BSDB Newsletter

Winter 2015
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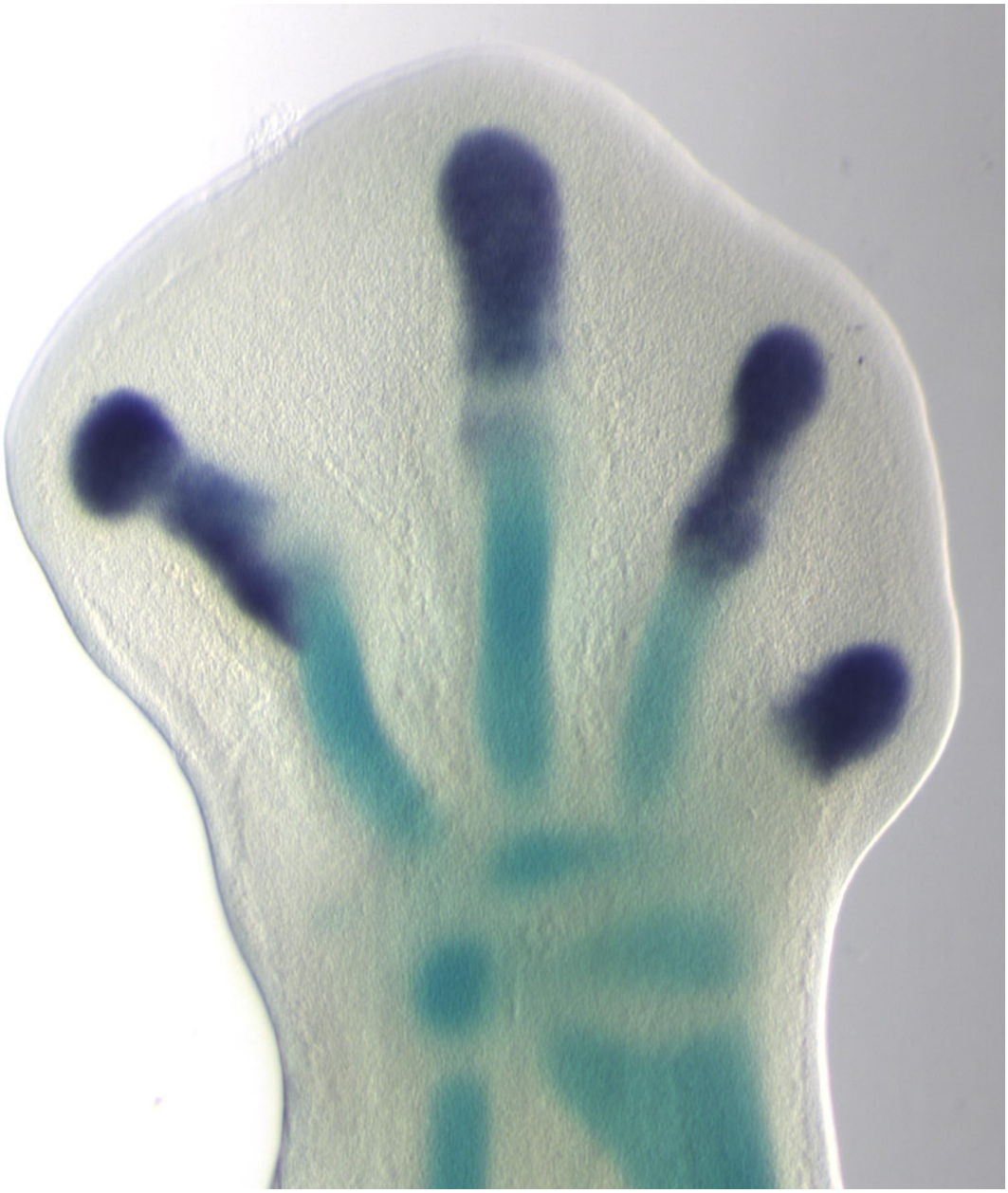
British Society for Developmental Biology

www.bsdb.org



joined

BSDB-BSCB Spring Meeting
Warwick
10–13 April 2016

BSDB Autumn Meeting

Edinburgh
28-30 Aug 2016
Using chimaeras to study developmental processes

The Company of Biologists

THE NODE

Editorial

As you might have noticed, there was no BSDB summer newsletter this year. The reason for this is that the BSDB committee has taken the sensible decision to reduce them to one edition a year. Newsletters clearly do no longer play the same role as they used to. In times of the internet, they are no longer needed to update members on new developments of society matters or in the area of Developmental Biology. This is now done far better through the BSDB website and through The Node (also see page 9). However, we feel that providing an overview of the year still is a service we owe to BSDB members, and which might provide an informative document also for future generations.

This year, the BSDB has implemented the new **Cheryll Tickle Prize** and we proudly announce **Abigail Tucker** as the well-deserved inaugural Awardee of 2016 (page 14). This prize is for outstanding women in their mid-career and our **chair**, Ottoline Leyser, explains the underlying rationale in her welcome note (page 2). As usual, this issue contains the reports by our **secretary** Kim Dale (page 3), **meetings officer** Joshua Brickman (page 4), **treasurer** Chris Thompson (page 7), **communications officer** (page 9) and, for the first time, a joined note by our **graduate student rep** Alexandra Ashcroft and **postdoc rep** Michelle Ware who explain to us their plans to improve services for young BSDB members (page 10). We congratulate all **BSDB awardees of 2015** (page 6), introduce our **new committee members** (page 11) and present Ana Ribeiro's report of the **Autumn Meeting 2015** (page 5). Claudio Stern makes an important case for **promoting developmental biologists** for prizes and politically important memberships (to which the BSDB committee is responding already; page 16), and we explain our recent decision to become a full member of the **Royal Society of Biology** (page 16). Finally, we present four reports of the **2015 Gurdon/The Company of Biologists Summer Studentship awardees** which clearly demonstrate the success of this scheme (page 17).

I hope you enjoy this issue and, in the name of the BSDB committee, would like to wish you a happy and successful new year 2016.

Andreas Prokop (Communications officer)

***Cover image:** Embryonic chicken foot, showing SOX9 mRNA expression (dark blue) and skeletal cartilage pattern (light blue). SOX9 was shown to be an important part of the 'Turing Network' which patterns digits (see more info here; photo by Megan Davey).*

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Chair's welcome note by Ottoline Leyser

"…a new BSDB medal...will be awarded annually to a mid-career, female scientist for her outstanding achievements in the field of Developmental Biology"

"...in the current circumstances in biology, where there are essentially as many women as men at PhD and post-doctoral level, the question as to why they progressively disappear along the rest of the academic career path must be addressed."

"In our culture, losing is much harder for men to accept than for women. Instead, for women, a lifetime working in that sort of environment, where success is so narrowly defined, looks unattractive."

It's been another excellent year for the BSDB, and you can read all about it in the newsletter reports of the BSDB officers. For me, a highlight was Lewis Wolpert's inspirational Waddington Medal Lecture at the spring meeting. Altogether, it was a very successful meeting, and it was great to see so many people contributing to the AGM and volunteering to serve on the BSDB Committee. I would like to thank Malcolm Logan, Andy Chalmers, Lynda Erskine, Jenny Nichols and Magdelena Stasiulewicz**,** who stepped down this year for their excellent service. I am delighted to welcome Alexandra Ashcroft, Alistair McGregor, Berenika Plusa, Tristan Rodriguez and Rita Sousa-Nunes, who have been elected to replace them (see page 11).

An unexpectedly controversial topic on the agenda was the announcement of the institution of a new BSDB medal, named after Cheryll Tickle (see page 14). The Medal will be awarded annually to a mid-career, female scientist for her outstanding achievements in the field of Developmental Biology (for this year's winner see page 14). For some, awards for women in science are ironically patronizing, suggesting that women need special treatment and implying that they can't succeed on equal terms. It would, of course, be better if there was no need for such awards. But in the current circumstances in biology, where there are essentially as many women as men at PhD and post-doctoral level, the question as to why they progressively disappear along the rest of the academic career path must be addressed.

The answer to this question is multifaceted, but of particular importance, much of the evidence I have seen suggests that women simply don't apply for PI positions. They choose other options. There are many interesting and rewarding career options open to researchers. Former members of my group are now enjoying careers in teaching, industry, publishing, science administration, and science policy. For example one of them is currently the policy analyst for the House of Lords Science and Technology Committee. So if there are so many interesting alternatives, why are they disproportionately taken up by women and not by men? Again, there is not a single simple answer to this question, but I think a large part of it comes down to the perception in most of our labs that a research career in academia is the only one worth having. Succeeding in academia is perceived as highly competitive, and if you move into a different career it is because you have lost the competition and failed at research science. In our culture, losing is much harder for men to accept than for women. Instead, for women, a lifetime working in that sort of environment, where success is so narrowly defined, looks unattractive. To sum it up, as I have said before, women are too scared to stay in and men are too scared to get out. Career decisions motivated by fear are not good, especially when we are talking about science, which is truly a joy.

The solution to this part of the problem requires two things. The first is that the value of the many career options open to researchers must be celebrated, supporting researchers at all career stages from student to professor, to make decisions about what to do next based on considered positive choices of what they really want. Any suggestions for what the

"Any suggestions for what the BSDB can do to encourage this culture change would be welcome."

BSDB can do to encourage this culture change would be welcome. The second is that diversity in the academic career path must be welcomed and supported. This provides role models for more junior researchers, and a much-needed reminder that there is more than one way to excel. The Cheryll Tickle award is part of this endeavor. It would be great if in a decade it made sense to stop awarding the Medal only to women, and start awarding it more generally for diversity. In the mean time, I look forward to celebrating the many contributions of women to our field.

Ottoline Leyser

Secretary's report by Kim Dale

" Since March 2015, we have had 51 new applications. The current membership stands at 1287."

Another wonderful year for the Society in terms of membership, medal nominations and indeed medal winners. Since March 2015, we have had 51 new applications. The current membership stands at 1287. The nominations for the 2016 Waddington Medal were outstanding again this year. The voting was completed on schedule and I invite you to all come along to the Spring meeting to hear what will be a spectacular talk by the worthy winner. The voting for the inaugural 2016 Cheryll Tickle Medal (see the article in this issue) was also completed on schedule. We proudly announce that the first winner of the Cheryll Tickle Award is Abigail Tucker (see page 14). Again, I encourage you all to come to the Spring meeting to listen to Abigail's medal talk and share with her the honour of being presented with her medal by Cheryll herself. Lastly, I encourage you all to **send in nominations** for the 2016 Beddington Medal for PhD dissertations **which were defended** during 2015. A Happy New Year, and see you in Warwick in April 2016.

Kim Dale

Conference and travel grants

BSDB conference grant application deadline *for the joint* ***Spring Meeting 2016****: Sunday 31st of January 2016*

Note, that only BSDB members paying the correct subscription to the Society will be eligible for a Travel Grant.

Members can apply for **BSDB Conference Grants** to attend BSDB-sponsored meetings, for **The Company of Biologists Travel Grants** to attend meetings and courses outside the UK, and the **Louie Hamilton Fund** provides travel support for handicapped members. For an overview visit the **membership area** on the BSDB.org site.

Subscription information

Full members: **£35** per annum

Students: **£15** per annum (as long as you have student status, max. for 4 years)

Student members that joined the Society in 2012 are reminded to upgrade their subscription to the full member rate of £35.

Meeting Officer's report by Joshua Brickman

"Our Spring Meeting 2016 in Warwick is rapidly approaching. The dates are 10-13 April and abstract submission is now open."

" The Autumn Meeting 2016 will be a specialised conference entitled "Using chimeras as a tool to study developmental processes". It ... will take place in Edinburgh (28-30 Aug. 2016). ... For updates on these meetings, see the BSDB meetings page."

Ideas for a meeting?

A major task of the BSDB Committee is to host high quality scientific meetings.

We welcome therefore suggestions of future topics for Autumn Meetings. Simply contact: meetings@bsdb.org

This past year we once again have put together two very successful meetings. Our **Spring Meeting 2015** was held jointly with the BSCB in April in Warwick and was organized by Jo Begbie and Jenny Nichols for us, and Catherine Nobes and Grant Wheeler for the BSCB. They have all done a fantastic job!

The **Autumn Meeting 2015** took place in early October and was joined with the Spanish and Portuguese Societies of Developmental Biology**.** It took place in a fantastic location, a seaside resort in the Algarve, Portugal (see page 5). It was also a big success and our thanks go out to the organizers António Jacinto (SPDB), Domingos Henrique (SPSB), Miguel Manzanares (SEBD), and Kate Storey (BSDB). For the third year in a row, our Autumn Meeting did well enough financially so that we did not need to spend any of the 8 K we normally allocate for these meetings. In fact they have all made a modest profit. While I do not think that it is essential that these meetings make money, it is nice that the last three have, and it certainly allows us to be more generous with **conference grants**, which we were: we gave 25 travel awards and The Company of Biologists gave the meeting an additional 10. The breakdown of participants showed a large UK turnout, with 65 out of 186 (including speakers).

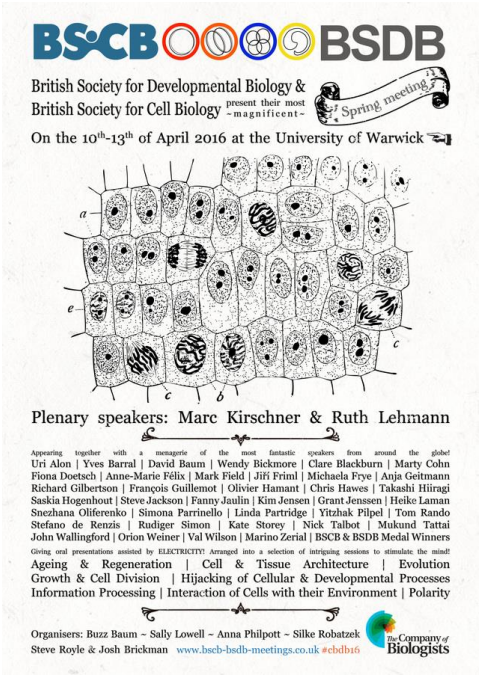
Our **Spring Meeting 2016** in Warwick is rapidly approaching. This will be another completely integrated meeting with the BSCB. Our organisers are Sally Lowell and Anna Philpott and the BSCB organizers are Buzz Baum and Silke Robatzek. This meeting will feature a new program in which the student symposium is slotted into the middle of the meeting. We will also have plenaries at the beginning and end, as well as new awards session for woman in science. The dates are 10-13 April and **abstract submission** is now open.

The **Autumn Meeting 2016** will be a specialised conference entitled "Using chimeras as a tool to study developmental processes". It is being organised by Jenny Nichols and Tristan Rodriguez and will take place in Edinburgh (28-30 Aug 2016). The list of speakers includes Richard Gardner, Janet Rossant, Liz Robertson, Hiro Nakauchi, Ginny Papaioannou, Martin Johnson and many more. There will also be a special issue of the Royal Society's Phil Transactions B based around the meeting.

The **Spring Meeting 2017** is well underway, and will be a three way meeting, joint with the BSCB and the Genetics Society. The **Autumn Meeting 2017** will be joined with the Scandinavian Societies for Developmental Biology. For updates on these meetings, see the **BSDB meetings page**.

Please, contact me if you are interested in **organising a future Autumn Meeting**, as we have currently nothing planned beyond 2017. They can either be joint with foreign societies and take place abroad or in the UK, or have a specialised focus and take place in the UK.

Joshua Brickman



Science on the Beach: report of the joined BSDB/SEBD/SPBD Autumn Meeting by Ana Ribeiro

*On 7-10 Oct 2015 the **Joint meeting of the BSDB with the Spanish and Portuguese Societies of Developmental Biology** took place on a sea side resort of the Algarve in Portugal, organised by António Jacinto, Domingos Henrique, Miguel Manzanares, Josh Brickman and Kate Storey. Please read this **meeting report** by **Ana Ribeiro** which was first published on **The Node**.*

A Portuguese, a Spanish and a British person meet in a bar… and start discussing developmental biology. This may sound like the beginning of a joke, but in fact happened during the Joint Meeting of the Portuguese, Spanish and British Societies for Developmental Biology, which took place in Algarve, Portugal, in early October. The meeting venue, besides having the aforementioned bar, was also closely located to the beach, which we were able to enjoy thanks to a pleasant weather. Some of the participants also took advantage of the beautiful and family-friendly location to bring their own families. Nevertheless, the scientific talks and poster sessions still managed to draw the participants away from the seaside.

The meeting started with early development, with a plenary lecture on the principles of pluripotency presented by **Austin Smith**. The lecture focused on the ongoing quest to establish human naïve embryonic stem cells in vitro independently of pluripotency transgenes, showing the progresses achieved so far and presenting the challenges that still need to be overcome.

The transition from pluripotency to lineage commitment was explored by **Sally Lowell**, whose work identified some of the factors that prime cells for differentiation and revealed a role for adhesion molecules in the decision to differentiate. **Berenika Plusa** presented the advantages of using rabbit as an alternative model to study early mammalian development. **Andrew Johnson** showed that axolotl, an organism without extraembryonic tissues, can be used to study later roles of the pluripotency factor Nanog.

The regulation of neuronal differentiation was also the focus of several talks. **Kate Storey** showed how differentiating neurons in the chick neural tube undergo apical abscission and revealed new evidence for the involvement of microtubule dynamics and adhesion molecules in this process. Also in the chick neural tube, **Elisa Marti** presented work on the role of Shh signalling in the decision to proliferate or differentiate and showed that the subcellular localisation of several Shh pathway components contributes for this decision. **Anna Philpott** also talked about division/differentiation in the nervous system and the regulation of proneural factor activity by phosphorylation in *Xenopus*. **François Guillemot** highlighted the role of the proneural factor Ascl1 in adult brain neurogenesis and how modulation of Ascl1 stability affects the balance between quiescence and differentiation. The talk by **Alexandre Raposo** was also on Ascl1 and its function promoting chromatin accessibility during neurogenesis.

The link between adult neural stem cells and cancer was discussed by two drosophilists. **Cláudia Barros** is using a fly brain tumour model to identify new factors involved in tumour initiation, while **Rita Sousa-Nunes** is using this model to study the interaction between tumour cells and the microenvironment.

Moving away from neural lineages, we also heard about regulation of proliferation, differentiation and cell movement of presomitic mesoderm progenitors from **Leonor Saúde** and single cell oscillators as components of the segmentation clock during somitogenesis from **Andrew Oates**.

Later in development, the formation of the inner ear lumen in zebrafish was introduced by **Berta**

Alsina, revealing that mitotic cell rounding and epithelial thinning regulate lumen expansion. **Juan R. Martinez-Morales** talked about optic cup morphogenesis in zebrafish, showing that both rim involution and basal constriction contribute to cup folding. Zebrafish embryos were also the stars in the beautiful movies shown by **Claudia Linker**, whose work combined live imaging with cell ablation to test the role of leader, follower and pre-migratory cells in the collective migration of neural crest cells.

At the chromatin level, **Ana Pombo** proposed that the priming of developmental genes for future expression in embryonic stem cells involves the Polycomb complex, a specific modification of the RNA polymerase II and local transcript degradation. **Rui Martinho** showed how chromatin remodelling is involved in the transcriptional reactivation of the *Drosophila* oocyte during meiosis. **Javier Lopez-Rios** presented his work on a limb-specific enhancer responsible for the spatial differences in *Ptch1* expression between mice and bovine, which underlies their distinct limb anatomy.

The meeting ended with a plenary talk by **Moisés Mallo**, who presented his work on Gdf11 as the coordinator of the trunk to tail decision during vertebrate embryogenesis and revealed an unexpected role for a pluripotency gene in trunk specification.

The meeting included many other exciting talks that have not been reported here. Overall, the meeting programme showcased the diversity of the developmental biology field in terms of subjects and model systems. The meeting also achieved a perfect gender balance among speakers - 17 female and 17 male speakers. Outside the lecture hall, scientific discussions continued throughout the free afternoons and outdoor poster sessions while enjoying the warm weather. And, of course, in the bar.

As the meeting came to an end, the sunny weather turned into a rainy storm, which made the departure a little less sorrowful.

Ana Ribeiro

The BSDB congratulates its Awardees in 2015

- BSDB Waddington Award winner: **Lewis Wolpert** (UCL, London); watch his Waddington medal lecture either on YouTube, and read the interview performed by The Node.
- BSDB Beddington Award winner: **John Robert Davis** (*then at Kings, London with Brian Stramer, now at CRUK/Crick, London, with Nic Tapon*); watch his Beddington medal lecture on YouTube, and read an interview with John performed by The Node.
- 1st BSDB PhD Poster Prize winner (visit to 2015 SDB meeting, Utah): **Wendy Gu** (Univ Cambridge, with M Landgraf; "*The role of Wnt5 ligand and the Ryk family Wnt receptors in positioning neurites along the anteroposterior axis of the developing Drosophila ventral nerve cord*"; read an interview by The Node.
- Runners Up for PhD Poster Prize (sponsored by Nat Rev Mol Cell Biol): **Sebastian Judd-Mole** (£200 prize; Monash Univ, with RB Burke; "*Functional characterisation of voltage gated chloride channel proteins in Drosophila*") ● **Jingchao Zhang** (£150 prize; SCRM, Univ Edinburgh, with I Chambers; "*Interactions between Otx2 and Nanog regulates self-renewal network*") ● **Hannah Roddie** (£150 prize; Univ Sheffield, with IR Evans; "*The apoptotic cell receptor Simu is required for normal inflammatory responses in Drosophila embryos*")
- PostDoc Prizes (Sponsored by Gene Tools): **Monica Faronato** (£150 prize; Imperial College, London, with L Magnani; "*DMXL2 regulates Notch in endocrine resistant breast cancer*") ● **Andrew Bailey** (£150 prize; NIMR/Crick, London, with AP Gould; "*An antioxidant role for lipid droplets in a stem cell niche of Drosophila*")
- Gurdon Summer Studentship Awardees: see page 17

Treasurer's report by Christopher Thompson

"The Society awarded a record number of 122 grants to allow members to attend BSDB meetings."

"Paying membership currently stands at around 1300 members"

"...the Society maintains an almost balanced budget and continues to have a very healthy reserve. This suggests that we can continue to support new expenditure in a sustainable fashion, cope with unforeseen events ... and, indeed, invest in new activities to promote developmental biology."

The last year has again been a successful one. The Society awarded a record number of **122 grants** to allow members to attend BSDB meetings (83 to the Spring meeting 2014 in Warwick, 39 to the November ISD Meeting 2014 in London) at a total cost of £56,165. This expenditure was partly offset by the income the Society received from its membership (£34,093), which is slightly lower than last year. Paying membership currently stands at **around 1300 members**, with around 900 full and 400 student members. The Society also receives a sum from the **The Company of Biologists**, which provides for the running of the Society (£35,000) and an amount (£35,000) to spend on **The Company of Biologists/BSDB travel awards** to enable our members to attend overseas meetings. Over the last year we gave out all of these awards that were budgeted (£35,005), reflecting both the high demand for the awards and our relatively good financial position, with awards being made to all eligible applicants. In total 82 The Company of Biologists/BSDB travel awards were made 2014-15. It should be noted from the accounts that we made an overall loss of £16K on the year. This loss is largely due to our investment in an additional meeting, the **ISD meeting held in London** in November 2014. This meeting was a unique event, attracting some of the top Developmental Biologists in the world to the UK, and thus provided an excellent opportunity to support our membership. This support came in the form of 39 additional travel awards that are not normally part of our budget. This investment was in part offset by the success of our regular **Autumn Meeting 2014** (held in Norwich; see page 5f.) in which we were not required to provide any support due to the success of the organisers in acquiring sponsorship. Indeed, the great efforts of our conference organisers in general, both to raise income via sponsorship and by keeping costs under control, means the **Spring Meeting 2014** (Warwick) also returned income to the Society (£4,527). Furthermore, the financial reserves of the Society are invested in **Baillie Gifford and L&G funds** and, overall, these did well over the last 12 months (increasing in value by ~18K). Bearing in mind that we also continued with our commitment to fund **10 Gurdon Summer Studentships** (at a cost of £14,400) for the second time (see page 17), the **Society maintains an almost balanced budget** and continues to have a very healthy reserve. This suggests that we can continue to support new expenditure in a sustainable fashion, cope with unforeseen events (e.g., cancellation of a meeting) and, indeed, invest in new activities to promote developmental biology. Our overall solid financial health means that we can do this without any significant threat to the core business of the Society.

Christopher Thompson
16 October 2015

The BSDB gratefully acknowledges the continuing financial support of The Company of Biologists Ltd (CoB).

www.biologists.com

BRITISH SOCIETY FOR DEVELOPMENTAL BIOLOGY

FINANCIAL STATEMENT YEAR ENDING JULY 31st 2015

Accruals Basis

Balance Sheet

2013/2014 £		2014/2015 £
	Investments	
61,237	L&G Global 100 Index Trust ®	65,977
252,923	Baillie Gifford Managed Fund	271,182
	Current Assets	
82,969	Barclays Bank High Interest Account	49,002
10,029	Barclays Bank Current Account	26,807
3,056	Barclays Bank: Louie Hamilton Account (1,2)	3,056
	PayPal	921
96,053	**Total Current Assets**	79,786
0	Less: Unpresented cheques	0
0	Debtors – Creditors	0
96,053	Net Current Assets	79,786
410,213	**Total Funds**	**416,944**

Income & Expenditure Account

Income	£	Expenditure	£
Membership (Standing Order & PayPal)	34,093	Grants (Overseas & Courses)	35,005
Block Grant (CoB)	35,000	Grants (BSBD Meetings)	36,265
Travel grant fund (CoB)	35,000	Gurdon Summer Studentships	14,400
Spring Meeting 2015	4527.82	Autumn Meeting 2014 (UEA)	0
Autumn Meeting 2014 (UEA)	0	Spring Meeting 2015	12,130
Refunds in	120	Autumn Meeting 2015	0
Unpresented cheques 14-15	0	Prizes	591
		Committee & administration	6,495
		ISDB membership	0
Interest and Investment Appreciation:		Bank Charges	25
Barclays High Interest a/c	33	Refunds out	231
Barclays Louie Hamilton a/c	0	ISD Meeting	19,900
Total Income	**108,774**	Total Expenditure	**125,042**
		Net Surplus for the Year	**-16,267**
		Unrealised Gains on L&G	4,740
		Unrealised Gains on Baillie Gifford 1	18,259
		Fund balance at 31st July 2014	410,213
		Fund balance at 31st July 2015	**416,944**

Notes

These accounts were prepared under the accrual basis convention, in accordance with the applicable accounting standards and Recommended Practice of Accounting by Charities. There have been no major changes to our financial arrangements this year.

1. The Louie Hamilton account valuation is at 14.9.13

2. This is the only restricted account and no call was made on it in the financial year 2014/15

BSDB communication by Andreas Prokop

"...you will stay best informed about BSDB matters by subscribing to email notifications on our bsdb.org site."

"The award lecture videos from the last Spring Meeting were uploaded on our new BSDB YouTube channel."

"For those of you who use Twitter, please, help us by tweeting our news posts to your followers using the #BSDB hashtag."

"...if you are interested ...to sight and evaluate the [the BSDB archive] materials and/or help us digitalise a selection of important documents, such as newsletters..., please get in touch [Tel. +44(0)161-2751556/7; Andreas.Prokop @manchester.ac.uk]"

(1) With the help of Lorna Tittle, our **bsdb.org website** has now been fully installed including the updated Canvas scheme which essentially improves the display on mobile devices. Furthermore, we bought in Securi services to protect our site against attacks, of which we unfortunately suffered one in November. Many minor changes were introduced. For example, the "Membership" area has been revamped and all grant information is now easily accessible on one single page; under the "About us" tab there is now more detailed information on BSDB committee members, we invite members to promote the BSDB in their institutions (posters can be downloaded), and images can be downloaded to acknowledge BSDB/The Company of Biologists grant support; we introduced a "Meetings" tab which informs primarily about future BSDB meetings and keeps track of past conferences. With about 1000 users and 3000 views since summer (overwhelming majority from the US followed by the UK), the **user statistics** of our page are reasonable, especially when considering that **The Node** now covers many of the topics that would otherwise be within the remit of the BSDB. This means in no way competition, and our collaboration with The Company of Biologists, in particular also Catarina Vicente at The Node, remains outstanding. However, it means that the use of our site mainly restricts to society-specific information and news posts. If you follow The Node you will have noticed that some of the BSDB news posts are being mirrored there to reach a wider audience. However, you will stay best informed about BSDB matters by **subscribing to email notifications on our bsdb.org** site. For this, simply enter your email address in the 3rd item of the right hand side bar and emails will be sent to you whenever there is a new post (rarely more than one per fortnight). For those of you who use **Twitter**, please, help dissemination by tweeting our news posts to your followers using the **#BSDB hashtag**.

(2) In early 2015, the joint BSDB/BSCB's committee decided to film the medal award lectures at Spring Meetings (a decision that was upheld on the joint officers meeting in November). The award lecture videos from the last Spring Meeting were uploaded on our new **BSDB YouTube channel**. They can also be viewed in the "Awards" area of our website and the Waddington medal talks are linked out on Wikipedia. If you have not done so already, please have a look at the excellent captures of Lewis Wolpert's Waddington Medal talk and John Davis' Beddington Medal lecture.

(3) Finally, the **70th BSDB anniversary** will be in 2018, and the Spring Meeting of that year will be organised by the BSDB alone. We will therefore have the opportunity to look into the history of developmental biology in general and/or in the UK, as well as to look back at 7 decades of the BSDB and its precursor organisations. To engage on that path, I have been in contact with numerous early members of the society who helped with information that enabled us, for example, to reconstruct the now almost complete sequence of former presidents/chairs. I could also dig out substantial archive materials, part of which were used for the **BSDB history article** by Jonathan Slack. However, we need help. Therefore, if you are interested (or know someone who is) to sight and evaluate the materials and/or help us digitalise a selection of important documents, such as newsletters or conference programmes, please get in touch with me:Tel. +44(0)161-2751556/7 or email Andreas.Prokop@manchester.ac.uk.

Andreas Prokop

BSDB Graduate & Postdoc Rep report

by Alex Ashcroft & Michelle Ware

Alexandra Ashcroft

Michelle Ware

"The changes we are making to the Spring Meeting's Careers Session are particularly exciting... Keep an eye on facebook and the Spring Meeting 2016 website for updates on confirmed speakers and sign-up opportunities!"

As the graduate and postdoc representatives, we are eager to ascertain what exactly the student and postdoc members of the BSDB would like to get out of the society so that we can advocate for your needs. Therefore, we conducted a survey which was well responded to - thanks again to everyone who participated!

The **survey results** were published in a recent news post. Some clear trends emerged, such as a desire for more transferable, professional development at the annual Spring Meeting and beyond. The survey results were discussed in detail at the last committee meeting and we are extremely excited to now make changes that we hope will benefit the future generation of developmental biologists.

The changes we are making to the **Spring Meeting's Careers Session** are particularly exciting. This session will be a 2.5 hours round-table discussion. Students and postdocs will be able to sign up for these tables to discuss with experts and role models in and outside of academia as well as science communication. **Keep an eye on facebook and the Spring Meeting 2016 website** for updates on confirmed speakers and sign-up opportunities!

Here we briefly explain some additional changes which have been decided so far:

- The Spring Meeting 2016 will have science breakfasts with prominent scientists in the field - including our own society chair Ottoline Leyser!
- The 2016 graduate student seminar at the Spring Meeting will have a revamped format to increase the number of speakers.
- The 2017 graduate student seminar at the Spring Meeting will be replaced by a graduate student and early postdoc seminar.
- We are liaising with the BSCB reps to revamp the graduate student and postdoc social at the Spring Meeting 2016.
- We are investigating the logistics of introducing sustainable student and postdoc training days.
- We are planning to set up a graduate student and postdoc information page on the BSDB website.
- We are investigating the logistics of setting up a developmental biology mentoring network.

If you are interested in giving talks or mentoring, please contact Alex at students@bsdb.org or Michelle at postdocs@bsdb.org. Your comments or suggestions on any other matters are also welcomed. We look forward to hearing from you, and don't forget to join us on facebook.

Alexandra Ashcroft & Michelle Ware

BSDB committee members

Information about the BSDB committee members is given on the **BSDB website**. The current members are: **Ottoline Leyser** (Cambridge; 2014-2019; chair) ● **Kim Dale** (Dundee; 2013-2018; secretary) ● **Josh Brickman** (Edinburgh/Copenhagen; 2013-2018; meetings) ● **Christopher Thompson** (Manchester; 2014-2019; treasurer) ● **Andreas Prokop** (Manchester; 2013-2018; communications) ● **Alexandra Ashcroft** (Cambridge; 2015-2017; graduate representative) ● **Michelle Ware** (group of Jenny Morton in Cambridge; 2015-2018; postdoc representative) ● **Anna Philpott** (Cambridge; 2012-2017) ● **Jo Begbie** (Oxford; 2012-2017) ● **Henry Roehl** (Sheffield; 2012-2017) ● **Sally Lowell** (Edinburgh; 2013-2018) ● **Andy Oates** (London; 2014-2019) ● **Megan Davey** (Edinburgh; 2014-2019) ● **Alistair McGregor** (Oxford; 2015-2020) ● **Berenika Plusa** (Manchester; 2015-2020) ● **Tristan Rodriguez** (London; 2015-2020) ● **Rita Sousa-Nunes** (London; 2015-2020)

The new BSDB committee members

*We would like to thank the BSDB committee members who stepped down this year for their excellent services. They are **Malcolm Logan** (2008-2015; communications officer), **Jenny Nichols** (2010-2015), **Lynda Erksine** (2010-2015), **Andrew Chalmers** (2010-2015) and **Magdalena Stasiulewicz** (2013-2015; Graduate Representative). We would like to welcome the new committee members **Alistair McGregor**, **Berenika Plusa**, **Tristan Rodriguez** and **Rita Sousa-Nunes** who will serve until 2020 and briefly introduce themselves here.*

Alitair McGregor

His research programme currently investigates the genetic basis of developmental evolution in Drosophila *and the regulation of spider development.*

Berenika Plusa

Her lab perfected a strategy by which the potential of embryonic cells can be interrogated generating morula chimaeras via injection strategies.

Alistair McGregor

Alistair McGregor has an honours degree in Genetics from the University of Edinburgh and a PhD in Genetics from the University of Leicester. During his PhD in the lab of Gabriel Dover he studied the turnover of binding sites in the enhancers of developmental genes and their co-evolution with the Bicoid homeodomain. His post-doctoral work with David Stern (Princeton University) explored the role of changes in cis-regulatory sequences in morphological evolution, and showed that changes in three of the enhancers of the gene *shaven-baby* underlie the evolution of cuticular morphology in *Drosophila sechellia*. While at Princeton, he also collaborated with Eric Wieschaus and Thomas Gregor to analyse the Bcd gradient in live *Drosophila* embryos, which provided new insights into morphogen gradient formation.

In 2006, he moved to the lab of Wim Damen (University of Cologne) where he investigated the regulation of segmentation in spiders, and specifically the role of Wnt signalling in the formation and function of the segment addition zone. In 2008, he established his own group in the department of Christian Schlötterrer (University of Vetenary Medicine, Vienna), which allowed him to bring a population genetics perspective to help better understand the evolution of gene regulation, development and morphology. He won an ERC Starting Investigator Grant in 2009 to explore the evolution and development of eyes within and among *Drosophila* species.

He then moved back to the UK to Oxford Brookes University in 2011 where he is a Reader. His research programme currently investigates the genetic basis of developmental evolution in *Drosophila* and the regulation of spider development. He is also involved in teaching Developmental Biology to undergraduate and postgraduate students, and has established a successful outreach program to engage the public in his research.

Berenika Plusa

Berenika Plusa has a Biology degree from the University of Warsaw and a PhD in Developmental Biology by the Polish Academy of Sciences. As an undergraduate she was investigating the behaviour of sperm nuclei introduced to blastomeres of the 2-cell mouse embryo (with Krzysztof A. Tarkowski, Warsaw). During her PhD she worked on the fate of meiotic maternal chromosomes introduced to the late mouse zygote (with Jacek Modlinski, Warsaw). Her initial post-doctoral work in the laboratories of David Glover and Magdalena Zernicka-Goetz (Cambridge, UK), led to the conclusion that early events in mammalian development can be regulated by physical features, such as cell shape and the position of mid-bodies. She also demonstrated that interfering with polarity proteins changes the position, and thus fate, of cells in the early mammalian embryo during inner cell mass (ICM) vs. trophectoderm (TE) specification.

Her work in Kat Hadjantonakis' lab (Sloan Kettering Institute, NY) challenged the existing model of epiblast vs. PrE specification and led us to propose a three- step model (later

Rita Sousa-Nunes

She started her independent research group in 2012 ... working on mechanisms of neural tumourigenesis [primarily in Drosophila]

Tristan Rodriguez

His group not only studies how cells exit the pluripotent state and initiate the differentiation program but also tries to unravel how the mechanisms are conserved in the maintenance of tissue homeostasis or miss-regulated in disease

Find a list of all committee members on our web site: bsdb.org/about-us

confirmed by other groups) in which stochastic expression of lineage-specific transcription factors, precedes the maturation of mutually inhibitory regulatory pathways, leading to a salt-and-pepper distribution of epiblast and PrE precursors in the ICM at the mid blastocyst stage. Her experiments were the first to visualise the process of PrE formation in time-lapse movies.

She started her independent research group in 2006 at The University of Manchester supported by a Manchester Fellowship. Her lab perfected a strategy by which the potential of embryonic cells can be interrogated generating morula chimaeras via injection strategies. Through this, she has discovered that the epiblast precursors (always described as the most plastic cells within the embryo) exhibit less plasticity than the precursors of the PrE, which have a more restricted fate during later development. She is a passionate communicator and has been involved in a number of initiatives engaging the public and young students with science.

Rita Sousa-Nunes

Rita Sousa-Nunes has a Biochemistry degree from the University of Lisbon and a PhD in Developmental Biology by University College London. As an undergraduate she worked on astrocyte metabolism by nuclear magnetic resonance in the laboratory of Helena Santos (New University of Lisbon). During her PhD she worked on early patterning of vertebrate embryos using mouse and zebrafish models, in the laboratories of Rosa Beddington and Derek Stemple (National Institute for Medical Research).

Her post-doctoral work applied the power of fly genetics to distinct questions in neural stem cell biology: asymmetric division and reactivation from quiescence, respectively in the laboratories of William Chia (King's College, London and Temasek Lifesciences Laboratory, Singapore) and Alex Gould (NIMR). She has obtained various studentships and fellowships and in 2011 won the UCL Neuroscience Domain Early Career Prize in the category of Senior Post-Doc and an MRC Special Award for her work showing that reactivation of *Drosophila* neuroblasts requires both cell-autonomous and non-autonomous amino-acid sensing, a glial relay involving transcriptional upregulation of insulin-like peptides (Ilps), and that systemic and glial Ilps are segregated into functionally isolated compartments.

She started her independent research group in 2012 at the MRC Centre for Developmental Neurobiology, King's College London where she is on a tenure-track position supported by a Cancer Research UK Career Development Fellowship working on mechanisms of neural tumourigenesis. She is a passionate communicator and has been involved in a number of initiatives engaging the public and young students with science.

Tristan Rodríguez

Tristan Rodríguez did his undergraduate degree in Molecular Biology at the University of Manchester. After this he moved to London for his PhD, to work in the laboratory of Paul Burgoyne (National Institute for Medical Research, Mill Hill, London) where he used mouse genetics to investigate the checkpoints that monitor chromosome pairing during meiosis. During his PhD, Tristan became fascinated by how extra-cellular signals are translated into pattern formation.

To pursue these ideas he joined the laboratory of the late Rosa Beddington (MRC National Institute for Medical Research, Mill Hill, London), who was a key figure in establishing the early mouse embryo as a model system to understand cell fate. His work in the Beddington lab sparked a long-standing interest in how the first asymmetries are established during early embryogenesis. In 2003 Tristan was awarded a Lister Institute of Medicine fellowship and moved to the

Alexandra Ashcroft

"As graduate representative, I hope to be able to enhance the student experience of the society...If anyone has any event that they would like to see run at the meetings or any other ideas or concerns that they would like to be addressed by the committee, please contact me."

MRC Clinical Sciences Centre to develop these interests further, where his group initially focussed on studying the signalling centres that initiate anterior patterning in the mouse embryo.

With time, these interests have evolved into trying to understand more global questions regarding the mechanisms that control cell fate decisions and cell survival in the early mammalian embryo. To be able to best purse these ideas Tristan's group moved in 2011 to the National Heart and Lung Institute (Imperial College, London), where he was appointed as a lecturer. His group not only studies how cells exit the pluripotent state and initiate the differentiation program but also tries to unravel how the mechanisms are conserved in the maintenance of tissue homeostasis or miss-regulated in disease.

Alexandra Ashcroft

Alexandra Ashcroft is the new Graduate Representative for 2015-2017. She is PhD stude*nt in* Anne Ferguson-Smith*'s lab* at the University of Cambridge, investigating the disease implications of manipulating the dosage of genes in the Dlk family. Please, read her message here:

I am delighted to be part of the BSDB committee. I hope to apply the skills I learnt as a student representative on an undergraduate student staff liaison committee to fully represent the needs of the society's graduate members.

As graduate representative, I hope to be able to enhance the student experience of the society. The annual spring meeting – a high point in the societal calendar that I encourage all students to attend! – already offers opportunities to form meaningful collaborations, to broaden ones scientific horizons and meet potential (post-doc) supervisors in an informal setting. I would like to expand this repertoire and perhaps organise experimental master-class sessions run by expert post-docs or a "speed-dating" themed networking event to ensure all students have the opportunity to form new connections.

If anyone has any event that they would like to see run at the meetings or any other ideas or concerns that they would like to be addressed by the committee, please contact me. I am available through this email address, the BSDB graduate student facebook group, and the following social media platforms:

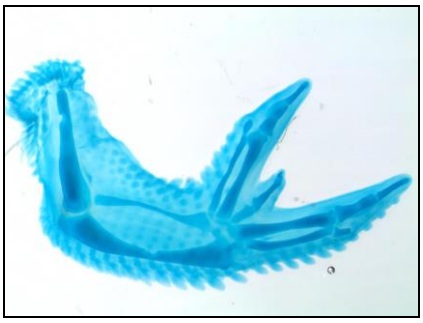
- Twitter
- Linkedin
- Researchgate

The new BSDB Cheryll Tickle Medal

*The BSDB newly introduces the **Cheryll Tickle Medal**, which will be awarded annually to a mid-career, female scientist for her outstanding achievements in the field of Developmental Biology. The BSDB is proud to announce that the inaugural awardee is Abigail Tucker. The medal will be presented at the Spring Meeting 2016 where Abigail will give her Cheryll Tickle Award Lecture.*

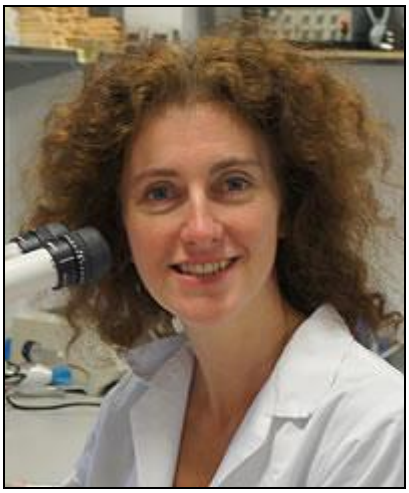
Background & History

The award is named after **Cheryll Tickle** (CBE FRS FRSE Hon FSB), an extremely eminent cell and developmental biologist who used the developing limb bud to explore pattern formation in embryogenesis. After her undergraduate studies at Cambridge and PhD work at Glasgow, she worked as a postdoctoral researcher at Yale University, then as a postdoc in the group of Lewis Wolpert at Middlesex Hospital (later merged into UCL) where she studied the morphogen model of digit patterning. This laid the foundation for her subsequent work on the elusive limb polarising factor, mechanisms of limb outgrowth, FGF signalling, HOX gene regulation and snake limblessness.



While at Middlesex/UCL, she moved up the ranks from lecturer, to reader and eventually to Professor, and shortly after she was elected a Fellow of the Royal Society, an acolade which was awarded the same year she moved to Dundee (1998). Cheryll was the first ever Waddington medal winner (1998) and became the first female Royal Society Foulerton Fellow (2000). Currently Professor Emeritus at the University of Bath, she continues to explore diverse limb projects such as the loss of the pelvic fin in natural populations of sticklebacks as well as ectopic bone formation in wounded war veterans.

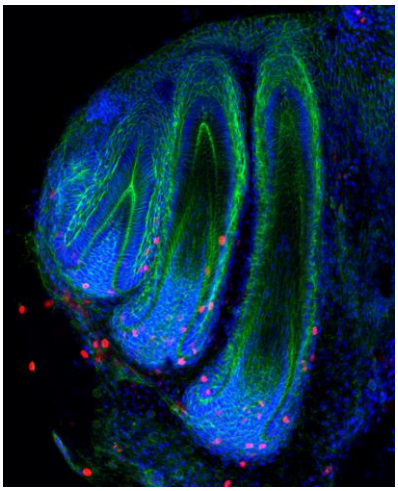
Abigail Tucker



The BSDB is proud to announce the first winner of the Cheryll Tickle Medal, which will be awarded at the 2016 BSDB-BSCB Spring meeting in Warwick to Prof. Abigail Saffron Tucker. Abigail obtained her DPhil from Oxford University in 1996 in the lab of Prof Jonathan Slack. She then worked as a post-doctoral fellow at Guy's Hospital, London, in the labs of Prof Paul Sharpe and Prof Andrew Lumsden. Here she started her interest in embryonic development of the head. She set up her own laboratory as a Wellcome Trust Research Career Development fellow in 1999 in the MRC centre for Developmental Neurobiology at King's. In 2002 she moved to the department of Craniofacial Development within the Dental Institute at King's College London as a Lecturer and was promoted to Senior Lecturer in 2007, Reader in 2012 and Professor in 2015. In 2014, she was selected as a Wellcome Trust Senior Investigator and leads a research team of 11

people, including an impressive number of past and present PhD students. She has three children, Poppy, Imogen and Max.

Abigail's has published over 100 papers on Developmental Biology, many of them in high ranking scientific journals. Her research concerns the development of the head, with particular recent focus on the ear, jaw, teeth and glands, which are all linked during development depending on complex epithelial-mesenchymal interactions. The Tucker group investigates a number of aspects concerning these tissues, including the transcription factors and signalling molecules that control their patterning and shape, their embryonic origins, congenital birth defects relating to them, and how cranial structures undergo repair/regeneration. A further research line of the group investigates how evolution shapes our faces and how Developmental Biology can be used to understand the mechanisms behind evolutionary change. The lab is therefore a host to many different species for study, including snakes, geckos, chameleons, chicks, opossums, and mouse.



Snake teeth

Apart from the Wellcome Trust Senior Investigator Award mentioned before, Abigail has been selected for KCL's "Supervisory Excellence Award" in 2011, the Anatomical Society's "Fellow of the Year" Award in 2014, the "BSDB Cheryl Tickle Medal" in 2016 and shortlisted for the "King's Public Engagement Award" in 2015. She acts as an editor for the Journal of Anatomy and Developmental Dynamics, is a council member for the Anatomical Society, a member of KCL's Life Sciences Museum management board, sits on the Public engagement committee of the Royal Society of Biology, and is director of postgraduate research at KCL's Dental Institute. Besides these many scientific and administrative roles, Abigail even finds time for successful public engagement activities including the "Science uncovered evening" at the Natural History museum, the "Summer Science Exhibition" of the Royal Society, the "Cheltenham Science Festival", giving career talks in schools and providing work experience placements, as well as contributions to broadcasted programmes, such as "Easter Eggs Live" (Channel 4, 2013) and "Your Inner Fish: an Evolution Story" (BBC4, 2015). Read here some of Abigail's views concerning important questions concerning our field and its future.

Which are the important questions in Developmental Biology?

I love developmental biology, how you can generate a complex structure, such as the head, by combining tissues of different origin and ending up with a coordinated structure. Although we know lots about the development of many structures, there are always more questions being generated. At the moment there is a wave of research trying to understand how gene expression changes result in cellular changes that physically shape tissues and organs. We can say that a mutation in a specific gene causes a developmental defect, such as a cleft palate, but we still don't always know how that genetic change leads to a cellular change. At the moment we are used to saying, oh that happens due to proliferation or cell death, but now people are starting to look at such cell behaviours much more closely. Personally, I find there are lots of very understudied organs/tissues/processes just waiting to be investigated. I have just started working on the external ear, which has a fabulously complex morphogenesis, but hardly anything is known about it.

Will Developmental Biology remain an important discipline that young researchers should aspire to?

I really hope so. It is a fascinating area and one that the general public are also really interested in. An understanding of Developmental Biology is also essential for understanding cell fate decisions, which is a key part of repair and regenerative biology. From an evolutionary point of view Developmental Biology is also important to provide possible mechanisms whereby evolutionary change can be generated. I have read quite a few papers where proposed mechanisms for evolution of a new structure didn't make any sense, as the writer didn't have a good knowledge of how structures normally form during development. From a clinical point of view you can really understand anatomy if you understand how tissues form in the first place.

Which were the key events or experiences in your life that influenced your career decisions and paved your path to success?

I have been lucky in that I always wanted to be a scientist. At the age of eleven I wrote that in 10 years time I would be starting a PhD in biology and I was, although I must admit I thought I would be travelling the world researching primates in exotic locations rather than working in a lab! At University I took a course in Developmental Biology and was hooked. At the time many great names in developmental biology were at the Oxford Developmental Biology Unit: Jonathan Slack, David Ish-Horowicz, Julian Lewis, Phil Ingham, Chris Graham to name a few. I was very lucky to arrive there at that time and it drove me to a PhD and my future career. I have also been lucky to have some really supportive supervisors and mentors over the years, which is essential, particularly while having career breaks and going part time.

What advice do you give young researchers towards a successful career?

I have really benefitted from trying different model organisms throughout my career. I moved from Xenopus *to mouse to chick during my PhD and postdocs, which meant I can now use aspects of all these models to answer questions. It's given me a much broader understanding of developmental biology and lots of flexibility. When moving to an independent career I think it's important to come up with some real key questions you want to answer in an area you can make your own. Look out for the quirky and take advantage of new technologies but also read the old papers (some very old) as they are often a real font of forgotten information.*

A Proposal to Promote Developmental Biologists

At the last meeting in Warwick I suggested during the AGM that the BSDB (the society as a whole, but obviously this needs to be endorsed and actively driven by the committee) should take a more proactive role in ensuring that our most deserving developmental biology colleagues are put forward for major prizes (all the way up to the Nobel! but also some suitable for more "normal" colleagues including junior investigators), named lectures, election to major learned academies (eg Royal Society, Academy of Medical Sciences, etc. in the UK, multi-national ones like EMBO, Academia Europaea, and/or similar academies abroad if appropriate for the person). I do know that the field is currently rather under-represented on certain committees at the moment and this inevitably leads to a reduction of panel members in that discipline being appointed to select the next set of candidates - in turn this generates a downwards spiral which can damage the whole discipline very badly.

It would be good if the committee could:

(a) draw up a list of suitable prizes, prize lectures and major academies that appoint fellows by election and

(b) consider names of top/overlooked individuals for proposing to these (usually requiring one or more members of the academy in question to propose, so This needs a parallel list to (a) above of individuals and what they have received to date).

Once this is started, it would require very little effort to keep up, giving it a few minutes at each meeting, and by reminding both committee members and ordinary society members to propose their colleagues (or perhaps themselves if they feel that they should have been proposed). One mechanism for this could involve creating a new (sub)-committee for prizes and elections who would report to the main committee at each of those meetings?

This would be an opportunity to promote equality (women, minorities and everything else) and also more junior colleagues at an appropriate stage of their careers, to get out of perceptions of "clubiness" in these elections and making it a more open process, and especially to ensure that there is a constant stream of really good developmental biologists being proposed, and then getting, these prizes and elections to further our discipline. As such I think this would be a very important activity for the BSDB to fulfil.

Best wishes, *Claudio*

The BSDB committee has responded to this proposal and decided to put together a list of potential prizes, dates and principal procedures and links to respective sites. These will be online soon.

Gurdon/The Company of Biologists Summer Studentships

In 2014, the British Society of Developmental Biology (BSDB) has initiated the Gurdon/The Company of Biologists Summer Studentship program providing highly motivated students with exceptional qualities and a strong interest in Developmental Biology an opportunity to engage in practical research. Each year, 10 successful applicants spend 8 weeks in the research laboratories of their choices. The awardees of 2015 were: Emma MI (*Cambridge University; host: J Gurdon, Cambridge*) ● Oliver DAVIS (*Brighton and Sussex Medical School; host: JP Vincent, Crick Institute*) ● Anna KLUCNIKA (*Cambridge University; host: Aziz Aboobaker, Oxford*) ● Julia OH (*Edinburgh University; host: Megan Davey, Edinburgh*) ● Ortlaith MANNION (*Natl Univ Ireland Galway; host: Maura Grealy, Galway*) ● Rachel WANG (*Univ College London; host: Yanlan Mao, UCL*) ● Joe WATKINS (*University of Birmingham; host: Yun Fan, Birmingham*) ● Samantha COOPER (*Cambridge University; host: Daniel St Johnston, Cambridge*) ● Arun SHAUNAK (*Cambridge University; host: Jose Silva, Cambridge*) ● Isabella WATTS (*Oxford University; host: Tatjana Sauka-Spengler, Oxford*). Read below four reports *(first published on The Node)* describing the experiences the successful candidates made during their projects.

Oliver Davis: Dying for a pattern

This summer, I had the glorious opportunity of undertaking a BSDB funded research project in the laboratory of **Jean-Paul Vincent** at the Francis Crick Institute in Mill Hill, London. My project took place under the patient and inspiring tutelage of one of his PhD students, Sam Crossman. Our project investigated the mechanism of apoptosis in the model organism *Drosophila melanogaster*. Apoptosis is a form of programmed cell death and is an important process in the development of all multi-cellular organisms. Understanding why cells die in certain situations and not in others is of relevance to many areas of health, including embryological disorders and cancer, and my overall research aim was to investigate the role of apoptosis in the developing fly embryo. To do this, I worked with strains carrying mutations in genes required for patterning the anterior-posterior axis. Mutation of these so-called patterning genes can trigger extensive apoptosis in the embryonic epidermis (figure. 1) and therefore provides a useful model to investigate the apoptotic machinery in *Drosophila*.

The cause of the ectopic apoptosis observed in patterning mutant embryos is not fully understood. One previously suggested explanation is that the cells of the epidermis can sense their ability to adopt the correct fate and undergo apoptosis if they lack the required patterning inputs to do so (Werz *et al*, 2005). However, if this were the case, there would have to exist an unknown machinery that would allow individuals cells to detect patterning errors and initiate apoptosis as a result.

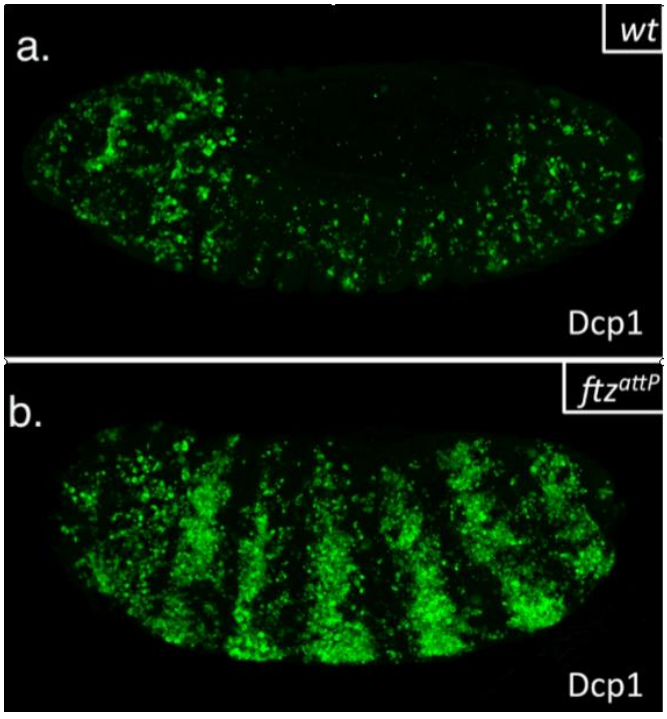


Figure 1: *Increased apoptosis is observed upon the mutation of many patterning genes. Minimal cell death is observed when wild type embryos are stained with the apoptotic marker cleaved-Dcp1 (a), whilst embryos mutant for the patterning gene* fushi tarazu *(ftz) have increased apoptosis (b).*

In order to determine if cells are truly capable of detecting patterning errors, I planned to use a light

inducible form of Cre recombinase to clonally remove a lox flanked allele of the *ftz* gene in a small subset of cells within each segment. If these small clones survive in an otherwise wild type embryo, it would argue against a cell-autonomous system where individual cells monitor their ability to differentiate correctly and would suggest that an alternative mechanism could be in play.

One difficulty with this plan is that *ftz* is activated very early on in embryogenesis. As a result, I set out to generate an early acting form of Cre, which could be used to remove *ftz* before it has carried out its function. To achieve this I spent the first part of my project cloning the Cre enzyme into a plasmid containing the *actin* promoter. As *actin* is an important protein in every cell, it is expressed from very early stages of embryogenesis. As a result, we hoped that by using the *actin* promoter to drive expression of Cre, we could produce the enzyme early enough to remove our lox flanked *ftz* allele in a timely manner and create mutant cells.

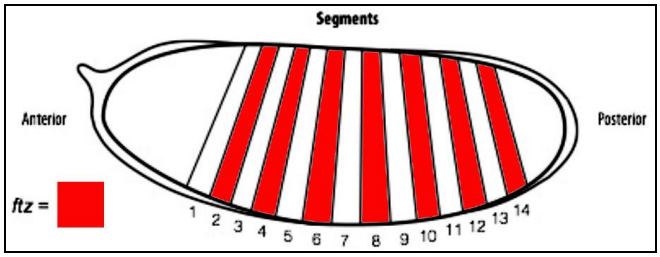


Figure 2. *A diagram of a Drosophila embryo with 14 segments subdividing its anterior-posterior axis, which is achieved through the expression of patterning genes.*

Unfortunately, cloning proved frustrating. Fortunately, it also proved educational. I learnt a lot about the way that experiments work, and how progress in science is more staccato than smooth. One issue I faced was the purification of my final plasmid using an Invitrogen maxiprep column. Each time I purified the plasmid I ended up with a lower yield than required, as I needed enough DNA to send to a company that would use it to generate a transgenic fly. I adjusted a parameter each time, but in the end it may have just been a plasmid with a low copy number as during my last attempt I purified it from a much larger bacterial culture, which finally gave me a sufficient amount of DNA.

The second part of my project was spent optimising a fluorescent *in-situ* hybridisation (FISH) protocol. I planned to use FISH to label cells expressing the pro-apoptotic gene *hid* in a series of patterning mutant embryos to characterise the regions where cell death occurs. As a control, I first conducted the protocol with a probe against the segment polarity gene *wingless*, which is expressed in a row of cells in every segment. This probe was made by someone else in the lab and is known to work, so I used it to learn the steps of the *in-situ* protocol.

My FISH experiments with the *wingless* probe worked like a treat (figure 3), but difficulties soon followed when I attempted to make a new probe to label cells expressing *hid*. The stainings I conducted with the *hid* probe I had made repeatedly failed to work, and every attempt to generate a new probe proved unsuccessful. Disappointingly, I reached the end of my project before I managed to develop a protocol that worked, but I at least learnt plenty of science along the way!

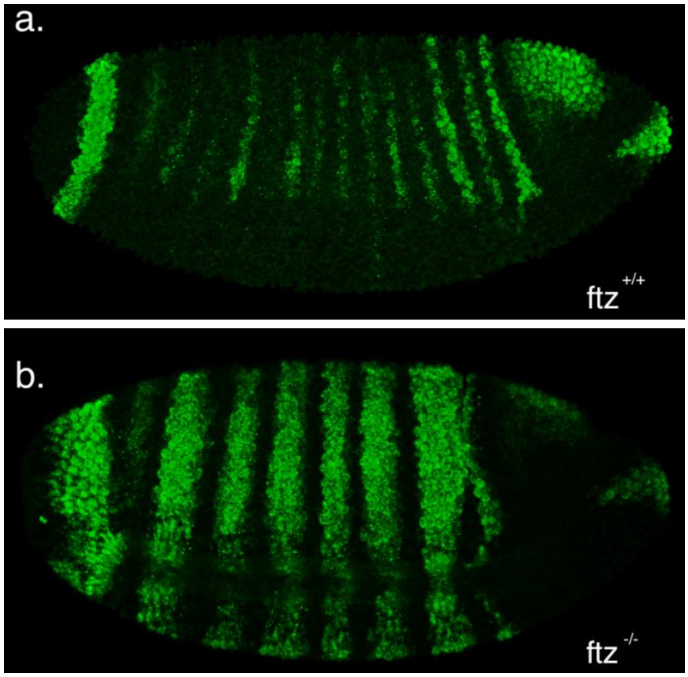


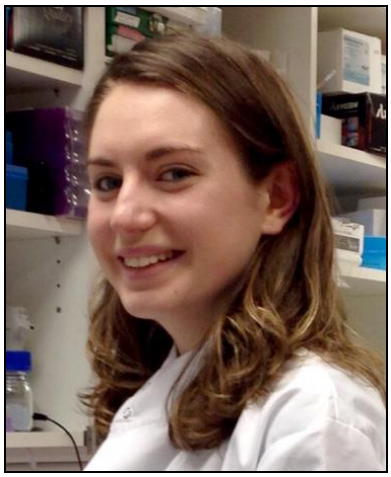
Figure 3: *Fluorescent in-situ images of wild and mutant ftz embryos using a wingless probe. a) a wild-type embryo with fourteen stripes; b) a mutant ftz embryo with seven stripes.*

My time in J.P.'s lab has been great for a number of reasons. I've come to love the problem solving nature of science and the freedom you get to explore what really interests you. It really is an adventure! However, I've also realised how difficult a career in science can be. Whilst this project has inspired me to become a scientist, I wonder if there's a route into academia that would better suit my background as a medical student and my wider interests in medicine.

Sources

(1) Werz C, Lee TV, Lee PL, Lackey M, Bolduc C, Stein DS, Bergman A. Mis-specified cells die by an active gene-directed process, and inhibition of this death results in cell fate transformation in Drosophila*. Development, 2005. 132(24): p. 5343-5352.*

Isabella Watts: A transcriptional analysis of the innate immune response to melanoma: the promise of the zebrafish



This summer I was privileged enough to receive a Gurdon Summer Studentship to work for 8 weeks in the laboratory of Tatjana Sauka-Spengler, at the Weatherall Institute of Molecular medicine. About to go into my third year of studying medicine at Oxford, I have spent the majority of the first two years of my degree learning about the science that underpins medicine. All our lecturers highlight the importance of understanding the scientific evidence that underlies the concepts that we learn. However, no matter how much time you spend trawling through the depths of PubMed to find a new and exciting paper for an essay, it's not the same as getting hands on experience in a laboratory and learning about different scientific techniques.

My project involved helping my supervisor Amy Kenyon with the final steps of her PhD. Amy had generated a transgenic zebrafish model to study the innate immune response under conditions of inflammation, including tuberculosis and melanoma. This model system harnesses developmental biology and basic science to provide an invaluable tool to better understand the mechanisms of different disease states.

I was mainly focussing on the innate immune response to melanoma, which is an incredibly exciting area of research as macrophages and neutrophils form a major part of the tumour microenvironment. These cells have diverse roles in tumours and can both destroy transformed cells and also contribute to tumour development. However, it has proven difficult to fully examine the interactions of these cells and transformed cells *in vivo* due to limitations in current model systems. Amy developed a unique model system, pioneered *in vivo* by the Sauka-Spengler laboratory, which allows isolation of specific cell types and cellular compartments directly from the organism, via a genetically encoded, tissue-specific biotin tagging system.

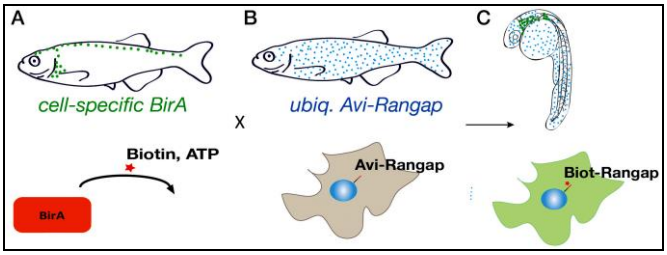


***Fig. 1**. A genetically encoded, tissue-specific biotin tagging system.*

The system involves fish that ubiquitously express the nuclear envelope-associated protein Rangap fused to an Avi-tag (Avi-Rangap). These have then been crossed with a separate transgenic line where *E.coli* biotin ligase (BirA) is selectively expressed under control of the *mpeg* or *mpo* promoter which are specifically active in macrophages or neutrophils, respectively. Therefore, in the macrophages or neutrophils, biotin is covalently added to the Avi-tag Rangap protein, resulting in the 'biotinylation' and tagging of the nuclei of these cells, which can then be isolated using highly stringent streptavidin-biotin affinity purification protocol.

To generate an inducible melanoma model, another binary system of transgenic fish has been used. In the driver line, the bacterial LexPR repressor is fused to a truncated form of the human progesterone receptor, all under the control of a melanocyte specific promoter. The effector line harbours the Lex Operon, controlling the expression of a Ras-oncogene fused to an mCherry fluorescent reporter. When the synthetic steroid mifepristone is added to the water of embryos carrying both alleles, it binds to the LexPR transactivator which, in turn, binds to the Lex Operon region and drives expression of Ras-oncogene specifically in melanocytes, resulting in their transformation and proliferation.

From the very first day of my project I learned a huge amount, and the learning curve was definitely vertical at times! I was incredibly lucky to be working on a very broad topic which meant that I was able to try my hand at a huge number of different techniques.

Some of the earliest work I did involved confirmation of the different model lines I was using. In my first experiment, I wanted to check whether the melanoma model we were using effectively mimicked the cancer over-proliferation phenotype. In the zebrafish embryo melanocytes

are usually post-mitotic at 60 hours post fertilisation, thus I wanted to confirm that induction of our cancer system resulted in continued cell proliferation past this point. We injected EdU, a thymidine analogue incorporated into the DNA of dividing cells, into the pericardium of day 4 embryos, in order to label proliferating cells. Upon imaging we saw that, in fish where the LexPR system was activated, there was continued proliferation of melanocytes whilst in control fish there was no overlap between the melanocytes and the stain that labelled the dividing cells.

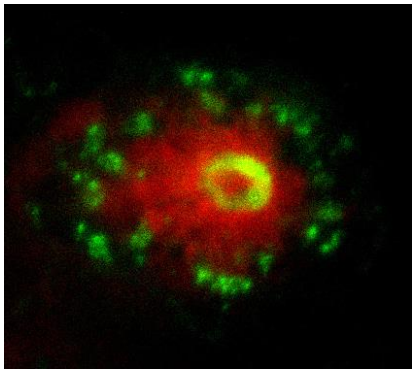


Fig. 2. *This image shows the early interaction between the neutrophils (green) and a transformed melanocyte (red).*

In the next step of my project I made use of the transparency of the early zebrafish embryo to image the live interaction between the neutrophils, macrophages and transformed melanocytes (Fig. 2). The final step of my project was a transcriptional analysis of the interactions between the innate immune cells and tumour cells. Collecting day 5 embryos where we had induced the oncogenic transformation in melanocytes, we selectively isolated the nuclei of macrophages and neutrophils from the fish using the streptavidin-biotin affinity purification previously mentioned. Whilst incredibly rewarding, this did involve spending entire days in the cold room, and I got a lot of strange looks as I carried 3 jumpers into work in the blazing sun and even drank hot chocolate in the institute's cafeteria on the hottest day of the year! After isolating the RNA from the nuclei and making cDNA libraries, the data was sent off for sequencing and we were able to see which genes were up- and down-regulated in these cells in response to the cancer.

Looking back at my time in the lab I can't quite believe how much I have learned! I have had an amazing time and every week has been packed with new things. I loved getting to learn more about the processes involved in laboratory science and I have been convinced that in the future I want to combine both clinical work and research. This has been a very valuable experience and I would really encourage other university students to apply for a **Gurdon/The Company of Biologists Summer Studentship**. I also want to say a huge thank you to everyone in my lab, especially Tatjana and Amy for making my summer so interesting!

Anna Klucnika: Immortal worms

The Gurdon Summer Studentship has allowed me to undertake a fascinating summer project in the laboratory of Aziz Aboobaker in Oxford, working with the planarian *Schmidtea mediterranea*, an exciting model for stem cells, ageing and cancer[1]. These flatworms have the capacity to regenerate completely from the smallest fragment from almost any body part, owing to the widespread abundance of neoblasts in their mesenchyme. Neoblasts, or at least a subset, have been demonstrated to be pluripotent by single cell injection into lethally irradiated worms resulting in complete rescue[2].

Since vertebrates do not have adult stem cells that are pluripotent, planarians provide a unique opportunity to study the mechanisms of stem cell maintenance, induction of differentiation, whole body regeneration, as well cancer related stem cell behaviour.

An interesting feature of neoblasts is the presence of chromatoid bodies, which strikingly resemble germ granules found in germ cells across metazoa. These are electron dense structures made up of RNPs involved in posttranslational gene regulation in the germline. Chromatoid bodies and germ granules contain many homologous proteins, which suggests a conserved germline multipotency program[3]. Except for Nanos, neoblasts express most germ line specific genes, such as homologues to Bruli, Piwi, and Tudor, and RNAi depletion of these proteins blocks regeneration and indicates involvement in neoblast maintenance and differentiation[4].

Does Tudor reign over pluripotency?

The focus of my project was on the Tudor homologue in *S.mediterranea*, *Smedtud-1*. RNAi in a related species, *S. polychroa,* results in neoblast depletion, indicating a role in long-term neoblast maintenance[5]. From studies in other organisms we know that the Tudor domains of Tudor bind symmetrically dimethylated arginines of Piwi proteins and glycolytic enzymes in the germ granules[6,7]. These studies and knockdowns indicate that Tudor is involved in piRNA synthesis required for gametogenesis and stem cell maintenance. The role that Tudor may have as a pluripotency factor made me keen to investigate this mysterious protein.

What makes the picture even more interesting is that RNP granules are also found in planarian neurons and *Smedtud-1* is expressed in the CNS as well as in germ cells and neoblasts[8,9]. However it is not known in which specific neurons Tudor is expressed or when Tudor expression is switched on and/or off.

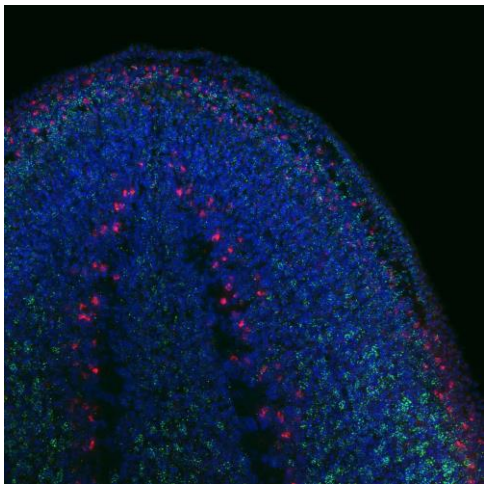
Elucidating the Tudor lineage

I wanted to find out what is the pattern of Tudor expression in stem cell progeny as they differentiate into neurons. To do this I carried out fluorescence in situ hybridization (FISH) for several markers (*tudor, coe, th, tph, ChAT*) to visualize their expression on top of an immunostain for Tudor protein.

Coe is a marker for neural progenitors and neurons and so I synthesised antisense probes to detect *coe* to see whether Tudor is co-expressed continuously throughout the neuronal lineage or not.

To establish where in the CNS Tudor is expressed, various markers for specific neuronal subtypes were used- *th* for dopaminergic, *tph* for serotonergic and *ChAT* for cholinergic neurons. Anish, a DPhil student, was thus able to help me show that Tudor protein is not expressed, for example, in dopaminergic neurons but in proximal neurons.

To find out whether the expression pattern of the transcript matches that of Tudor protein. I used the genome data available to clone *Smedtud-1* to synthesise antisense probes that I used for FISH jointly with immunostaining for the protein using the Tudor antibody.



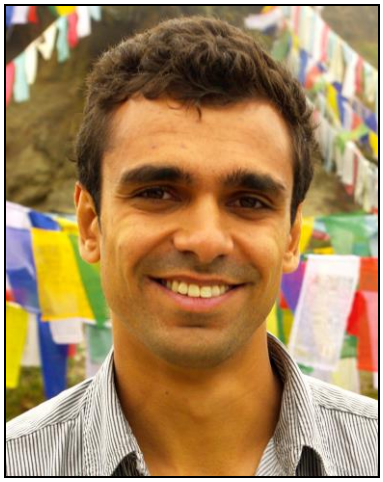
FISH and immunohistochemical staining showing the expression of a domapinergic neuron marker in (red), Tudor (green) and nuclei (blue). Courtesy of Anish Dattani.

Although I wasn't able to collect all of my data in the short time that I was in the lab, I've achieved so much. I've learnt how to cut worms, microinject, clone genes, synthesise probes and carry out immuno and in situ protocols. I've learnt to always ask when in doubt. I've learnt to be scrupulous. I've learnt that it can be very frustrating when experiments don't work out as planned and when time runs out. But those little setbacks showed me just how determined I am to do science.

The Aboobaker lab was extremely welcoming and supportive. Thank you to Aziz, Natasha, Dani, Nobu, Prasad, Anish, Sounak, Yuli, Sam, Damian, Alvina, Holly, Ben and Alex.

Aran Shaunak: What every potential academic needs to learn about science

Arun studies at Cambridge University and was hosted in summer 2015 by Jose Silva at the Cambridge Stem Cell Institute. During his project, entitled ***"The molecular mechanisms of Oct4"****, Arun aimed to create new cell lines for the study of Oct4 and optimise a protocol for P-STAT3 western blots to test its functional involvement. Arun's report does not focus on the actual project but rather presents an entertaining opinion piece about the emotional roller coaster of his project, which provides good insights into the realities of laboratory life*.



Six days into my first real taste of scientific academia, I found myself in the tissue culture room at 9.15 on a Saturday morning. I had been the willing recipient of my own batch of stem cells, which I was charged with growing up, looking after and eventually experimenting upon to *hopefully* provide data of some use to my PhD supervisor. Excited to be flying solo already, my cell line was given the 5 star treatment.

Apparently stem cells are so demanding to grow that they often require feeding every day once their flask is well populated, meaning that I had no choice but to come in on my supposed weekend to give them their meal of serum and LIF. And so initially I was thoroughly disillusioned with the glamorous cutting-edge-of-science academic lifestyle which seems to be the usual interpretation of "I work in a stem cell lab"; to me, it just seemed like I had unsuspectingly taken on millions of pets that were higher maintenance than my ex-girlfriend and more productive than teenage rabbits.

However, everything changed over the course of the next week. Working closely with my supervisor, a time-course experiment done on those very cells which had consumed my weekend resulted in the production of a gel and a western blot. The lab were sceptical; people had spent months attempting to get out a clean western for the protein we were looking at, all to no avail, hence why a large part of my 6 week project was expected to be taken up with western after western after western. But lo and behold, a protocol based on 'estimated' dilutions and getting bored before the timer went off produced a near-perfect western blot – a testament to the experience of my supervisor. Furthermore, there was actually an interesting result there too, one which we had hoped to see (although, obviously, no-one believed it until we could show them the loading control – as a born and bred cynic I feel science may be the perfect career path after all).

Thus the majority of my planned placement was completed in the first 10 days. And as I fed my cells *yet again* I realised something had changed. It wasn't a chore to change their media, or passage them into a new flask to give them room to grow. I wanted to freeze down stocks, so that if disaster struck I wouldn't lose them. The result of our experiment had both given me a taste of the success that an academic feels when they finally look down the microscope and see that they were right all along, and earned me the respect of my older, more experienced colleagues. And I have come to realise that I had attributed some of that success to the cells themselves; that they had earned the time and trouble it took me to look after them.

Real life hit like a hammer in the second half of my placement, when a year's worth of work disintegrated in front of my supervisor's eyes, nearly forcing us to resort to the emergency gin tucked away in the second drawer. Cloning experiments that were going beautifully suddenly collapsed and we were forced to begin again from scratch. I finally felt the disappointment that comes from unexplained failure, and found true respect for the resilience of your average Joe PhD; after a day, week, month or year of two-steps-forward-one-step-back, they still come into the lab with the idea that *just maybe* today is the day for a breakthrough. But I also felt the pride that comes with success; a week of western blot optimization resulted in the development of a protocol that my lab will use in order to quantify levels of pSTAT3 in stem cell experiments, something that had previously been impossible to reliably achieve.

However, it seems to me that my first ever cell line was responsible for my fundamental change of opinion on academic life. I realised that scientists don't spend weekends in the lab and nights with a pad of paper by their bed because they have to. The life isn't as glamorous as it sounds: stem cells may not be growing people new kidneys in time for Christmas this year. We do it because the cells become yours, and you care about them ; your results become your badge of honour, and you show them off with pride; and most importantly, you absolutely, definitely will find out how Oct4 functions on a molecular level, and you're damn well going to do it before anyone else.

Aran Shaunak

Royal Society of Biology Membership

At the beginning of 2016, the BSDB will become a full member of the Royal Society of Biology to interlink with a significant network of 100 organisations around the life sciences and 16,000 individual members (approximately 90% of whom based in the UK) including senior scientists from industry and academia, hands-on scientists working in a wide range of environments, lecturers, teachers, students of all ages and interested members of the public. Full member organisations receive a range of benefits, designed to help increasing their profile and promoting their services including:

- Opportunities to help formulate the UK's position with respect to the biological sciences. We create policy task forces, which meet to discuss and formulate responses to Government and other consultations. MOs are invited to take part in these meetings, and contribute to the response, which is submitted on behalf of all RSB members
- Membership of the Society's Special Interest Groups and partnerships, including the Animal Science Group, UK Plant Sciences Federation and the Natural Capital Initiative
- Invitations to Parliamentary events
- 50% discount for advertising on the jobs board
- Discounted rates on general Society advertising
- Promotional opportunities publicising events and services within the monthly e-newsletters and on the RSB website
- 25% discounted rate on a wide range of courses, workshops and training events
- Free course approval for CPD purposes
- Members' e-bulletin as monthly new email
- Discounted room hire at Charles Darwin House – the RSB's central London head office
- Invitations to attend MO and other networking meetings
- 50% discount for all members and staff to join the Society for their first two years