ...........................................................................................................
Address: ...........................................................................................................
Telephone: ......................................................................................................
Email: ..............................................................................................................

Please return this form by 6 June 1996 to:
Richard Clarke, HMIP, Don House, Pennine Centre, Hawley Street, Sheffield S1 1HD,
or telephone (0114) 270 0459 during the day.

AEA Technology and JET

I intend to take part in the visit to AEA Technology and JET on 17 May 1996.

Name: ............................................................................................................
Address: .........................................................................................................
Telephone: ......................................................................................................
Email: ..............................................................................................................

Please return this form by 9 May 1996 to:
John Garland, 48 Priory Orchard, Wantage, Oxon., OX12 9EL,
or email john_garland@online.rednet.co.uk.

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