British Society for Developmental Biology

NEWSLETTER No. 5

November 1981

(I) BSDB MEETINGS

Change In Format

There are currently two meetings of our society each year. The committee have suggested that in future, these should have two components:

a) A two-day Symposium

b) 1½-2 days of mostly contributed papers; not necessarily related to the symposium topic.

It is envisaged that the contributed paper sessions will run as at least two parallel sessions on unrelated topics, and that each of these will be headed by a plenary lecture which will be timetabled so that all meeting participants can attend. These plenary lectures will lay a foundation for the ensuing contributed paper sessions. Organizers of these parallel sessions will have an allocation of funds from the society (currently envisaged as around £400) to help defray costs of speakers. Below are outlines of forthcoming BSDB meetings already planned in this way. This Newsletter calls again for suggestions and volunteers for further topics, for coverage by symposium or short-paper treatment. Hopefully, we can cater for all subjects, large or small, which are of interest to members. Please communicate such interests to the Meetings Secretary, or to the nearest Committee Member (see last page of Newsletter for addresses).

1982

UNIVERSITY OF SUSSEX (March 30th-April 2nd.)

Symposium: "Development And Evolution" Organized by Brian Goodwin and Nigel Holder.

General Session 1: "Limb Development" (Dick Hinchliffe) and"Regeneration" (Hugh Wallace).

General Session 2: "Insect Morphogenesis" (Robert Whittle and Vernon French).

St. GEORGE'S HOSPITAL MEDICAL SCHOOL, LONDON
September 6th.-10th 1981

Symposium: "Germ Cell Differentiation" Organized by Anne McLaren and Chris Wylie.

General Session 1: "Mammalian Development" (Martin Johnson) and "Teratomas" (Chris Graham)

General Session 2: "Developmental Neurobiology" (Michael Gaze).

1983

UNIVERSITY OF NOTTINGHAM (April 19th-22nd. 1983)

Symposium: "Metamorphosis" Organized by Michael Balls.

General Session 1: "Molecular Biology Of Development" (Ron Laskey)

General Session 2: "Developmental Immunology" (John Hortonand Michael Balls)

UNIVERSITY COLLEGE OF ABERYSTWYTH (September)

Joint meeting with the British Society Of Cell Biology. Topics will include "Matrices and cell differentiation" and "Aspects of cell surfaces". Organizers will be Dick Hinchliffe (BSDB) and Richard Kemp (BSCB).

1984

UNIVERSITY OF LEICESTER (Spring)

Topics not yet decided. Suggestions would be very welcome.

UNIVERSITY OF SOUTHAMPTON (September 2nd-8th.)

This will be the EUROPEAN DEVELOPMENTAL BIOLOGY CONGRESS, jointly organized by EDBO and BSDB. Chairman of the local committee is Peter Thorogood, but comments

and enquiries to the BSDB Meetings Secretary please.

Details of forthcoming BSDB meetings

(1) SUSSEX MEETING, MARCH 1982

The 45th meeting of the society will be held at the University of Sussex from Wednesday 31st. March to Friday 2nd April 1982. It will contain the 6th. BSDB Symposium, entitled "DEVELOPMENT AND EVOLUTION", and two parallel general sessions of contributed papers.

Symposium Outline (from the local organizers, Brian Goodwin and Nigel Holder)

"If early staged embryos of assorted mammals are placed together in a dish; only an expert can tell them apart. The limb of an axolotl and that of a human have striking similarities, even though the former evolved about 300 million years before us. These observations, linking the studies of development and evolution, have fascinated biologists since the time of Haeckel, Owen, and Darwin; and have generated innumerable articles, theses, and books over the intervening 100years or so.

Are we any nearer understanding the links between developmental proce-sses and evolutionary possibilities in the 1980s than were the classical zoologists of the last century ? Come to this symposium and find out !

The programme of speakers is outlined below, and includes 16 people with a wide range of views on such topics as cladistics, binary codes, and gene switching during development. These views will be discussed with reference to numerous experimental systems and evolutionary groups from Protozoa to insects, and from amphibians to higher plants.

Those who followed the debate on evolutionary theory in Nature earlier this year (it ran to over 30 letters and 4 editorials, and provided much strong comment, and enough jibes and innuendo for the script of a Marks brothers film- or should that be Marx ?) will anticipate a very lively and informative meeting.

Spekers: S.J. Gould (Harvard), J. Maynard-Smith (Sussex), L. Wolpert (London), C. Patterson (London), B.C. Goodwin (Sussex), R. Hinchliffe (Aberystwyth), P.D. Nieuwkoop (Utrecht), J. Frankel (Iowa), K. Sander (Freiberg), V. French (Edinburgh), S. Kauffman (Philadelphia), A. Garcia-Bellida (Madrid), V. Walbot (Stanford), B. Hall (Halifax), M. Maden (London), N. Holder (London).

Contributed paper sessions for this meeting are being convened by Dick Hinchliffe (LIMB DEVELOPMENT) and Hugh Wallace (LIMB REGENERATION); and by Robert Whittle and Vernon French (INSECT DEVELOPMENT).

Those wishing to submit papers or posters for these sessions should submit titles and brief abstracts (50-75 words) to the Meetings Secretary: (Dr. Mike Snow, MRC Mammalian Development Unit, Wolfson House, 4 Stephenson Way, London NW1 2HE. Tel. 01-387-9521), not later than Friday 11th December 1981. Please indicate clearly whether you wish to submit a paper or poster. Contributions from graduate students are especially encouraged.

(II) St. GEORGE'S HOSPITAL MEDICAL SCHOOL (September 6th.-10th. 1981)

7th. BSDB Symposium;"GERM CELL DIFFERENTIATION" Organized by Anne McLaren and C.C. Wylie

This symposium comes at a particularly opportune time. The germ line is perhaps unique in the body, because of its totipotency, combined with the extraordinary degree of differentiation required for its specialised function.

During their long and complex differentiation, germ cells display a wide variety of behaviour, of great interest to an equally diverse group of biologists, who study the cellular mechanisms of such phenomena as:

Determination in the early embryo

Directed cell movement and invasiveness

Cell interactions in the early gonad, whereby, among other things, germ cell sex is determined.

Later interactions between germ cells and somatic cells, leading to maturation of the gametes.

The synthesis of informational molecules, which may play a role in cell determination in the next generation,

Furthermore, due to their large size, oocytes can be used as living test tubes in the study of the control of transcription and translation; and tumours derived from the germ-line may also provide insights into the mechanisms of cell differentiation. We would like to bring together representatives from all these groups, to discuss each in the overall context of the germ cell lineage.

The following major sessions have now been organized:

(1) DETERMINATION OF THE GERM CELL LINEAGE, Convener: Tony Mahowald (Indiana)

(2) MIGRATION OF EARLY GERM CELLS, Convener: Chris Wylie (London)

(3) TUMOURS OF THE GERM LINE, Convener: Chris Graham (Oxford)
(4) INTERACTIONS IN THE EARLY GONAD, Convener: Anne McLaren (London)
(5) OOCYTE MATURATION, Convener: Bob Moor (Cambridge)
(6) THE OOCYTE AND DEVELOPMENTAL CONTROL MECHANISMS, Convener: John Gurdon (Cambridge)

Each of these sessions will contain THREE INVITED PAPERS for publication in the BSDB Symposium series, as well as several SHORT CONTRIBUTED PAPERS. If you would like to contribute a paper (or a poster) related to any of the above topics, then contact the Symposium organizers NOW, so that sessions can be planned well in advance. Posters will be very welcome. Contributions from graduate students even more so.

The Symposium will be followed by two parallel sessions of contributed papers on "MAMMALIAN DEVELOPMENT AND TERATOCARCINOMAS" (Organized by Martin Johnson and Chris Graham) and"DEVELOPMENTAL NEUROBIOLOGY" (Organized by Michael Gaze. Anyone wishing to present a paper or a poster to this part of the meeting should contact the Meetings Secretary, Mike Snow (address given above).

(III) XVth. EDBO INTERNATIONAL EMBRYOLOGY CONFERENCE

Organized by the SFBD, under the auspices of the Parliamentary Assembly Of The European Community.

STRASBOURG, FRANCE
21st - 25th. June
1982

(A) PLENARY LECTURES

Hot Points In Differentiation

W.C. Gehring (Basel) No title yet.
L.G. Lathja (Manchester) "Stem cells and their properties"
E. Scarano (Naples) "Enzymatic modification of DNA and embryonic differentiation revised"
M.A. Weiss (Gif-Sur-Yvette) "Expression of the albumin gene in cell lines of hepatic origin"

H. Meinhard (Tubingen) "Pattern Formation"

Extracellular Matrix

H.V. Slavkin (Los Angeles) "Role of extracellular matrix in determination and differentiation"

K. Von der Mark (Munich) "Role of extracellular matrix in cartilage and muscle differentiation"

J. Thesleff (Helsinki) "Role of extracellular matrix in morphogenesis and cell differentiation"

P. Sengel (Grenoble) "Extracellular matrix and differentiation of skin appendages"

B.S. Spooner (Kansas) No title yet

J-P. Thiery (Nogent-Sur-Marne) "Molecular mechanisms of cell migration and homing during embryogenesis"

A.S.G. Curtis (Glasgow) "The role of tension in the control of cell division"

Natural And Experimental Reconstitution In Multicellular Organisms.

G. Fahl (Frankfurt) "Mechanisms of normal and abnormal regeneration in plants"

L. Strange (Kassel) "Regeneration in lower plants"

H.W. Kohlenbach (Frankfurt) "Regeneration of higher plants via somatic embryogenesis in cell and tissue culture"

M. Bopp (Heidleberg) No title yet.

Thouveny (Marseille) "Histogenic and morphogenetic programming in annelid regeneration"

Boilly (Lille) "Positional information in the metazoans"

Le Moigne (Creteil) "Neurotransmitters, cell proliferation and differentiation during planarian regeneration"

(B) ROUND TABLE DISCUSSIONS, Topics include:

Mechanisms of gonadal sex differentiation in the vertebrates (Chairman A. Jost, Paris)

Regulation et cellules germinales (Chairman L. Gomot)

Regeneration (Chairman M. Bopp)

Ethics and developmental biology

Other "Round Tables" or lectures will be organized in relation to subjects of general interest appearing in submitted poster abstracts. Contributions would be particularly welcome on the subjects of cytoskeleton,

cell membrane, cell wall, asymmetric growth of homotypic organs, cell shape and proliferation, cell death.

Abstracts of posters should be submitted to:

EDBO Conference
Palais De Congress
F-67082 Strasbourg Cedex , France.

Type abstracts in a 16cm x 12cm space please, and send in before December 1981 if possible. The final programme of the meeting can be obtained by application to the above address after January 1982.

BSDB TRAVEL GRANTS

Postgraduate students who apply for these awards should make sure that they avail themselves of any student reductions and/or any special travel deal organized specifically for a particular conference. It is in everybody's interest to make our money stretch as far as possible. This year, the BSDB made 22 awards, totalling £1054.

GRADUATE STUDENT BSDB MEMBERS

Held their first meeting at the Edinburgh conference in September 1981. We would like to make this a regular event at BSDB meetings; minutes, or general conclusions from these can be circulated in the Newsletter.

Interested parties should contact the BSDB Graduate student reprentative on the Committee: Gillian Porter-Gough, Sir William Dunn School of Pathology, South Parks Road, Oxford OX1 3RE.

BOOK REVIEW SECTION

"The Development Of The Vertebrate Limb" J.R. Hinchliffe & D.R. Johnson.
Oxford 1980 ISBN 0-19-857552-1. £20.00

This timely book reviews the vertebrate limb in all its aspects. The limb has figured largely in developmental biology; its accessibility to microsurgery making it a lure to scientists interested in the establishment of basic body patterns. The text consists of a description of the origin of the vertebrate limb, its adaptive radiation during vertebrate evolution, a descriptive account of its ontogeny in modern vertebrates, and an excellent account of the phenomenon of limb regeneration. The most interesting part of the text considers theories, both ancient and modern, concerning the way patterning in the developing limb becomes established. Given the current status of such theories, this section is, not surprisingly, inconclusive. However this is a well written account, understandable to all readership levels. This section ends with the authors' postulate that the examination of the "genetic literature" of the vertebrate limb (as manifested by naturally occurring mutants), may help in the search for developing mechanisms. The presumption here is that atavistic mutants will help to explain the evolution of patterning mechanisms. Although necessarily inconclusive, this book is thoroughly researched, and highly recommended.

"Movable Genetic Elements" Cold Spring Harbor Symposium on Quantitative Biology
Vol. 15. 1980. Cold Spring Harbor. ISBN 0-87969-044-5. $156.00

To review the 45th. Cold Spring Harbor Symposium is a task only slightly less daunting than that faced by Yarmolinsky in summarising the 117 presentations, which have been distilled into more than 1000 pages. The volume is, of course, an essential aquisition for any lab. engaged on research in the broad field of "jumping genes". It is moreover, a highly useful source book for anyone interested in the state of the art of such fields as the transposable elements in bacteria, plants (where the field was born in the early 1950s), Drosophila, and yeast. Its use does not stop there, however, for there are sections dealing with the involvement of genetic rearrangements in the generation of antibody diversity, and in the variation of bothtrypanosome surface antigens, and Salmonella flagellar antigens. It becomes obvious at a glance from the subjects included in this book that DNA rearrangements are spread throughout living systems; indeed one of the aims of the symposium was to draw these together.

It is in the field of bacterial transposition that the clearest

picture of transposition is emerging; indeed, studies of these elements occupy more than ⅓ of the volume. One of the themes running through the work is an emphasis on stability of genetic systems, and in this light the general importance of such a potentially anarchic phenomenon as transposition in the evolution and development of organisms is still unclear. However, for the practising developmental biologist the volume might be considered an ideas book for the possible ways in which DNA rearrangements may crop up in other biological systems. It is not cheap (£80), but good work rarely is.

"A Manual For Genetic Engineering, Advanced Bacterial Genetics" R.W. Davis, D. Botstein, J.R. Roth. 1981. Cold Spring Harbor. ISBN 0-87969-130-1. $28.80.

The technology of molecular biology is advancing so rapidly that it has, until now, daunted the collection and publication of a comprehensive methods manual. This book fulfills this role providing an outline for a laboratory course designed to teach these methods, and a reference manual. It is not a guide to molecular cloning, but an assortment of the techniques involved, particularly those related to bacterial and phage genetics. Culled from the advanced bacterial genetics course run at Cold Spring Harbor for the last four years, it is a sequel to Miller's "Experiments In Molecular Genetics". It is organised into three sections: Experimental, Procedures, and Appendices. There are thirteen experiments, some of which are interrelated, and each has a detailed rationale. They are designed for those already familiar with basic microbiological technique. The experimental protocols are lucid, and cover cloning and screening techniques as well as many by now classical DNA and RNA methods. Although many procedures in common use are not described; this is inevitable and emphasizes the difficulties involved in producing a manual devoted to this field. The appendices contain a variety of information normally found in an assortment of papers and books. Its contents are invaluable and range from buffers, solutions, formulas, to lists of restrictuon enzyme sites and restriction maps. This is an extremely useful book, and at around £14, is essential for any lab. involved in molecular cloning.

" Centrifugation In Biology And Medical Science" Philip Sheeler. 1981, John Wiley. ISBN 0-471-05234-5 £22.20.

Beginning with a short history of centrifugation, the author follows with a detailed explanation of the physical and mathematical concepts underlying the technique. The various types of centrifugation, their advantages and limitations are discussed in detail, bringing the researchers awareness to the wide range of techniques available and the effectiveness of these in application to specific problems. Recent developments and improvements are given special attention, and the detailed

appendices provide useful data. Finally, a list of centrifuge manufacturers and their products is included. The book is well referenced, and illustrated with clear informative diagrams. A useful, but expensive, reference volume for centres which employ specialised centrifugation methods in research.

"Introduction To Embryonic Development" Steven B. Oppenheimer. 1980, Allyn & Bacon
ISBN 0-205-07348-4. £7.50

This is a textbook aimed primarily at undergraduates. The topics are introduced in the form of questions, with the aim of stimulating the student and appreciate the experimental approach. The text falls into two parts. The first covers general basic embryology, and includes a section on early human embryogenesis and birth defects. The second tackles the puzzles of morphogenesis and differentiation, with concise reports of experimental analyses of the parts played by cellular interactions, nucleic acids and specific protein synthesis in these events. As the author points out, one strongly accentuated theme in the text is the role of the cell surface in controlling developmental processes. This reflects the author's personal research predilections; but it complements the general approach, which is tomake the student aware of the experimental background of our knowledge. The book ends with a chapter summarising the relationship between tumour cells and embryonic cells; with short passages on some of the presently known causes of cancer, and on its diagnosis and treatment.Although the coverage of most topics is brief, the clear discursive style will suit many undergraduates, as will the reasonable price. Extra points with student appeal are the helpful illustrations, the summaries at the end of each section, and key words in the margin.

"Cellular And Molecular Aspects Of Implantation" Eds. S.R. Glasser & D.W. Bullock.
1981, Plenum Press. ISBN 0-306-40581-4. $35

The edited proceedings of a conference held in Houston in 1979, under the auspices of the National Institute Of Child Health And Human Development, this volume contains 24 full-length original papers and 28 short communications. The former are grouped under seven main headings: Perspectives, Cell Biology of the Developing Egg, Macromolecular Synthesis in the Developing Egg, Uterine Preparation for Implantation, Gene Expression in the Uterus, Blastocyst-Uterine Interactions, and Mechanisms of Implantation. The 28 short communications range over topics such as hormonal influences, cell interactions, the role of glycoproteins, and immunological factors involved in implantation and decidualisation. The volume is a good up-to-date collection for workers in this field of reproductive biology. It is well produced and well referenced.

"Experiments With Normal And Transformed Cells" R. Crowe, H. Ozer, & D. Rifkind
1978. Cold Spring Harbor 21.60.

Although three years old, we include a review of this volume because it could be a boon for anyone running advanced undergraduate practical classes in cell biology. The experiments described range from an initial investigation of the growth characteristics of cell cultures (growth curves, serum dependence, anchorage dependence) through a variety of increasingly complex procedures (e.g. cell fusion, DNA- and virus-infection of cells, immunocytochemical detection of surface and intracellular proteins, macromolecule synthesis and precursor uptake, cytoplast preparation, etc. etc.). Each method is laid out step-by-step, and most have been subdivided into several groups so that various conditions and treatments can be compa-red to controls. The introductory background materia is usually brief and clear, but in cases where the underlying theory is complex(e.g. isolation of cell hybrids after fusion) explanation is more rigorous. Although many of the experiments extend over days or weeks, a good number can be done in one day, or modified for convenient use of teaching time. Recipes for all solutions are included, plus tips on the most economical ways to use and reuse expensive materials, with warnings on the dangers of each hazardous chemical. The appendix includes notes on autoradiography, general photography and u/v microscopy, and a method for mycoplasma detection. Altogether a very useful volume for hard-pressed teachers of cell biology.

"Computers And Embryos" R. Ransom. 1981. John Wiley. ISBN 0-471-09972-4 £14.00

This book attempts to demonstrate, in about 200 pages, how computers can be used as analytical tools in the study of development. Of the ten chapters, the first four deal with the principles of developmental biology, chapter 5is concerned with mathematical models in development, and the remaining five contain the main thrust of the book, the description of how to programme a computer, and the discussion of specific models that have been used to analyse specific developmental systems. Unfortunately, the first part of the book is rather superficial and contains a smattering of annoying errors. e.g. we are told that "...cells of the dermis secrete the body's skin covering..." The use of the word model throughout the book is also rather confusing. Although the author spends about ten pages defining the word, it was never clear whether the subtitle of the book: "Models in developmental biology" referred solely to computer models, or to theoretical frameworks in general. Some theoretical models, particularly concerned with pattern formation, are mentioned, but many are not. Unfortunately, the omissions include many such models which are currently popular frameworks for experimentation. The book will probably be relevant to people directly in the field of computer modelling, but probably not to developmental biologists in general.

"Vertebrate Limb Regeneration" H. Wallace. 1981. John Wiley ISBN 0-471-27877-7 £19.50

This monograph was written "with a certain amount of missionary zeal". In an

exhaustive review of investigations of the last 50 years, the author has succeeeded in providing a highly critical and provocative analysis of the background to our current understanding of limb regeneration. He has included many of the original figures, plus many new ones, and summary tables, and more than 750 references. Seldom can so much information have been so skillfully packed into a mere 276 pages. The author is frank in his exposure of the deficiencies of some traditional views which, though still passionately held, are often based on shaky foundations in the form of poor experimental work or biassed analysis. Is reluctance to abandon a cherished hypothesis in the face of the evidence a particular characteristic of developmental biologists ? I well remember the shock wave which went through the audience at a BSDB meeting in 1976, when John Saunders announced that he no longer believed in the ZPA -his own invention. Such honesty and objectivity would have made Hugh Wallace's chapters on Nervous Control, Hormonal Influence, and Effects of Irradiation much shorter and more easily written. Other chapters deal with Metabolic Changes, Genetic Aspects, Regional and Axial Determination, and Blastemal Morphogenesis. In a forward-looking final chapter, the author concludes that limb regeneration is strictly a repetition of normal limb development, and that the stimulation of regeneration in adult mammals, including man, remains a worthwhile objective. That however,will require a much better understanding of the control mechanisms involved. This excellent book will provide a stimulating, fascinating, and entertaining starting point for students and others who wish to be better informed, or want to develop their own ideas.

"Electron Microscopy In Biology" Volume 1. Ed. J.D. Griffith. 1981 John Wiley
ISBN 0-471-05525-5 £30.50

This is the first volume in an annual series of invited articles on all aspects of electron microscopy, as applied to biological research. It looks as though it will be very useful, containing as it does not only detailed techniques and applications, but also critical appraisals of the interpretation of electron micrographs using the techniques described. Articles in Volume 1 include: Freeze-etching of the photosynthetic membrane, Visualisation of chromosomes and chromatin, Electron microscopy of RNA, Resolution in the high voltage TEM, Mapping RNA-DNA heteroduplexes by EM, and Image processing of histological specimens. Well worth a library copy, though pricey for a personal vade mecum !

BSDB OFFICERS AND COMMITTEE

The Society is currently run by:

1) A ruling junta, consisting of:

CHAIRMAN Chris Graham, Dept. Of Zoology, South Parks Road, Oxford OX1 3PS

SECRETARY/TREASURER Michael Balls, Dept. Of Human Morphology, University Of Nottingham, Queen's Medical Centre, Nottingham NG7 2UH.

ASSISTANT SEC./TREAS. (Also Symposium Secretary and Editor of Newsletter) Chris Wylie, Dept. Of Anatomy, St. George's Hospital Medical School, Cranmer Terrace, London SW17 ORE.

MEETINGS SECRETARY Mike Snow, MRC Mammalian Development Unit, Wolfson House, 4, Stephenson Way, London NW1 2HE

2) ...who are prevented from the worst excesses of power by THE COMMITTEE:

Dick Hinchliffe (University College Of Aberystwyth)
Martin Johnson (Anatomy Dept., Cambridge)
Michael Gaze (Mill Hill)
Johnathen Bard (MRC Unit, West General Hospital, Edinburgh)
Gillian Morriss-Keay (Anatomy Dept., Oxford)
Donald Ede (Dept. Of Zoology, Glasgow)
John Horton (Dept. Of Zoology, Durham)
Ron Laskey (MRC Laboratory Of Molecular Biology, Cambridge)
Gillian Porter-Gough, Graduate Student Representative (William Dunn School Of Pathology, Oxford)

3) ...above all this, and able to pass judgement on constitutional matters, represent the society on state occasions etc. is: THE PRESIDENT Prof D.R. Newth, Dept. Of Zoology, Glasgow. Weakened undoubtedly by the continual demands for his Solomon-like judgements, David Newth has recently resigned the Presidency. The committee have invited Anne Mclaren to be the next president.

CELL BEHAVIOUR: THE MICHAEL ABERCROMBIE MEMORIAL MEETING

Organisers: R. Bellairs, A.S.G. Curtis, G. Dunn

A meeting will be held in memory of Michael Abercrombie on Monday, Tuesday and Wednesday, 19th, 20th and 21st April 1982 at University College London. The meeting will be open to anyone interested in Cell and Developmental Biology.

The provisional programme includes the following invited speakers:

P.B. Armstrong (Davis, California). Fibronectin and the associated preferences of embryonic tissues.

R. Bellairs (London). Cell interactions in gastrulation in the chick embryo.

D. Bray (London). Filopodial contraction and growth cone guidance.

A.S.G. Curtis (Glasgow). The genetics of the control of cell behaviour.

G.A. Dunn (London). Contact guidance of cultured tissue cells.

T. Ebendal (Uppsala). Orientation of neurites.

A.K. Harris (North Carolina). Traction and its relation to contraction in tissue cell locomotion.

J.P. Heath (London). Behaviour and structure of the leading lamella during fibroblast locomotion.

J.E.M. Heaysman and **S.M. Pegrum** (London). Spreading chick heart fibroblasts.

J.M. Lackie (Glasgow). Leucocyte movement: adhesion changes and their consequences.

C.A. Middleton (Leeds). Contact interactions and cell behaviour of epithelial cells in culture.

T.A. Partridge (London). The mobility of muscle precursor cells during regeneration of skeletal muscle *in vivo*.

M.S. Steinberg (Princeton). Liquid behaviour of embryonic tissue.

C. Tickle (London). Mechanisms of epithelial invasiveness – insights from mammary gland morphogenesis.

J.P. Trinkaus (Yale). Movement of cell clusters during embryogenesis.

R.A. Weiss and **S.M. Pegrum** (London). Behaviour and morphology of virus transformed cells.

J.A. Weston (Oregon). The migration and differentiation of neural crest cells.

L. Wolpert (London). Cartilage morphogenesis.

S. Zigmond (Philadelphia). Chemotactic peptide receptor dynamics on polymorphonuclear leukocytes.

Applications for places for poster sessions will be welcome.

Accommodation will be available at Ramsay Hall, which is within close walking distance of University College.

Booking forms will be distributed in January 1982 together with the final programme.

Enquiries to: Professor R. Bellairs, Department of Anatomy & Embryology, University College London, Gower Street, London WC1E 6BT, U.K.