1989 (Newsletters #15, 16, 17, 18, 19)

SPRING 1989

The location of the Spring 1989 Symposium meeting has not yet been decided, but the topic is likely to be 'Towards the molecular basis of morphogenetic signalling', proposed by Rob Kay.

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SPRING 1989

The Spring 1989 Symposium meeting will be held in St. Andrews on April 3rd-6th. The topic is 'The molecular basis of morphogenetic signalling', and the organizers are Rob Kay and Jim Smith, who write:

In the last few years we have had our first glimpses of the molecular mechanisms that might underlie the generation of spatial pattern of cells during development. The heart of the problem is to understand the signalling systems that communicate positional information. We want to know the nature of the molecules (morphogens) that signal between cells or nuclei, the dynamics of the signalling system and how the signals affect the cells. Knowledge of morphogens is coming from work on a number of organisms and from at least two major strategies: molecular genetics (as in Drosophila) and cell biology (as in Xenopus and Dictyostelium). The objective of the meeting is to bring together these different approaches to promote the search for common themes, which we all expect to be present at some levels.

Speakers who have already agreed to attend include: Devreotes (Baltimore), Eichele (Boston), Gelbart (Harvard), Kimble (USA), Lawrence (Cambridge), Lehmann (MIT), Maden (London), Schaller (Tubingen) and Slack (Oxford).

St. Andrews is a beautiful location for a meeting, famous for its golf club and within easy reach of the Scottish Highlands. To make it easier to get there we hope to be able to provide transport from Edinburgh. Graduate students are reminded that travel grants are available from the Treasurer, Mary Bownes (address at back of Newsletter).

Spring 1989, St Andrews

The Spring 1989 meeting will be held in St Andrews on April 3rd-6th. As usual this will be a joint meeting with the British Society for Cell Biology. A poster advertising the meeting accompanies this Newsletter: please display it in your department. The topic of the BSDB Symposium is **The Molecular Basis of Morphogenetic Signalling.** The organizers, Rob Kay and Jim Smith, write:

In the last few years we have had our first glimpses of the molecular mechanisms that might underlie the generation of spatial patterns of cells during development. The heart of the problem is to understand the signalling systems that communicate positional information. We want to know the nature of the molecules (morphogens) that signal between cells or nuclei, the dynamics of the signalling system and how the signals affect the cells. Knowledge of morphogens is coming from work on a number of organisms and from at least two major strategies: molecular genetics (as in *Drosophila*) and cell biology (as in *Xenopus* and *Dictyostelium*). The objective of this meeting is to bring together these different approaches to promote the search for common themes which we all expect to be present at some level.

Other sessions at this meeting are organized by the Scottish Developmental Biology Group. The topics are **Sex determination** and **Growth factors**. The BSCB Symposium is on the **Cell cycle**. Other BSCB sessions include **Proteolytic mechanisms**, **Alternative splicing**, **Glycosaminoglycans**, and **G-proteins**. There will also be a workshop on **New Developments in microscopy** organized by Brad Amos (Cambridge). The timetable for this meeting is outlined on the next page, with speakers' titles where available.

The Molecular Basis of Positional Signalling

Tuesday 4th April

9:00	**P. Nurse** (Oxford; BSCB Plenary speaker)
	BSDB Sessions
10:10	**R. Kay** (Cambridge; Welcome and introductory remarks)
	Chair: **J. Cooke** (London)
10:15	**L. Wolpert** (London) Positional Information Revisited
10:50	*Coffee*
11:20	**R. Lehmann** (MIT) *Drosophila* posterior pole plasm
12:00	**H. Jäckle** (Munich)
12:40	*Lunch*
2:00	**D. Melton** (Harvard)
2:40	**J. Gerhart** (Berkeley) Cortical rotation in the *Xenopus* egg
3:20	*Tea*
	Chair: **D. Ish-Horowicz** (Oxford)
3:50	**W. Gelbart** (Harvard) *Decapentaplegic* and *Drosophila* morphogenesis
4:30	**J. Austin** (Madison) Genetics of intercellular signalling in *C. Elegans*
5:10	To be decided
6:00	*Dinner*
7:30	**A. Tomlinson** (Cambridge)
8:10	**P. Ingham** (Oxford) Role of local interactions in *Drosophila* pattern formation

Wednesday 5th April

Chair: **D. Garrod** (Southampton)

9:00 **P. Devreotes** (Baltimore)
9:40 **R. Kay** (Cambridge) Morphogenetic signalling in *Dictyostelium*
10:15 **J. Williams** (ICRF, Clare Hall) Two pathways of stalk cell differentiation
10:50 *Coffee*
11:15 **C. Schaller** (Heidelberg) Morphogens and pattern formation in Hydra
12:00 **BSDB Plenary Lecture: C. Nüsslein-Volhard** (Tübingen; Chair: **L. Wolpert**)
1:00 *Lunch*

Chair: **N. Holder** (London)

2:30 **M. Maden** (London)
3:10 **G. Eichele** (Harvard Medical School)
3:50 *Tea*
4:20 **H. Meinhardt** (Tübingen) Models for positional signalling in relation to available observations
5:30 BSDB AGM
6:00 BSCB AGM

Thursday 6th April

9:00 **B. Alberts** (San Francisco: BSCB Plenary speaker)

BSDB Sessions

	POSITIONAL SIGNALLING	**SEX DETERMINATION**
	Chair: **P. Lawrence** (Cambridge)	
10:10	**J. Smith** (London) XTC-MIF & mesoderm induction	**A. Spence** (Cambridge)
10:50	*Coffee*	
11:20	J. Slack (Oxford) FGF & mesoderm induction	**M. Bownes** (Edinburgh)
12:00	**A. McMahon** (New Jersey)	**M. Ferguson** (Manchester)
12:40	**P. Lawrence** (Cambridge)	**P. Goodfellow** (London)
1:00	*Lunch and end of positional signalling sessions*	
		GROWTH FACTORS
2:30		
3:10		
3:50		*Tea*
4:20		
5:00		
5:40		*End of meeting*

The BSCB **Cell Cycle** sessions are organized by Tim Hunt, Paul Fantes, Rob Brooks and Denys Wheatley. The timetable was not available as this Newsletter went to press, but the speakers include: B. Alberts (San Francisco; Glaxo Plenary Lecturer), D. Beach (Cold Spring Harbor), K. Bloom (Chapel Hill), J. Blow (Cambridge), F. Cross (Seattle), M. Dorée (Montpellier), M. Fairman (Cold Spring Harbor), D. Glover (London), L. Hartwell (Seattle), T. Hunt (Cambridge), E. Hurt (Heidelberg), C. Hutchison (Sussex), E. Karsenti (Heidelberg), J. Kilmartin (Cambridge), J. Maller (Denver), T. Mitchison (San Francisco), J. Newport (La Jolla), P. Nurse (Oxford; Plenary Lecturer), S. Reid (La Jolla), J. Roberts (Seattle), G. Sluder (Shrewsbury), M. Whitaker (London) and M. Yanagida (Kyoto).

MEETING REPORT

The Spring meeting was held jointly with the British Society for Cell Biology at St. Andrews. The BSCB Symposium was entitled **The Cell Cycle** and there were also BSCB sessions on **Proteolytic mechanisms, Alternative splicing, Glycosaminoglycans** and **G-proteins.** Additionally the Scottish Developmental Biology Group organised sessions on **Sex determination** and on **Growth factors** and there was a workshop on **New developments in microscopy.** The topic for the BSDB Symposium was **The molecular basis of morphogenetic signalling** and it was organised by Rob Kay and Jim Smith. In all 400 people attended the joint meeting. The local organisation, led by John Tucker, was excellent. The following report on the BSDB Symposium was written by **Dennis Summerbell** from *The National Institute for Medical Research* .

Why another meeting on positional signals? Well, it wasn't just that the BSDB Meetings Secretary needed a good excuse for a week's golfing at the Royal and Ancient. There were other reasons. As the organisers pointed out it is the 20th anniversary of Lewis Wolpert's presentation of the Theory of Positional Information. It is also, as Jonathan Slack reminded us, the 50th anniversary of the discovery of the existence of mesoderm inducing factors in amphibia. It is even (I see in retrospect) the 100th anniversary of Driesch's experiments in which he showed that development was not determined by the mosaic arrangement of the sea urchin egg cytoplasm but involved interaction between cells. Any one of these (except arguably the golf) would have been a suitable excuse for the meeting, but the real reason must be that this small branch of science has reached a very exciting phase. Ten years ago one would have been wiser to bet on Nigel Holder winning the British Open (now you remember the name of the Meetings Secretary) than on us finding a real morphogen. Today we are inundated with good candidates or possible handles on candidates. Nor has progress been restricted to morphogens. It would have been a brave man who ten years ago would have predicted the progress that has been made in understanding the development of the *Drosophila* embryo. At 1 p.m., Wednesday, 5th April, any one of Nüsslein-Volhard's audience could have been excused for thinking that in principle *Drosophila* was solved (at 1.05 Janni was firmly denying rumours of retirement because of impending boredom).

The meeting held together as a subject remarkably well. Everything somehow seemed relevant. Much of the credit for this must go to the organisers (though we were a splendid audience). However, it was probably also due in part to Wolpert's introductory talk, which made it easy for the listener to place the subsequent talks in a common conceptual framework, whilst also introducing some controversial viewpoints. He gave most prominence to the distinction between inductive and positional signals. He suggested many differences. The critical one is that a positional signal is graded and therefore can simultaneously instruct a number of cell populations to change their behaviour. An inductive signal is a simple interaction between two populations with a single outcome. There was a time when I thought these distinctions important. As the accumulating data has seemed to me to blur the edges of these definitions, so I have come to think of

them as being artificial and unhelpful. However, as the Symposium proceeded it seemed to me that the bar and beverage discussion was more fruitful and meticulous when couched within the context of Lewis's definitions. Perhaps after all we still need both them and Lewis.

The main question arising out of the meeting must be whether there are positional signals. The best support came from a source that would probably have surprised most of us ten years ago. Perhaps we should not have been surprised. Wolpert provided the inspiration, but Stumpf (tragically killed in a car accident) and Lawrence, provided the early evidence using insects as their model system. They were the boyhood heroes who brought many of us younger chaps into the game. Here and now Nüsslein-Volhard, ably supported by the other *Drosophila* speakers are homing in on the final proof. There are gradients, I have seen and I believe. There are also genes that respond to the gradient, and perhaps the first good evidence for differential gene expression dependent on concentration. In comparison, all of the other putative signals MIF, DIF, retinoic acid and head activators look tentative and complicated.

I will not summarise the rest of the meeting. You all saw the programme in the last Newsletter and you will all be buying the Symposium volume. Most of you interested enough to read this were probably there. I will give some of my personal impressions as well as relaying some overhead comments and moments that are unlikely to appear in print. I did not hear a single adverse comment about the overall scientific quality of the meeting. Everyone that I spoke to was very complimentary about the content of the meeting. Nobody liked the overlong first day. Thirteen hours less 80 minutes for lunch and 90 minutes for dinner is too long. The programming on the final day was also less than ideal with many in the audience having to leave before the end of catch the last practicable bus for the airport. For many the most lasting memory of the meeting may well be 150 pairs of eyes looking at a particular empty seat when the lights came on at the end of the final talk.

I thought the poster session particularly good. The number of posters was high (too many for the available space) and the quality was good. Perhaps this is a result of offering a prize for the best student poster. I think that the value of the BSDB prize (£100) is quite adequate. I thought the steep gradient (to adopt an appropriate technical term from the Symposium) of prizes used by BSCB was not a good idea. I suppose that occasionally there is a really outstanding poster (for me this was true the first year that a prize was awarded) but normally I expect that the judges have a near impossible task.

I will now award my own prizes. Most stunning scientific content, Nüsslein-Volhard; she gets to keep the trophy having won it at the last three meetings at which I have heard her talk. I hope that she will remember this small award as she collects her Nobel Prize. (Remember you read it here first). Best presentation, tied John Gerhart and Andy McMahon. McMahon wins on the grounds that Gerhart had lots of data while he was just as good with almost none. Most amusing presentation goes to Jonathan Slack, of which more later. Most manic presentation, Chika Schaller; surprisingly Lewis Wolpert was totally outclassed. Fastest talking, A. Oro, but he had an unfair advantage, the organisers giving him less time than anyone else. Least boring presentation: I was about to award it jointly to Devreotes, Kay and Wiliams, but then Williams let them down by showing the *Dictyostelium*

life-cycle slide. Longest pause between words: Jim Smith. Most interesting discussion: shared between Lewis Wolpert and Peter Lawrence. The discussion was one-sided and unusually took place at the start of Peter's talk. Biggest disappointment: Hans Meinhardt. Hans, I only come to these meetings to see your movies. Biggest surprise: jointly to the Chairmen; the meeting almost kept to schedule.

Finally I return to Slack. True scientific insight comes infrequently: to Slack perhaps more often than to most. The high point of the meeting was his advice to students. The Government should adopt it as the only item of core curriculum for trainee developmental biolgists. "When you want to publish in Cell, do an RNA protection assay. When you want to publish in Development, do a Western. When you want to know the answer, look down the microscope."

An special issue in the journal *Development* entitled "The molecular basis of positional signalling"relates to this meeting and was edited by the meeting organisers Rob Kay and Jim Smith and is available here: http://dev.biologists.org/content/107/Supplement

DEVELOPMENT 1989 SUPPLEMENT

THE MOLECULAR BASIS OF POSITIONAL SIGNALLING

EDITED BY
ROB KAY AND JIM SMITH

Papers presented at a meeting of the
British Society for Developmental Biology
at the University of St Andrews
April 1989

THE COMPANY OF BIOLOGISTS LIMITED

CAMBRIDGE

AUTUMN 1989

The location for the Autumn 1989 meeting has not been decided on, but the topic is likely to be 'Fertilization and Second Messengers', organized by Michael Whittaker.

Winter 1989, Warwick

The second meeting of 1989 will be held at Warwick University on December 18-20. The topic is 'Cell Messengers at Fertilization' and the organizer is Michael Whitaker (London). This will be a joint meeting with the Society for the Study of Fertility. Full details will be published in the next Newsletter.

Winter 1989, Warwick: Fertilization

The second BSDB meeting of 1989 will be held at Warwick University on December 18th -20th on **Fertilization**. It will be a joint meeting with the Society for the Study of Fertility. It will be followed by a one-day meeting of the SSF at which BSDB members will be welcome. BSDB organizer of the meeting, Michael Whitaker, writes:

The central question at fertilization is how the sperm induces the egg to begin to grow and divide. There has been rapid progress in the last five years that has centred on the contribution that second messengers make to sperm and egg activation. In other cell types, these second messengers are responsible for coupling hormonal stimulation and cellular responses. It is now clear that the same cellular signals govern the activation of sperm and egg. In particular, calcium and the phosphoinositide second messengers have recently been shown to play a central part in egg activation in frog, sea urchin and mammals. Moreover, there are sufficient differences in precise mechanism between these three groups to make comparison stimulating. Fertilization is intrinsically interesting, but in addition serves as a model for the more general phenomenon of the stimulation of growth and proliferation in cells.

Each stage of fertilization involves second messenger mechanisms. The stages are (1) The activation of the sperm and the acrosome reaction; (2) Interaction and fusion of sperm and egg; (3) Generation of second messengers within the egg; (4) Activation of second messenger targets that control the onset of development. A session is devoted to each of these stages, as studied in frog, starfish, sea urchin and mammals.

The programme for the meeting is outlined on the next page and there is a booking form in the 'centre section' of the Newsletter.

CELL MESSENGERS AT FERTILIZATION

MONDAY, DECEMBER 18

1. **Sperm activation and the acrosome reaction**

Chairman : **Roy Jones**

Ben Shapiro (University of Washington Medical School).
Molecular mechanism of sea urchin sperm activation prior to fertilization.

Lynn Fraser (King's College, London).
Cyclic nucleotides and mammalian sperm capacitation.

Greg Kopf (University of Pennsylvania Medical Center)
Zona pellucida-mediated signal transduction in mouse spermatozoa.

Motonori Hoshi (Tokyo Institute of Technology)
Induction of the acrosome reaction in starfish.

Robin Harrison (AFRC Institute, Babraham).
Phosphoinositides and their products in the mammalian sperm-acrosome reaction.

2. **Interaction and fusion of sperm and egg**

Chairman : **David Whittingham**

Paul Wassarman (Roche Institute of Molecular Biology).
Receptor-mediated fertilization in mammals.

Roy Jones (AFRC Institute, Babraham)
Identification of sperm-egg recognition molecules.

Harry Moore (Institute of Zoology, London)
The development of sperm-egg recognition processes in mammals.

Laurinda Jaffe (University of Connecticut Health Sciences Center)
First messengers at fertilization.

Ted Chambers (University of Miami School of Medicine)
Fertilization in voltage-clamped sea urchin eggs.

TUESDAY, DECEMBER 19

3. **Generation of second messengers in eggs and oocytes**

Chairman : **Michael Whitaker**

Shun-Ichi Miyazaki (Tokyo Women's Medical College).
Cell signalling in hamster eggs at fertilization.

Bill Busa (Johns Hopkins University)
Ca^{2+} and PI cycle-derived second messengers during fertilization and early embryogenesis in the frog *Xenopus* .

Karl Swann (MRC EET Unit, St. George's Hospital Medical School)
Second messengers and the calcium wave at fertilization in sea urchin eggs.

David Cran (AFRC Institute, Babraham)
Cortical granules and the cortical reaction in sheep eggs.

Marcel Doree (CNRS, Montpelier).
Calcium and regulation of MPF activity during meiotic maturation of starfish oocytes: facts and hypotheses.

4. **Second messenger targets and the onset of development**
Chairman : **Martin Johnson**

Richard Steinhardt (University of California, Berkeley).
Regulation of the first cell cycle in the sea urchin embryo by calcium.

Michael Whitaker (University College London).
Calcium and cell cycle control - protein phosphorylation in early sea-urchin embryos.

Josie McConnell (University of Cambridge).
Cell cycle control in early mouse development.

Merill Hille (University of Washington)
Regulation of the rate of translation in eggs and embryos of sea urchins.

Hugh Woodland (University of Warwick)
The regulation of protein synthesis in early amphibian development.

Douglas Melton (Harvard University)
Signal transduction during mesoderm induction.

POSTERS

Time has been set aside for Poster Sessions on both afternoons of the meeting. There will also be SSF posters on display on Wednesday, 20th December.