

# International Society for Clinical Biostatistics

Number 9

November 1990

Editor: Jørgen Seldrup

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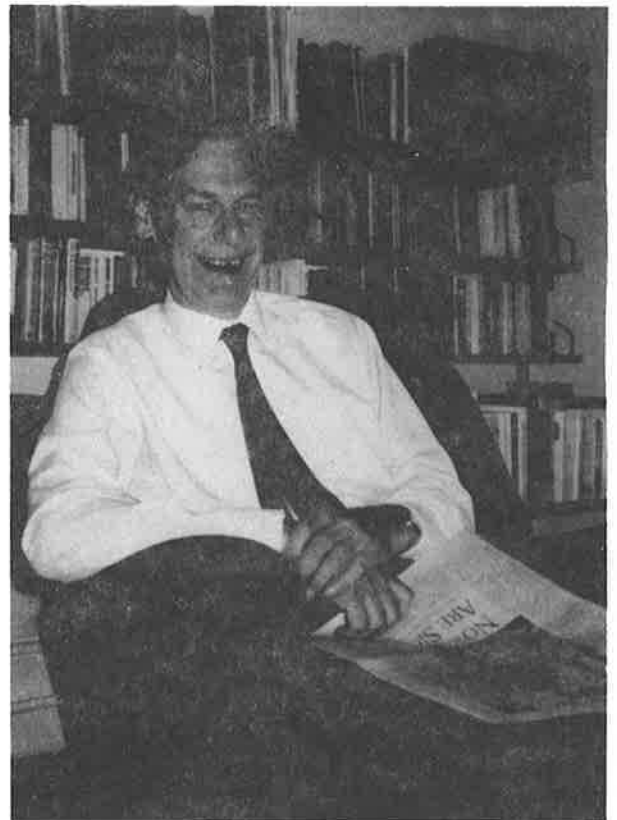
## ISCB President 1990/91

**Professor Peter Armitage**

Last year Professor Peter Armitage was elected Vice-President of the ISCB. Thus, at this year's Annual General Meeting, 20th September, he was duly declared President of the Society.

Peter was born in Huddersfield in 1924. He obtained his bachelor's degree and his PhD from the University of Cambridge and the University of London, respectively. He succeeded Sir Austin Bradford Hill in the Chair of Medical Statistics at the London School of Hygiene and Tropical Medicine in 1961 having started at the School in 1947 in the Statistical Research Unit of the Medical Research Council. In 1976, Peter moved to Oxford University as Professor of Biomathematics and in 1988 as Professor of Applied Statistics. It was from this post that he retired at the end of September this year.

The name Peter Armitage is synonymous with Medical Statistics. His scientific work in this field, past and present, is very highly regarded as original and relevant. His knowledge and expertise have resulted in many awards and honours, not least of which was the CBE in 1984. Many Societies, and now ours, have benefitted from his leadership. It is with great confidence that we look forward to his year in the chair.



# History of the ISCB

*reprinted and updated from ISCB-News issues 1&2.*

There has always been a need for interaction between statistician and practitioner, and in no field of application of statistics has this been more vital than in medicine. Not only are the consequences of clinical situations so potentially and immediately beneficial to the human race, but also the problems and issues involved are stimulatingly complex.

In early 1978 this was the topic of conversation around a dinner table in Brussels. A small group of biostatisticians had gathered to discuss the results of some clinical trials. That work done, it was agreed that in order to encourage more interaction between clinician and statistician an international meeting should be planned.

This was undertaken by Dr Maurice Staquet and hosted by EORTC in Brussels over a two-day period in May 1979. It was the first advertised meeting of what was later to become the International Society for Clinical Biostatistics. It was agreed by those attending the meeting (ISCB-1) that further meetings should be planned and a society formed.

The next meeting, ISCB-2, was organised by Dr R R Harris and held at the University of Exeter in September 1980. It continued to involve clinicians and statisticians and saw the first joint presentation on work initiated during the Brussels meeting. The Society was formalised with the acceptance of a statement of the objectives, and with the election of a small Acting Committee to draw up a constitution to be put to a General Meeting. The Acting Committee consisted of Drs R R Harris, Exeter (Chairman), R A Dixon, Sheffield (Secretary), D W Wilson, Cardiff (Treasurer) and K L Q Read.

ISCB-3 took place the following year at Erasmus University, the local organising committee being chaired by Professor R van Strik. A special feature of the meeting was a mini-symposium on Prediction of Survival Cancer. This kind of event was to become a part of future meetings. It was at a General Meeting in the Erasmus University on 14th September, 1982, that a formal Executive Committee was formed. The inaugural president was Professor E Marubini.

Since 1983 the annual scientific meeting, the President and the mini-symposium have been as follows:

**ISCB-4, 1983: Paris.**

President: Professor R van Strik (NL)  
Mini-Symposium: Diabetes.

**ISCB-5, 1984: San Marino.**

President: Professor H J Jesdinsky (D)  
Mini-Symposium: Gastroenterology.

**ISCB-6, 1985: Düsseldorf.**

President: Dr D W Wilson (GB)  
Mini-Symposium Clinical Oncology.

**ISCB-7, 1986: Cardiff.**

President: Dr H Sancho-Garnier (F)  
Mini-Symposium: Human Prostatic Disease.

**ISCB-8, 1987: Göteborg.**

President: Professor E A Gehan (USA)  
Mini-Symposia I & II: Post-Marketing Surveillance and Prevention of Cardiovascular Disease.

**ISCB-9, 1988: Innsbruck.**

President: Dr M Lörstad (S)  
Mini-Symposium: Quality of life.

**ISCB-10, 1989: Maastricht.**

President: Professor W Koepcke (D)  
Mini-Symposium: Nutrition.

**ISCB-11, 1990: Nîmes.**

President: Professor P Armitage (GB)  
Mini-Symposium: Phase I and II Trials.

## AIMS

The Society was founded to stimulate research on the principles and methodology used in the design and analysis of clinical research, to increase the relevance of statistical theory to the real world of clinical medicine; and to provide a common forum through meetings and publications, for the exchange of knowledge, experience and ideas among clinicians, statisticians and members of related disciplines (eg epidemiologists, clinical chemists and clinical pharmacologists), working in, or interested in, the field of clinical biostatistics.

The main activity of the Society is the organisation of an annual scientific meeting.

# International Society for Clinical Biostatistics Society for Clinical Trials

## Joint Meeting

July 8-12, 1991, Brussels, Belgium.

For the second time in the history of the Society a joint meeting is being planned (the first was in 1985 with the GMDS in Düsseldorf).

Under the high patronage of His Majesty the King of Belgium, the Society has joined with the Society for Clinical Trials to put on a major conference in Europe. Organized under the auspices of the EORTC Data Center the meeting will take place in the Medical School at the Catholic University of Louvain, Brussels, Belgium, July 8-12, 1991.

Louvain-en-Woluwe, two names: Louvain, the name of the Catholic University, a prestigious place for study and research, amongst the oldest universities of Europe; Woluwe, the name of the commune of Woluwe-Saint-Lambeth, East of Brussels where the faculty of medicine has been established since 1966. It is on this site that the scientific sessions of the conference will be held.

Experts from both sides of the Atlantic have already accepted to contribute to the Plenary Sessions and Workshops, including:

From the U.S.A.:

Sergi Aral, Paul Carbone, Thomas Chalmers, David Demets, Lloyd Fisher, Curt Furberg, Genell Knatterud, Stephen Lagakos, Julia Levin, Tom Louis, Paul Meier, Tom Pickering, Ross Prentice, Hugh Tilson.

From Europe:

Sylvie Ahn, Peter Armitage, Michael Baum, Marc Buyse, Jean-paul Collet, Rory Collins, Hilary Franklin, Jorgen Hilden, Karl-Heinz Jöckel, Wolfgang Koepcke, John Lewis, Alessandro Liberati, Jacobus Lubsen, Gordon McInnes, Tom Meade, Geoffrey Rose, Thorkild Sorensen, Hans Wedel, Ian Weller, John Whitehead.

As part of the Joint Meeting, a Symposium will be devoted to «Regulatory Affairs in Europe and North America». The Symposium will be led by representatives from both the Food and Drug Administration and the European Economic Community: Jean-Marie Alexandre (EEC), Marie Donnelly (EEC), David Jones (EEC), Robert O'Neill (FDA) and Robert Temple (FDA).

Four Post-Conference Courses will be aimed at all professionals involved in clinical trials and biostatistics. There will be two general courses: «Design of clinical trials» and «Reporting and interpretation of clinical trials», and two specialized courses: «Multiplicity of data in clinical trials» and «Martingales in survival analysis».

The scientific program itself consists of:

Plenary sessions:

*Impact of Clinical Trials on Clinical Practice*  
*Ethical Dilemmas and Public Perceptions of Clinical Trials*  
*Dealing With the Unexpected*

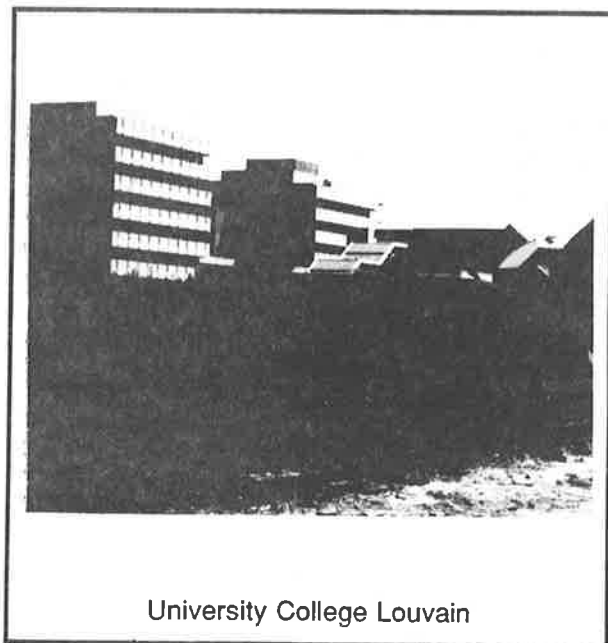
Workshops:

*Multi-national Clinical Trials*  
*Surrogate Endpoints*  
*Bayesian Methods in Clinical Research*  
*Organization and Management of a Trial's Clinical Centres*  
*Achievements of Cooperative Groups*  
*How Valuable are Repeated Prognostic Clinical Measurements?*  
*Stopping Rules and Data Monitoring*  
*Behavioural Intervention Trials*  
*Computer Intensive Methods in Biostatistics*  
*Issues in AIDS Clinical Trials*

Contributed Paper and Poster Sessions.

*Contributed papers and posters are invited on Statistical Methods in Clinical Trials, Data Management, Trial Design Issues, Trial Conduct and Results, Statistical Methods in Epidemiology, Statistical Methods in Laboratory Research, and other topics related to Clinical Biostatistics.*

*The deadline for receipt of abstracts is December 15, 1990.*



University College Louvain

For further information about the meeting, please contact:

**Ms. D. Eeckhoudt, Joint Meeting SCT-ISCB, EORTC Data Center, avenue E. Mounier 83 Bte 11, 1200 Brussels, Belgium**  
Phone: (32-2) 774 16 11 - Fax: (32-2) 772 35 45

**Ms. M. Burke, Society for Clinical Trials, 600 Wyndhurst Avenue, Baltimore, MD 21210, USA**  
Phone: (1-301) 433 47 22 - Fax: (1-301) 435 86 31

# BOOK REVIEWS

## Readings in Decision Analysis.

by *Simon French*

*Chapman and Hall, London and New York (1989). 210pp.*

This book is intended to provide an introduction to decision analysis. French has chosen a number of papers from the *Journal of the Operation Research Society* and entwined them with his own commentary, his stated goal being to provide a coherent picture of the practice of decision analysis.

The book is in four parts. Part 1, centred around the article by Moore and Thomas concerning a tachometer manufactured by the Pethow company whose identities, in the best traditions of the cinema, have been changed (to protect the innocent?), serves as an introduction. Part 2, written by French, provides the theoretical underpinning of decision analysis. Part 3 consists of case studies. Part 4 is a miscellany within a miscellany comprising an exchange of views between K.D.Tocher and various correspondents (one of whom is French), and four further theoretical sections.

I am not convinced that the format chosen by the author is the best one for introducing readers to decision analysis. Admittedly the intended readership comprises students on management courses and perhaps such an approach is relevant for them. Certainly, as the author notes, for the more theoretically inclined the present volume should only be regarded as supplementary reading.

The bias towards management means that biostatisticians may find this book of little value - the only "medical" connection being a case study concerning a design problem associated with cardiac pace-makers. This readership may find the companion volume - *Decision Analysis : a Bayesian Approach* by J.Q.Smith - more approachable.

A.P.Grieve, ICI Pharmaceuticals.

## Empirical Bayes Methods, 2nd Edition.

by *J.S.Maritz and T.Lwin.*

*Chapman and Hall, London and New York (1989). 284pp.*

Empirical Bayes Methods are usually thought of as appropriate when data from a series of studies are assumed to be generated from an unknown prior distribution which can be estimated from the data themselves. Once the prior distribution has been "estimated", the whole range of Bayesian techniques may be used to make inferences, take decision etc. Such a perspective gives credence to one view of empirical Bayes methodology which sees it as an attempt to eat the Bayesian omelette without breaking Bayesian eggs.

After an introductory chapter on Bayesian and empirical Bayesian techniques the following five chapters cover estimation of the prior distribution, univariate point estimation, multivariate point estimation, hypothesis testing and interval estimation. The seventh chapter describes and contrasts alternatives to empirical Bayes methods: the complete Bayesian approach (so called Bayes empirical Bayes), likelihood methods and the compound decision theory approach. The final chapter covers published applications of empirical Bayes methods.

In the 19 years since the first edition of this book was published a considerable amount of work on empirical Bayes methods has found its way into the literature. This new edition therefore provides a useful compendium of recent results although I could have wished that the theoretical presentation had been tempered with more practical examples.

In the preface the authors remark that there is a close connection between empirical Bayes methods and the currently popular topic of meta analysis. Statisticians working in the medical sciences, an area in which a lot of recent interest in meta analysis has been shown, may therefore be disappointed that so little attention is given to meta analysis, in particular, and applications in general. The final chapter of the book covers 14 different applications; unfortunately a scant 30 pages are devoted to them.

A.P.Grieve, ICI Pharmaceuticals.

# Bores, Damned Bores and Bayesians

Guernsey McPearson

## Baysians - a touch of humour

Why are Bayesians so boring?<sup>1</sup> It may be because they are rarely on the same wavelength and certainly never on the same frequency as classical statisticians. It could be to do with their tedious views on subjective probability but I wouldn't bet on it. It could be because, always thinking about posterior distributions, leads them to talk through their hats (in that convoluted way of theirs) but I am inclined to think it's because they are in the wrong game: instead of earnestly applying algorithms for updating beliefs they should be investigating the archaeology of thought.

## STATISTICAL SERVICES CENTRE



### MEDICAL STATISTICS WEEKS

#### WEEK 1 JANUARY 1991

**Analysis of Survival Data from Clinical Trials** 21 - 23 Jan.

Directed by Dave Collett

**Meta - Analysis of Clinical Trials** 23 - 24 Jan.

Directed by John Whitehead

#### WEEK 2 APRIL 1991

**Cross-Over Trials** 22 - 24 April

Directed by Mike Kenward

**Repeated Measurements Analysis** 25 - 26 April

Directed by Mike Kenward

#### WEEK 3 JUNE 1991

**Modelling Binary Data** 24 - 26 June

Directed by Dave Collett

**Statistical Methods for Ordered Categorical Data** 26 - 28 June

Directed by John Whitehead

These courses will be presented at a level suitable for statisticians involved in medical research in public sector institutes and in the pharmaceutical and related industries.

For more details contact : Lorna Turner  
Statistical Services Centre,  
Department of Applied Statistics,  
University of Reading,  
Reading RG6 2AN.  
Tel.:(0734) 318025; Fax:(0734) 753169

Let me quote a maxim, probably ( $p = 0.95$ ) by La Rochefoucauld: "everyone complains of his memory, no one complains of his judgement". Those of you, who have not heard (or read) it before can now modify your priors. I shall possibly ( $p = 0.45$ ) use it as a support function in due course.

Now, let's consider a working definition of a Bayesian: "one who asks what you think before an experiment in order to tell you what you think afterwards". It's an irritating modus operandi, isn't it? Not only are you pestered by some lunatic demanding that you sketch out your beliefs but he wants to come back and present you with a map of the inside of your head in return. If you then reply, "but that's not what I think", he tells you you're illogical. He's questioning your judgement.

But suppose he had another project. He asks you after the experiment what you think now and works out what you must have thought before. It doesn't matter if this conflicts with your recollections after all, "everyone complains of his memory, no one complains of his judgement", - if I may introduce a maxim I don't recall having referred to before.

The possibilities of thought archaeology are endless ( $n \rightarrow \infty$ ).

Biologists are now busy sequencing the human genome. Perhaps we could send the Bayesians off somewhere to establish for a given human being (we could choose some famous man) all the sensory data to which he had access in his lifetime. All we need then is his opinions at death and we can work out if he was born prejudiced or with an uninformative prior. Obviously with a science in such an embryonic stage of development ( $t \approx 0$ ) we do not even need to preclude studies of reincarnation.

Now all this may be standing logic on its head but when time runs backwards it may emit interesting phenomena. For example take a phrase like, "pulling wool over the eyes", drop an outlier, bootstrap without replacement and you get, "eyeing the wool pullover", which leads us quite naturally from what Bayesians do, considering the Jersey, in this case Neyman (use robust methods on the first name). Perhaps we could send these boring people off to work on him. Sizing him up should do them a power of good. On second thoughts how about La Rochefoucauld. Which reminds me, have you heard his saying about memory and judgement?

<sup>1</sup> This is an approximate qualification. The author's belief, however, that the next Bayesian he will meet will bore him may be modelled by a beta distribution with parameters  $\alpha=1000$  and  $\beta=1$ . This does not apply to wives of Bayesians who, perhaps due to the principle of exchangeability follow conjugal distributions of their own.

# Letters to the Editor

*Comment by Arend Heyting, chief statistician DUPHAR B.V. The Netherlands*

Professor Finney's story in ISCB-NEWS number 8, May 1990, raises several questions and speculations:

Why, if she was uncertain about the way her data had arisen, did the junior statistician find it worthwhile to present them for discussion?

Possibly, like so many new graduates, she had been trained to be a technician, capable of subjecting a data set to any number of complex computational manipulations, while quite unaware of the intimate link between the precise, detailed way the data had arisen and the appropriate inferential space.

Why did she not point out herself the curious aspects of her data?

Maybe, in the authoritarian style of her employer, she was forbidden to do so by her senior colleague; on the other hand she may not have spotted the peculiar data features, through inexperience and/or a gap in her professional training (many statistical courses omit instruction in the investigation of data quality).

Why would such a young statistician be unaware of the ethical issues involved?

Regrettably, it is still quite possible that professional standards were not an important topic in this young statistician's curriculum; however her senior colleague should have coached her and made her aware of existing ethical guidelines for statistical practice and professional codes of conduct (e.g. those issued by the American Statistical Association and the Institute of Statisticians).

Why did the senior colleague apparently fail to condemn the improper place assigned to statistics in this setting?

Whatever the reason, it pleads in his favour that he seems to have been sufficiently annoyed to bring the unsavoury position into the open.

There seem to be lessons to be learnt from this story by consulting statisticians, both junior and senior, as well as educators. As a final comment, I want to point out that PSI (a leading organisation of statisticians in the pharmaceutical industry) is taking the matter of professional standards seriously and has initiated a working party to develop operating procedures to safeguard the maintenance of high ethical professional standards.

*Comment by Simon Day, Head of Clinical Data Services, Lilly Research Centre, England.*

I share professor Finney's concern about a statistician feeling unable to ask a clinical colleague details of a study that may be crucial to the analysis, yet seem quite impertinent to the unexpected recipient of such questions. I do, however, think it more a matter of scientific ability to spot the right questions and a skillful matter of gentle tact to ask them in a polite, collaborative manner, rather than a matter of ethics. Though not wishing to appear to be shifting blame, I think the ethical deficiency in the sense described by Professor Finney is more likely to be on the clinician's part for not being prepared to answer such questions. There certainly are signs of a deficiency in ability shown by the young statistician described, but these matters would not be overcome by her having been taught a course in ethics.

The sorts of questions we ask can often be received in a very threatening way: 'Why did you do the experiment?', 'How do you get this lab measurement?', 'What are you interested in knowing from this data?'. They are questions that need skill, experience and tact to ask in a manner that does not come across as being impertinent. Young statisticians, both in industry and academia, need to develop such skills and only time can give them sufficient experience.

In a strive towards excellence, I believe that appreciation of ethics is very important for a statistician, but the cause of the type of problem highlighted by Professor Finney is a deficiency in consulting skills and perhaps it would be more useful if newcomers to our profession, first learnt what questions to ask, and secondly the ethical importance of asking them.

# More Books!

The following books have been received for review. Anyone interested in reviewing any of these books and prepared to write a short appreciation for the newsletter will receive the book to keep. Please contact the Editor of the Newsletter.

Berry, D. A. & Lindgren, B. W. (1990).  
Statistics: Theory and Methods.  
Brooks/Cole Publishing Company, Pacific Grove, California.

Maxwell, S. E. & Delaney, H. D. (1990).  
Designing Experiments and Analyzing Data  
A Model Comparison Perspective.  
Wadsworth Publishing Company, Belmont, California.

Keller, G., Warrack, B. & Bartel, H. (1990).  
Statistics for Management and Economics  
A Systematic Approach, 2nd Edition.  
Wadsworth Publishing Company, Belmont, California.

Bain, L. J. & Engelhardt, M. (1990).  
Introduction to Probability and Mathematical Statistics.  
PWS-KENT Publishing Company, Boston.

Ott, L. & Mendenhall, W. (1990).  
Understanding Statistics.  
PWS-KENT Publishing Company, Boston.

Scheaffer, R. L. & McClave, J. T. (1990).  
Probability and Statistics for Engineers.  
PWS-KENT Publishing Company, Boston.

Dobson, A. J. (1990).  
An Introduction to Generalized Linear Models.  
Chapman and Hall, London, New York, Tokyo,  
Melbourne, Madras.

Healey, J. F. (1990).  
Statistics: A Tool for Social Research, 2nd Edition.  
Wadsworth Publishing Company, Belmont, California.

Scheaffer, R. L. (1990).  
Introduction to Probability and its Applications.  
PWS-KENT Publishing Company, Boston.

Mendenhall, W., Wackerly, D. D. & Scheaffer, R. L. (1990).  
Mathematical Statistics with Applications, 4th Edition.  
PWS-KENT Publishing Company, Boston.

Bowerman, B. L. & O'Connell, R. T. (1990).  
Linear Statistical Models  
An Applied Approach, 2nd Edition.  
PWS-KENT Publishing Company, Boston.

Scheaffer, R. L., Mendenhall, W. & Ott, L. (1990).  
Elementary Survey Sampling, 4th Edition.  
PWS-KENT Publishing Company, Boston.

## Letter Home.....

*So, you have been missing me! It is not that I have not 'been' but I have been so busy. Isn't that everybody's excuse for not writing home. You do remember though that I got a friend to write to you, albeit a long time ago now.*

*I am in Nîmes in the South of France. Next week is the Fêria des Vendanges; the only bulls in the ring this week are at Cesar Palace, home of ISCB-11. I thought I had some difficulty finding the hotel. Economical as I am, I had taken the airport bus into the city. When there was only two of us left in the bus I drummed up enough courage to ask the driver where my hotel was.*

*My fellow companion, who turned out to be from the States, had the same impressive command of French as me, but none of us quite understood his reply. Judging from the expression on his face and his use of arms and legs we should have told him earlier.*

*However, out of the goodness of his heart he took us to our hotel (almost back to the airport). Did he have some sort of obligation to see us safely installed in our hotel?*

*Finally, I must tell you about the conference dinner evening, which was held on a farm in the Camargue. The convoy of buses set off in early evening through a most beautiful countryside. There really are flamingoes there, lots, and lots of birds and they say the horses are wild. I didn't test the theory.*

*The buses also had a theory of how to get us to our farm. In practice it was different. At one point, all buses had to turn and go back the way they came. A strange sight. Eventually we arrived at our farm to a reception on horseback. We were treated to a bull round-up session and the mosquitoes were treated to an early evening feast on conference delegates. I received a 'Gardian D'Onour' and a kiss from the first lady.*

*There are really many other things I like to tell you but once again the postcard I bought was too small so I am running out of space. See you soon. Kind regards*

*Jorgen*

# CALENDAR

- 11 December 1990.** **London, England.**  
Contract Clinical Research and the Company Medical Department.  
*Information: Elizabeth Richardson, Administrator, BAPP, 1 Wimpole Street, London W1M 8AE.*
- 14-19 December, 1990.** **Milan, Italy.**  
Long-term Clinical Trial Strategies: Design, Conduct, Analysis and Overviews.  
*Information: European School of Oncology, Secretariat, Room FA89, Via Venezian, 1, 20133 Milan, Italy.*
- 19-23 January, 1991.** **Agra, India.**  
The Annual Conference of the Indian Society for Clinical Pharmacology and Therapeutics.  
*Information: Dr. N. A. Kshir Sagar, Dept. of Pharmacology, Seth G. S. Medical College, Parel, Bombay-12, India.*
- February, 1991.**  
Clinical Trial Data Processing.  
*Information: Stuart W. Cummings, Merck Sharp & Dohme B.V., Brussels, Belgium.*
- 4-5 March, 1991.**  
Statistical Issues in the Pharmaceutical Industry.  
*Information: Michael Rubison, Marion Laboratories, Mariners Inn, Hilton Head Island, SC, USA.*
- 15-20 April, 1991.** **Peñíscola, Spain.**  
4th Valencia International Meeting on Bayesian Statistics.  
*Information: Prof. José M. Bernado, Presidencia de la Generalidad, Caballeros 2, E-46001 Valencia, Spain.*
- 17-23 April, 1991.** **London, England.**  
Foundation Course in Clinical Trials.  
*Information Clinical Reseacch Services Ltd, 36 Neeld Crescent, London NW4 3RR, England.*
- 22-24 May, 1991.** **Muncie, IN, USA.**  
Fourteenth Annual Midwest Biopharmaceutical Statistics Workshop.  
*Information: George Dimberger, Marion Merrell Dow Inc., 2110 E. Galbraith Rd, Reading, OH 45215, USA.*
- 4-6 June, 1991.** **Toronto, Ontario, Canada.**  
Statistical Society of Canada 1991 Annual Meeting.  
*Information: Prof. K. S. Brown, Dept of Statistics and Actuarial Science, University of Waterloo, Waterloo, Ontario N2L 3G1, Canada.*
- 5-7 June, 1991.** **Ile de France, France.**  
Analyse des résultats d'un essai clinique.  
*Information: Alain Spriet Conceil. Tel.: (33)1.43.44.44.00*
- 8-12 July, 1991.** **Brussels, Belgium.**  
Society for Clinical Trials and International Society for Clinical Biostatistics, Joint Meeting.  
*Information: EORTC Data Center, Ms. D. Eeckhoudt, avenue E. Mounier 83 Bte 11, 1200 Brussels; Belgium.*  
*Society for Clinical Trials, Ms. M. Burke, 600 Wyndhurst Avenue, Baltimore, MD 21210, USA.*
- August, 1991.** **Basle, Switzerland.**  
7th International Conference on Pharmacoepidemiology.  
*Information: Dr Standley A. Edlavitch, International Society for Pharmacoepidemiology, 308 Harvard Street SE, HSUF 7-159, College of Pharmacy, University of Minnesota, Minneapolis, Minnesota 55455, USA.*
- 5-7 August, 1991.**  
Bioavailability / Bioequivalence - Pharmacokinetic and Statistical Issues.  
*Information: Richard A. Okerholm, Merrell Dow Research Institute, Bethesda Hyatt Hotel, Bethesda, MD.*
- 2-6 September, 1991.** **Barcelona, Spain.**  
19th European Meeting of Statisticians.  
*Information: ISI Permanent Office, 428 Prinses Beatrixlaan, PO Box 950, 2270AZ Voorburg, The Netherlands.*