Review of Wellcome Trust PhD Research Training

The Student Perspective

The Wellcome Trust

Acknowledgements

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Copies of this report can be obtained on request from the Trust's Marketing Department (Tel: 020 7611 8651; Fax: 020 7611 8545; E-mail: marketing@wellcome.ac.uk) or from the Trust's website (www.wellcome.ac.uk/publications). Correspondence concerning scientific or academic issues arising from the report should be addressed to Dr P M Chisholm, Scientific Programme Manager, Career Development Section, Wellcome Trust, 183 Euston Road London NW1 2BE.

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Review of Wellcome Trust
PhD Research Training

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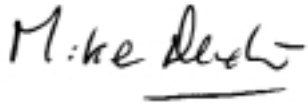
Preface

The Wellcome Trust has a portfolio of personal award schemes which support individuals from the earliest stage of a research career to professorial level. The Trust recognizes the crucial importance of the type and quality of first postgraduate research training, the PhD, in providing students with an excellent grounding in the intellectual basis of scientific research endeavour as well as with the practical research skills which will equip them for a career in research. The Trust has provided formal PhD studentship schemes since 1986 and since then has maintained a diverse range of studentship awards. However, there are generic features common to all its studentships which ensure that Trust-funded students receive adequate personal financial support and are placed in excellent well-funded research laboratories where they receive high-quality research training and scientific and academic mentoring.

The Trust attaches considerable importance to assessing the outcome of its various personal support schemes and in monitoring the subsequent careers of the individuals it funds through them. This report on the opinions of current Trust-funded PhD students and its companion report on the careers of a cohort of past Trust-funded students are the first of what is anticipated will be a series of reports. This report presents the results of an opinion survey of current Trust students on many aspects of their PhD experience and is therefore a contemporary snapshot of life for today's postgraduate research students. The report on the career outcomes of Trust-funded students traced a group of Trust students who held Prize Studentships between 1988 and 1993 and provides important base-line information against which more recent, and future, groups of Trust-funded students can be compared.

The two reports have provided important information for the Trust which will inform its internal policy-making processes, but it is hoped that these findings will also be of interest to a wider academic audience.



Dr T Michael Dexter FRS
Director, The Wellcome Trust
March 2000

Executive summary

The purpose of this study was to explore the experience and expectations of current Wellcome Trust-funded PhD students receiving training on either the new four-year PhD training programmes or via the more traditional three-year studentships. This was done through both in-depth interviews and from final-year student questionnaires. The study's findings will constitute part of a wider review of Wellcome Trust PhD training programmes, which will include an opinion survey of academic supervisors of Trust-funded PhD students as well as analyses of the subsequent career progress of past Trust students.

In-depth interviews were held between October 1998 and February 1999 with 45 current Trust-funded students on either three-year Prize Studentships or Four-year PhD Programmes, and at various stages of their PhD training. In addition, the results of a questionnaire survey of 146 final-year Trust students carried out in July 1998 and July 1999 were mapped, as appropriate, onto the findings of the more qualitative survey.

Key findings

- The Trust's Four-year PhD Programmes were welcomed by many students as an opportunity to gain valuable additional research training and experience. There was, however, little evidence to suggest that every student would prefer to follow such a programme. For students on three-year studentships who were sure of the PhD project they wanted to pursue, who had previous laboratory experience, or who were older, there was a clear preference for a three-year programme.
- Students were generally content with the PhD training they received. Holders of three-year studentships were more likely to have had laboratory experience prior to starting their PhD, and felt they required less training before beginning their PhD research project. In the Four-year PhD Programmes, students appreciated the opportunity to learn a range of laboratory research skills in the first year, although some programmes were criticized for providing too broad a research training.
- Students were generally happy with their academic supervision, although accessibility to supervisors was a problem for some students. Students felt that more care should be taken in the allocation of students to supervisors and in the assessment of supervisor performance.
- Freedom of project choice was an extremely important issue for the students on Four-year PhD Programmes and it was important to them to be given a wide choice of projects. There was considerable competition in some Programmes for places in the most popular laboratories and this may become a more widespread problem as the Programmes recruit more students.
- Over half of students on three-year studentships expected to submit their PhD thesis within the period of their Trust award. Students on Four-year PhD Programmes were more confident that they would be able to complete on time and, in some institutions, were under considerably greater pressure to do so than were their contemporaries on three-year studentships.

- The generous stipend provided by the Trust was very important to the students and they were appreciative of it. However, the difference between Trust stipends and salaries and those provided by other research bodies, plus the animosity it occasionally caused between students, was a cause for concern. In addition, Trust-funded students were also very aware that they would be required, in effect, to take a pay cut if their first postdoctoral position was not Trust funded.
- The reasons for doing a PhD were wide-ranging but, for the majority, obtaining a PhD was seen as a logical and necessary step in the path to a career in research.
- In the in-depth survey, only half the students thought they would continue to postdoctoral research work immediately after their PhD and more than one-third of students on Four-year PhD Programmes were fairly sure that they would not remain in any area of scientific research. Of the students who completed the final-year student questionnaire, just over two-thirds thought they would follow a career in scientific research, although not necessarily in the academic sector.
- The Trust's Science Communication Course was well received by students. However, a significant number of students were not convinced of the value of this kind of course. Students were often more preoccupied with their own research, and attached little importance to the need to communicate their science to a wider audience. In contrast, however, the overwhelming majority of students on both three-year studentships and Four-year PhD Programmes thought that additional training in scientific writing and presentation skills should be incorporated into their PhD training programmes.

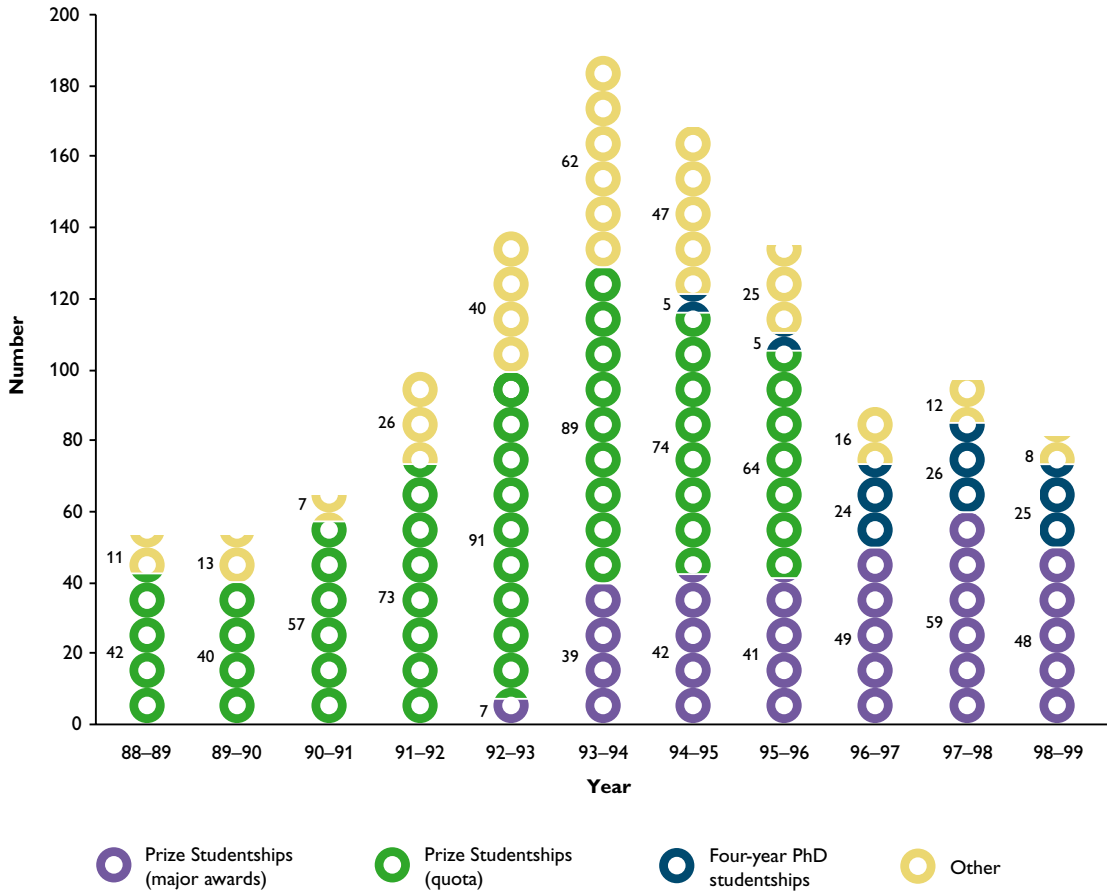
one Introduction

Introduction

The Wellcome Trust has a remit to fund biomedical research that will lead to improvements in human and animal health. Excellent research depends on the combination of excellent research facilities and a high-quality, well-trained research workforce. Provision of PhD research training is therefore an important part of the Trust's funding and career support portfolio.

During the decade 1988 to 1998, the Trust provided PhD research training support for just over 1100 PhD students **(Figure 1.1)**. The great majority of studentships were provided through the Trust's Prize Studentship scheme which provided three year awards either as a quota allocation to selected universities (discontinued during 1992–1995) or to individuals already in receipt of Trust major research grant funding awards. Much smaller numbers were allocated through subject-specific Trust schemes such as biodiversity, veterinary research, toxicology and mathematical biology. Since 1994 increasing numbers of students have been recruited to Trust Four-year Programmes which are currently based in five selected universities. Over the five-year period, from 1998 to 2003, due to the planned increase in the numbers of Four-year PhD Programmes, similar numbers of students will receive PhD training through these Programmes as through the Trust's more traditional three-year studentship schemes.

Figure 1.1 **Wellcome Trust PhD studentships (academic year start date 1988/89–98/99)**



In July 1998 and 1999, a total of 146 final-year Trust students completed a questionnaire three months before their Trust award was due to finish in which they provided details about their future plans and opinions about the PhD research training they had received. During the autumn of 1998 and the spring of 1999, a smaller group of 45 students, at various stages of their PhD training on either three-year Prize Studentships or on Four-year PhD Programmes, took part in a much more detailed in-depth survey of their views on a number of aspects of their postgraduate experience.

The purpose of these surveys was to obtain detailed information on the perceptions of the students on a number of issues, and to compare the views of students on traditional three-year programmes with students enrolled on the more recently introduced Four-year PhD Programmes. The Trust recognizes that the quality of the first postgraduate research training years is a crucial factor in determining whether or not an individual elects to embark on, and remain in, a research career. The views of students on the quality of their PhD training are therefore of considerable importance.

This report focuses firmly on the students and their opinions. All the students who took part were questioned during the period of their Trust award, in either their first, second, third or final year. All had been provided with a Trust stipend equivalent to the salary, after tax, of graduate research assistants of comparable age and experience. All had been placed, for their full (three-year) research project in host laboratories which were already in receipt of substantial research grant funding – either from the Trust or from other sources – and which also contained researchers with previous experience of PhD student supervision. The host laboratories had been provided with either a substantial or a full-cost contribution towards the costs of the students' research projects.

two Aims and methods

Aims and methods

The purpose of this evaluation was to identify the strengths and weaknesses of the Trust's three-year studentships and Four-year PhD Programmes from a student perspective and, to compare students' perceptions of the relative merits of the two kinds of programme. Two quite different groups of students were involved in the two surveys, but many of the same issues were explored with each group and, taken together, the findings reflect the opinions of a large number of students on a number of key issues.

2.1 In-depth survey

In 1997, Trust staff held meetings with the Directors and other academic staff of each of the Four-year PhD Programmes and met students who were at that time in their first or second year. The students were asked about their motivation for applying to a Four-year Programme and about their perceptions of the particular value provided by the additional first year. The more detailed evaluation presented here builds on issues raised by the students in 1997 and sought to compare their experiences with those of students on three-year studentships at similar stages.

The evaluation survey was designed and carried out by staff from the Trust's Policy Unit, which is not directly involved in the Trust's funding decisions. It was emphasized to the participating students that all comments and responses would be treated in confidence and that the results would be published in anonymous form. Most of the students approached were pleased to be involved and were on the whole happy to put forward their views.

A semi-structured protocol was developed and adapted for telephone and face-to-face interviews (see a short version of the protocol in Appendix A). An introductory letter, explaining the purpose and nature of the evaluation, was sent to the students and their academic supervisors or sponsors. Telephone and face-to-face interviews were carried out between October 1998 and February 1999.

The sample of current Trust-funded students was chosen on the basis of their year of study, and whether or not they were embarked on a three-year studentship or Four-year PhD Programme. All the three-year students were Prize Students and this group did not include students recruited as part of any of the Trust's other, subject-specific, PhD schemes. Some students on Prize Studentships were from academic institutions also host to Trust Four-year PhD Programmes.

Visits were made by Policy Unit staff to all five universities host to the Four-year PhD Programmes. Face-to-face interviews were carried out with students in their second or final year. Telephone interviews were carried out with students not interviewed in person. In total 30 face-to-face interviews and 15 telephone interviews were carried out. **Figure 2.1** and **Table 2.1** provide summary data on the student sample.

Qualitative surveys of this kind involving direct contact with the respondents permit examination of issues in detail and can make it easier to understand the social, academic and cultural context for the opinions expressed. Interviews can also reveal and explore aspects of PhD student life which might be overlooked by a more structured, quantitative approach.

Figure 2.1 Student sample

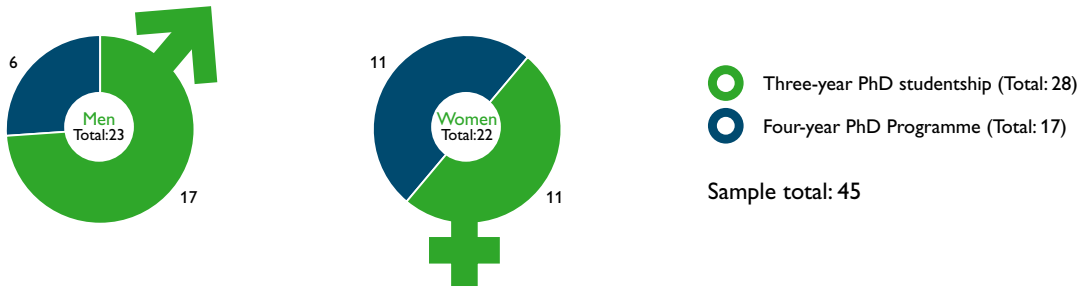


Table 2.1 Student sample

	Three-year PhD studentship	Four-year PhD programme	Total
Interviews at universities with Four-year PhD Programmes	19	17	36
Interviews at universities NOT host to a Four-year PhD Programme	9	n/a	9
Total	**28**	**17**	**45**

The Trust's Four-year PhD Programmes have only recently been introduced with only a handful of graduates to date. In the absence of more formal outcome measures, it can be particularly valuable to obtain detailed opinions on new initiatives from these first recruits and to compare their views with those of students on the more established or traditional types of PhD award.

The verbatim comments which follow in the results section are identified by a series of three numbers **(see below)**: the first number refers to a particular individual, the second to the duration of the Trust award, and the third to the number of study years completed at the time of the interview.

15 / 4 / 3

The interview number

Whether the duration of the Trust award was three or four years

The number of completed years of PhD training at the time of the interview

2.2 Final-year student questionnaire survey

Each year, the Trust invites all students in their final year to attend a two-day meeting, held in July, at which they present the results of their PhD research. The meeting also provides an opportunity for the Trust to canvass the opinions of the students on how their PhD has progressed and this is done through group discussions as well as by asking students to complete a Trust questionnaire (Appendix B).

The results of two questionnaire surveys carried out in July 1998 and July 1999 involving a total of 146 students, are presented here. All students were within a few months of the end of their Trust award and the great majority had undertaken three-year studentships awarded either through the Trust's Prize Studentship scheme. There were only ten students from Trust Four-year PhD Programmes in these surveys.

Students were not obliged to identify themselves and were assured that the results would be treated in confidence.

For much of the analysis, the responses of the 1998 and 1999 student groups were combined but, where appropriate, the two years were separated in order to illustrate particular issues or differences.

Information was also stratified according to the type of PhD programme and the sex of the student. Access and Excel databases were used to analyse the results.

three

Results

Results

The in-depth student interviews were carried out between October 1998 and February 1999 and the quantitative final-year student data were collected in July 1998 and July 1999. The results are divided into eight sections which deal with:

- student characteristics;
- choice of PhD programme;
- the stipend;
- aspects of training;
- PhD supervision;
- completing the PhD;
- career aspirations;
- perceptions of the ideal PhD.

3.1 Student characteristics

3.1.1 In-depth survey

Individuals who held three-year PhD studentships were on average older at the start of their PhD than those studying on the Four-year PhD programme **(Table 3.1)**. Of the ten three-year students who were aged 25 and over, three had previously worked in research and two had obtained a Master's degree.

Table 3.1 Age of students at the start of their PhD

	Age group				
PhD type	21–22	23–24	25–26	27+	Average age
Three-year	15	3	7	3	24
Four-year	12	5	0	0	22
Total	**27**	**8**	**7**	**3**	**23**

Just over two-thirds (31 of 45) of students started their PhD immediately after their first degree **(Figure 3.1).** A higher proportion of students on Four-year PhD Programmes had started their PhD studies immediately after their first degree than those on three-year studentships (88 per cent compared to 57 per cent).

One-third (15) of the students remained for their PhD at the institution where they had first graduated. A higher proportion of students on Four-year PhD Programmes changed universities for their PhD studies, probably because these were available at only five universities. Nine students had completed their first degrees outside the UK **(Table 3.2)**.

Figure 3.1 Did you go on to do a PhD straight after your degree?

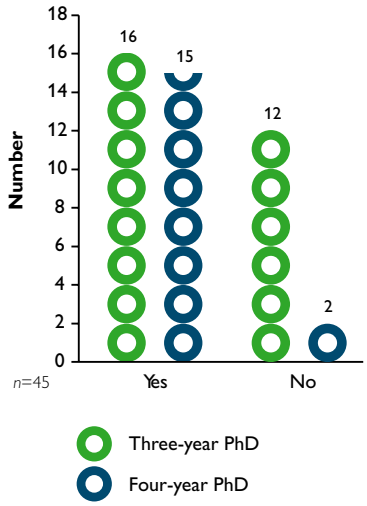


Table 3.2 Country of first degree

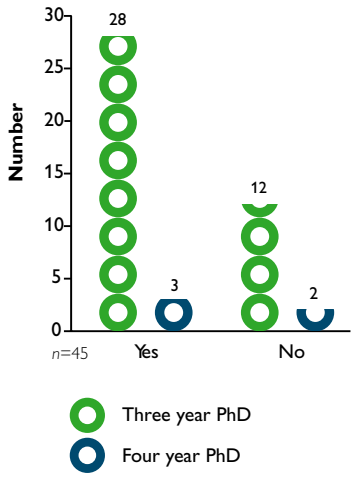
Country of degree	PhD type: Three-year	PhD type: Four-year	Total
UK	22	14	36
Elsewhere in Europe	5	3	8
USA	1	-	1
Total	**28**	**17**	**45**

3.1.2 Final-year students 1998 and 1999

The students who completed final-year student questionnaires were broadly similar to the in-depth survey group **(Table 3.3)**. Some 76 per cent of this group were aged between 21 and 24 when they started their PhD, compared to 64 per cent of students in the in-depth survey.

The same proportion of students (69 per cent) in both groups started their PhD immediately after their first degree **(Figure 3.2)**. A similar proportion of students in both groups had obtained their first degrees in the UK.

Figure 3.2 Did you go on to do a PhD straight after your degree?*



* Question introduced in 1999

Table 3.3 Final-year students' age at the start of their PhD

PhD type	Age group: 20–24	25–29	30+	Unknown	Total
Three-year	106	21	9	4	140
Four-year	5	-	1	-	6
Total	**111**	**21**	**10**	**4**	**146**

3.2 Student motivation in choice of institution and programmes

3.2.1 In-depth survey

Students on three-year studentships and Four-year PhD Programmes gave different reasons for their choices of universities and research subjects. Students on three-year studentships whose awards were associated with Trust major grant holders were attracted specifically to the project and to the proposed supervisor, who was usually known to them personally or by repute.

> **5/3/3 "It was related to what I had been working on...and my supervisor is a good name [in his field]. So it was a nice guy and a good project. Not having a detailed knowledge of the subject area did make it more difficult but also more interesting as well."**

> **20/3/3 "I had two options of a PhD but the supervisor on the project I chose was enthusiastic when I went to see him and he presented the project and impressed me more. The other was a bit more reserved."**

> **18/3/3 "My supervisor was very well known, so I thought it would be good to get to work with him and learn from him. The project is not as important as the supervisor."**

The location and work environment were also important attractions for prospective PhD students:

> **14/3/1 "I was offered this early on…It seemed like too good an opportunity to miss and the lab had a good reputation. I didn't have a particular topic that I was keen in but the work in the lab looked interesting."**

> **39/3/2 "I wanted to go to [X] as it was a cool place but this project was the most interesting even though the place isn't as good."**

Students on Four-year PhD Programmes were attracted to their special features and the rotation year was particularly important to students who did not have a clear idea of what they wanted to do:

> **35/4/3 "It was broadening my horizons. I did try molecular biology in another lab as part of my rotation but I found this rather boring. This project was interesting and it was a good group to work with."**

> **42/4/2 "It's always hard, a bit of a guess, there's so much to choose from. That's why I'm doing the Programme [Four-year PhD], I didn't know what I wanted to do. [The rotations] really helped me to be happy with what I'm doing now. I was so scared of ending up in a lab where I couldn't stand my supervisor and I didn't get on with the lab."**

The active encouragement of a prospective supervisor and potential bench colleagues, regardless of the particular research project offered, was a crucial factor influencing the student's decision whether to do research in a certain place or a particular laboratory. This was true for students on both three-year studentships and on Four-year PhD Programmes.

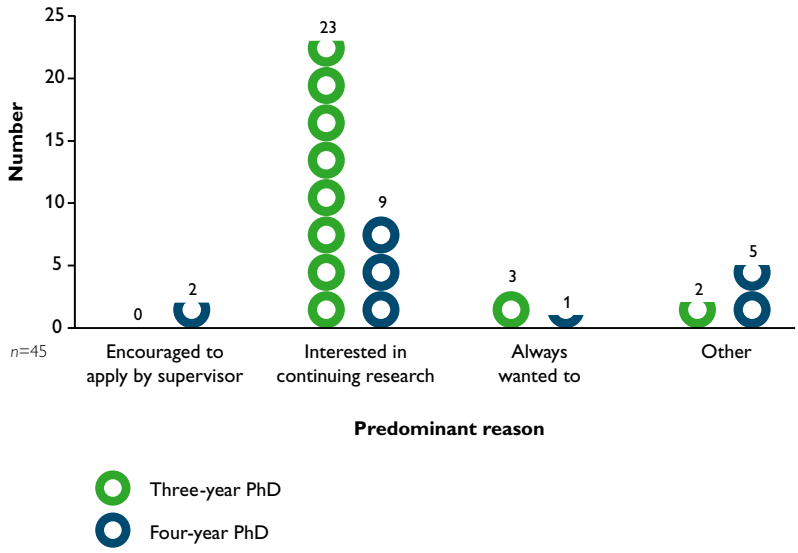
> **9/4/2 "I visited all of the supervisors I was interested in doing a PhD with and hammered out six or seven possible projects...I had developed a very good relationship with my supervisor on one of my rotations and chose a project with them. It was something that I didn't know anything about but the active participation that I was being given got me interested."**

39/3/2 "I knew the techniques but intellectually I didn't know anything. My supervisor made it clear that it didn't matter just as long as I was willing to learn when I got here."

40/4/2 "It was a follow-on from one of my rotation projects. The group atmosphere in the lab seemed very good and I had respect for my supervisor and it's important to get along with your supervisor."

A host of reasons were offered for doing a PhD. Many of the reasons were the same for all students, whether they were enrolled on three-year studentships or on a Four-year Programme **(Figure 3.3)**.

Figure 3.3 Why do a PhD?



The most common reason for doing a PhD was an interest in continuing research, which was accepted as a necessary qualification for a career in scientific research:

14/3/1 "I decided half-way through the degree. I wanted to do research to make use of the number of years that I'd been studying and a PhD is the way into research."

13/3/3 "I always had an interest in science, in the practical side, research not teaching. A PhD will help me further my career in science."

40/4/2 "Not because I necessarily wanted an academic scientific career but the realization that if I wanted to stay in science I needed a PhD."

10/3/3 "I wanted to go into research. In the field that I work in you need a PhD to get a job."

For several students, doing a PhD was a particular ambition as part of an already chosen career path:

12/4/2 "I started my degree with the idea that I wanted to continue. I like the academic open environment, you can investigate your own ideas. It's very challenging...you must persuade people that something is important."

42/4/2 "I wanted to do molecular biology before I entered university. I always wanted to do a PhD...and I was too squeamish to be a medic."

Nevertheless, a number of students described a less specific motivation for doing a PhD, often following encouragement from an academic tutor during their first degree:

33/4/2 "I didn't know what I wanted to do. In my degree I was offered an industrial placement which I did to see if research was for me. After the industry year I didn't really want to carry on in research. But I knew there would be more opportunities in industry if I'd got a PhD...Basically my tutor told me about the Four-year Programme and encouraged me to apply."

27/3/2 "I thought I was good at biology and speaking to tutors it sounded exciting to carry on."

The Trust's Four-year PhD Programmes, which were seen to provide a qualitatively different option for research training, were particularly attractive for some students:

9/4/2 "The four-year course was ideal for me, so when I was offered it I took it. It was the only interview I went to."

31/4/ "It seemed to be the best option. It looked more interesting than the others and the opportunity to choose a project after the first year appealed to me."

The major perceived benefits of the rotation year in the Four-year PhD Programmes included the experience of working in different laboratories and working environments:

34/4/4 The first year of the four-year PhD was attractive because it gave me the chance to experience many different areas."

…the ability to select a PhD project of interest proactively:

25/4/1 "I had a fair idea of what I wanted to do but I wasn't completely sure. I really liked the idea of doing a first year so that I could make a much more informed choice. As a result I'm now doing a PhD that I wouldn't have done before."

26/4/1 "I was indecisive. I knew I wanted to do physiology but I didn't know specifically what areas I wanted to look at and what techniques I wanted to use."

…and the opportunity to change disciplines or do multidisciplinary research:

12/4/2 "It was attractive because it was an interdisciplinary project. I was a physicist and I was given the chance to combine this with something biological...All other projects are very narrow. Here I have one year to know what I want and I have the impression that I have more freedom, to choose my own project and during my project the freedom to follow my own path."

45/4/1 "I wanted to do a four-year PhD because I don't have a science background and I wanted to do the neuroscience side so it gave me a broad background."

3.3 The stipend

The Wellcome Trust student stipends are substantially higher than those paid by other biomedical research funding agencies **(Table 3.4)** and this was clearly an important factor in the choice of a PhD place.

Table 3.4 PhD stipends (academic year 1998/99)

Organization	No. of awards p.a.	Stipend value p.a. (outside London)	Stipend value p.a. (in London)	Research costs
Wellcome Trust	c. 90	£11 962	£13 392	In full
MRC †	388 (1998)	£7070*	£9400*	'Support'
BBSRC ‡	571 (1999)	£6455*	£7835*	max. £2610
CRC §	c. 20	£9870	£9870	max. £8925
BHF ¶	c. 50	£10 284*	£11 748*	-

*Y1= year 1 of PhD. There are generally small increases in stipend in subsequent years.
† Medical Research Council.
‡ Biotechnology and Biological Sciences Research Council.
§ Cancer Research Campaign.
¶ British Heart Foundation.

3.3.1 In-depth survey

All students were satisfied with the level of stipend they received with their Trust award, with the clear majority describing the stipend as 'very good'. Many students commented that the stipend allowed them to live comfortably and to get on with their research without financial worries:

4/4/2 "I have a good standard of life compared to other students who have to do part-time jobs."

24/3/2 "I'm getting pretty much the same as my undergraduate peers and have a good standard of living."

11/4/1 "It means that I don't have to do any demonstrating which takes up a lot of research time, and so I'm not forced to work extraordinary hours."

A number of students were attracted to Trust-funded PhDs precisely because of the stipend — indeed several said that they would not have done a PhD if they had not received such a stipend:

22/3/1 "During my undergraduate career I applied but I was put off by the money. I wanted to do a PhD with money so I was looking for Wellcome Trust funding or something similar."

30/4/3 "I was only looking for four-year PhDs. I only chose PhDs which offered over £10 000 because I can't afford to live on a BBSRC or MRC one."

18/3/3 "Part of the attraction of the Wellcome Trust PhD is the salary – you can't live on £6000."

44/4/1 "If I had any less I couldn't manage...money was a major factor in choosing a PhD."

33/4/2 "After my industrial placement I'd decided that if I was going to do a PhD then I wanted to get paid for it…I didn't apply for any that were £5500."

Trust-funded students were conscious of the level of their stipends in relation to those of other students:

7/3/1 "I get twice as much as a lot of my friends which is great but a bit unfair. For the first time in my life I don't have to work alongside my studies."

8/4/2 "Brilliant, too much compared to what other people get. They get half of what we get and they can't live on that. It's more than enough to live on. We work so hard the money makes things easier."

16/3/2 "I feel slightly guilty about it! I don't know how the Trust could do anything about it but when I see other students getting half…they can't live on that."

37/3/1 "It would be fairer if students could compete on the same level. In a sense it's unfair that other PhD students do as much work for half the money."

The Trust stipend was, however, responsible for a certain degree of hostility between Trust-funded and other PhD students. There was also some animosity from postdoctoral research assistants who either had received less substantial stipends during their own PhD studies, or from non-Trust-funded postdoctoral assistants who received less take-home pay than Trust-funded students:

35/4/3 "People who've been through the PhD [postdocs] are quite bitter about how much we get as PhD students."

30/4/3 "It gets a bit embarrassing at times being paid more than anyone else. Occasionally, some comments are made by the other PhD students, but basically they are jealous."

34/4/4 "Fantastic, brilliant, no complaints. Every other PhD student is jealous. There is no real animosity with all of the other students. It's all playful banter."

An important issue for Trust-funded students was their appreciation that they were likely to take an effective pay cut, due to the tax exemption of student stipends, if they took up a first postdoctoral academic position which was not Trust funded.

30/4/3 "When I finish I am going to have to take a pay cut when I start my first postdoc. The Wellcome Trust should fund first postdocs to keep the pay levels at a decent standard."

39/3/2 "I'm probably going to have to take a pay cut when I become a postdoc."

31/4/3 "What bothers me though is that if I do a postdoc my salary will be reduced. I wasn't aware of this when I started. If you work hard it is nice to be rewarded in an appropriate manner. The whole salary structure in academia needs looking at very carefully."

The Trust's stipends are sufficient to support students for a period of time following the end of their Trust award. Several students indicated that they had been able to save part of their stipend and intended to use the money to support themselves if they were unable to complete their project or the writing of their thesis during the period of the Trust award.

13/3/3 "In this department we're given four years to complete. I'm aiming to submit in February or March, having finished my lab work by Christmas. I've saved a bit of my stipend but it's an incentive once you stop getting paid to finish as soon as possible."

19/3/1 "I don't think it's [the stipend] too much; the principle of the Trust of paying students a decent amount is right, especially if they run over, they've saved enough money to support themselves."

One student mentioned that Trust students are 'welcomed' into departments because of their associated monies (in 1998/99 the Trust introduced real research cost provision to all its PhD training awards):

8/4/2 "People [academics] see Wellcome Trust PhDs as 'free' because the students' lab expenses are paid…so when the students are choosing their projects the labs try to entice them."

3.3.2 Final-year students 1998 and 1999

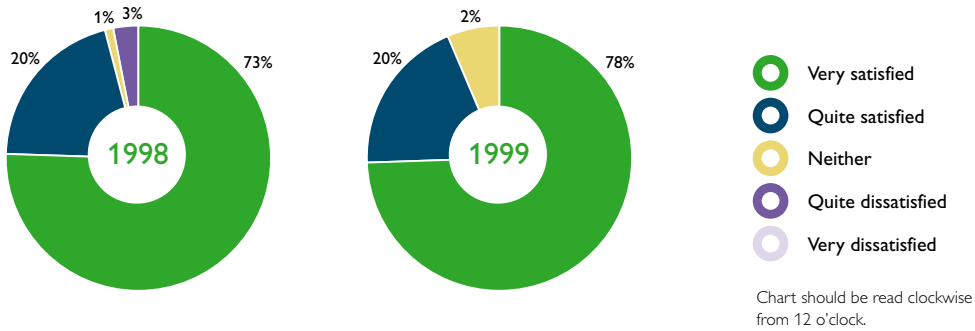
Among final-year students, satisfaction with the stipend was also high **(Figure 3.4)**, with over 95 per cent being either 'very' or 'quite satisfied'.

Questionnaire comments on the stipend followed themes similar to those elicited from the in-depth survey:

"Having a decent stipend makes a big difference to the whole experience of doing a PhD."

"I have definitely enjoyed my PhD studentship experience. The level of support and training was exceptional, and I only wish more PhD students could receive similar benefits."

Figure 3.4 Satisfaction with financial stipend



n =101 (1998); 45 (1999)

3.4 Aspects of training

3.4.1 In-depth survey

Students were asked if they felt they had the appropriate research training skills to get started on their PhD straight away. Students on three-year studentships who had worked in a laboratory before, or had completed a project on their undergraduate degree course, thought that they had:

5/3/3 "My year working helped a lot because I learned tissue-culture skills...but I learned a lot of skills along the way. So I had the basics from my working year but I learned to plan and execute my own experiments rather than expecting someone to plan for you."

6/3/1 "I had quite a lot of experience in molecular biology from my lab experience as an undergraduate and in my RA [Research Assistant] position."

13/3/3 "I learned a lot during my honours project and I knew the layout of the lab so I could get started straight away."

39/3/2 "I did know the techniques, I picked up a lot of them during my job in France and I also had a summer job in Australia one year."

Other students felt that they had few of the research skills required for their PhD project before they began their PhD projects, often citing their undergraduate degree training as unhelpful in the teaching of research skills:

38/3/2 "In the UK you don't do much benchwork in your first degree so I had to learn the general lab skills, safety, etc. Most of what I've had to do has been learned since I started the PhD."

16/3/2 "My supervisor has been great so I've had a lot of training. I hadn't worked in a lab before and my previous honours project hadn't helped a lot. So in my first year I had to make a lot of my own mistakes."

3/3/3 "As an undergraduate you don't get taught the particular skills but my supervisor warned me that I'd have to learn things – I knew what was coming."

Many students saw the whole PhD experience as a learning process, where they were constantly required to learn new skills:

12/4/2 "My project is multi-skilled. I will have to learn new techniques...that's what I think is important about my PhD, to learn new skills and learn to be independent."

9/4/2 "There are always more things to learn and I would like to pick up as many skills as possible, but I could finish my PhD with the skills that I have now."

14/3/1 "I anticipate having to learn more as I go on but I expect that. You can't predict at the beginning what you're going to need."

42/4/2 "I know what's going on but I always need to learn new techniques."

Students were confident that, when they had new skills to learn, they had been able to obtain the necessary help:

36/3/1 "I think I'm OK. I can always learn more. I'm lucky enough to have loads of people around here to help if I need it."

4/4/2 "Yes, unless the project takes a drastically different turn but I feel confident to ask people… the rotation course helped us strike up friendships."

6/3/1 "There are definitely things I need to learn. Whole areas are planned for the next couple of years but I have a lot of experience in the lab so I'm not really worried and people are there to help."

For students enrolled on Four-year PhD Programmes, the opportunity to acquire new research skills during the first rotation year was felt to be beneficial:

9/4/2 "My first year (doing rotations) made a huge difference to the breadth of my technical skills."

11/4/1 "I concentrated on doing placements in labs where I hadn't done the techniques before, but which would be useful. Consequently I was more confident in a lab than I would have been."

40/4/2 "In the three-month projects, which were absolutely excellent, you spend three months learning the techniques. It meant that when I started my PhD I didn't have to spend six months in a new lab, with new equipment, having to learn new stuff."

25/4/1 "Nothing can prepare you for working in a lab. I chose a project which I didn't do a rotation in, but the rotation training equipped me with most of the necessary skills."

Some features of the Four-year PhD Programmes were criticized, however, for being too broad:

33/4/2 "If you stayed in one of the labs that you work in the first year then you can get going quicker. But I think it would be better maybe to be given one project and then being able to choose the other but do it so that everyone's not competing to get the same project. When we started some of the labs were full."

34/4/4 "The rotations were too vague and there isn't enough time to get any really specific training. I would have liked more training in terms of lectures to bring my knowledge up to date. I want background information not just practical information. I know little about lots of things but nothing in depth about processes and how things actually work."

Not all students, however, were happy with the nature and breadth of the training they had received:

2/3/1 "My technical skills are OK now but I would have appreciated more help in the first year… I only really got help when things went wrong."

35/4/3 "I don't need any more skills [for the project]. My biggest complaint about it is the skills we've learned are very limited and specific to the project, where I need to develop broader skills to prepare for my career."

9/4/2 "There are always more things to learn and I would like to pick up as many skills as possible, but I could finish my PhD with the skills that I have now."

3.4.2 Science Communication Course

The Trust offers a Science Communication Course for students either during the first year or at the beginning of the second year which aims to teach students about communicating their science to a general audience. The course was seen to be valuable from a number of perspectives.

Firstly, as a confidence builder:

> **3/3/3 "The Science Communication Course was really good. When I started I was so shy; if I had to present something, I worried about it for three months. Then I got involved in the 'Science for Life' exhibition as an explainer and it has done heaps for my confidence."**

> **26/4/1 "The science communication workshop...wasn't especially helpful for things coming up in the department but it was good to stand up in front of people you don't know because that can always be scary."**

Secondly, in raising students' awareness of the need to be able to communicate science to a non-scientific audience:

> **12/4/2 "The Sci. Comm. workshop was good...So far it's the only time that anyone has told us to be clear in our results and present so that ordinary people can understand. It's nice to hear it said for scientists to use simple words, keep the discussion clear and not just shock people by being complicated."**

> **40/4/2 "I think speaking to a lay audience is far harder than speaking to scientists... It's important to learn how to make your work accessible."**

> **16/3/2 "I was quite interested in terms of the scientific writing; it's refreshing that they recommend that you be creative in your writing because quite a lot of scientific writing is stuffy."**

However, some students felt that they had a greater need for training in presentation and writing for an academic rather than lay audience:

> **20/3/3 "The Sci. Comm. workshop was OK but I had the impression that it was more for you [Trust] than us...and you felt you were being judged at the end of it. It taught you how to communicate science to those not in science but as a scientist that's the kind of thing you never do."**

> **35/4/3 "Some people were disappointed with that – how to communicate science to the man on the street rather than how to communicate with other scientists. It's not a complaint but not what was expected."**

> **30/4/3 "I heard (from some of the other four-year PhDs) that it was so crap that I didn't go. I also got very negative feedback from my tutors about it. It didn't offer the skills that I want out of a course like that. I want to know how to put really good talks together for conferences and poster presentations."**

The production of scientific papers was the most important criterion against which the students felt that they would be judged in the future:

> **1/3/3 "More training in writing papers and theses. I think this should probably come from the university. I'm lucky that I come from a supportive lab and have a good supervisor."**

33/4/2 "The presenting talks bit was useful but as far as written things, I think writing papers and abstracts would have been more useful to us rather than what they were doing."

40/4/2 "I think also 'writing your thesis', not how to but more what's expected of a thesis. Also 'what to do afterwards', I want to be told how, with a PhD, this is what it's like doing a postdoc, and in industry."

Several students had additional training requirements, specifically in writing grant applications and obtaining careers advice:

4/4/2 "There's not a lot of information on career structure or how to write grant applications."

7/3/1 "A business course might be a good idea...a lot of people would find it useful. As a PhD student you either go into business or into science. Either way you have to write a business plan or proposal, since after you've finished your PhD you're likely to go into a managerial, business position in a university. I would like to stay in academia but I've no idea on how to write a grant proposal. It would be very useful to know what they're looking for."

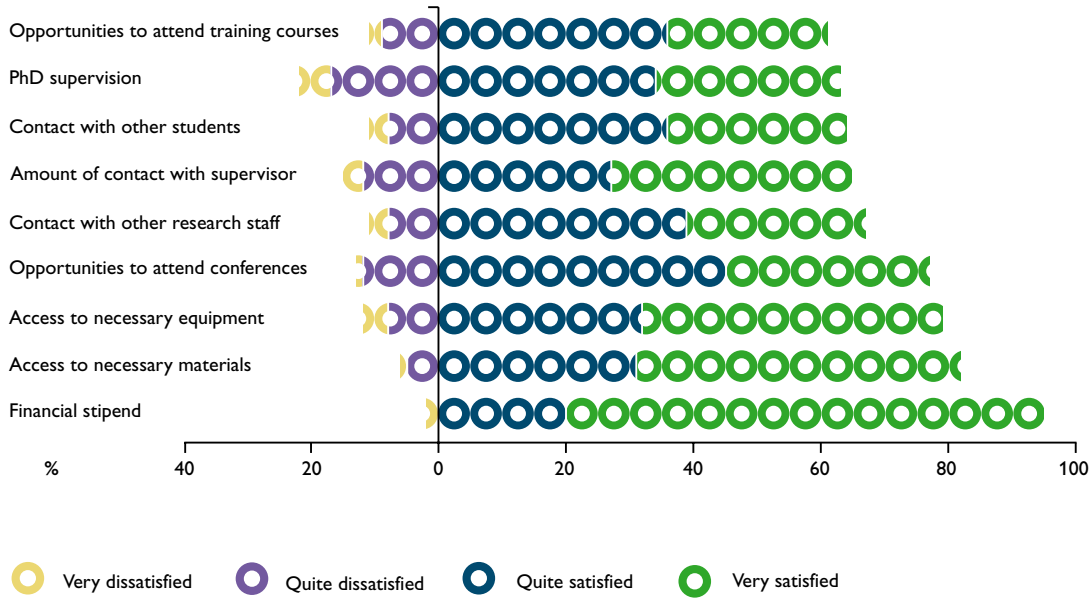
34/4/4 "The final-year meeting is too late for you to decide what to do. It's strange that the Trust is prepared to pay all of this money, but it doesn't take an active role in helping with your career."

35/4/3 "Careers guidance is very limited at all levels."

3.4.3 Final-year students 1998 and 1999

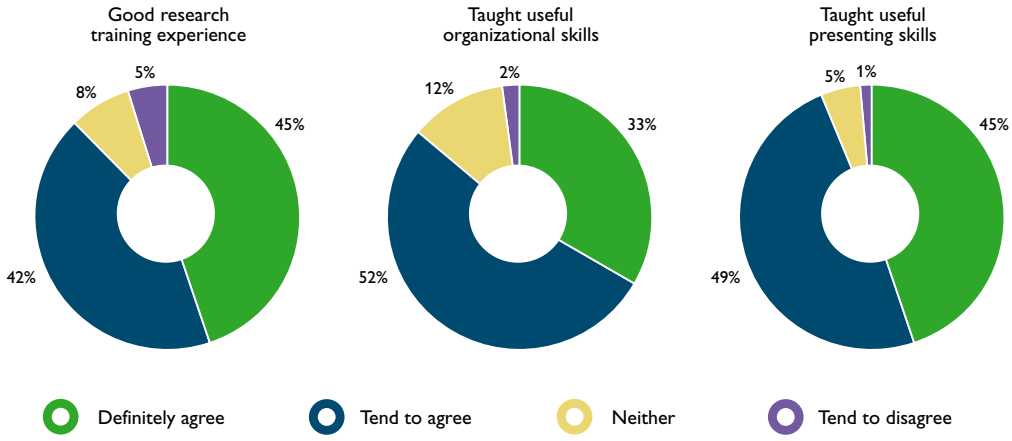
Final-year students were asked about a number of issues relating to their PhD training and most expressed a high degree of satisfaction **(Figure 3.5)**. Students were particularly satisfied with their stipend but expressed the greatest dissatisfaction with aspects of their supervision. The great majority of students agreed that their PhD experience had 'taught useful presenting and organizational skills' and was a 'good research training experience' **(Figure 3.6)**.

Figure 3.5 Satisfaction with aspects of PhD training



n=101 (1998); 45 (1999)

Figure 3.6 Satisfaction with PhD training



Charts should be read clockwise from 12 o'clock
n=101 (1998); 45 (1999)

3.5 Academic supervision

3.5.1 In-depth survey

Anecdotal evidence that a difficult or poor supervisor can affect both student morale and the quality of the PhD research project is never difficult to find:

> **40/4/2 "I'm so glad I did the four-year PhD. I meet other Wellcome three-year students who are jealous that they haven't done it. I've met ones who are stuck in PhDs with supervisors they don't like or projects they don't like or they're stuck in a crap lab. Doing a four-year PhD means you aren't faced with this chance."**

A perceived benefit of the Trust's Four-year PhD Programmes was that they provided the opportunity for students to meet, and effectively select, their supervisor before embarking on their substantial research project:

> **9/4/2 "I was wary of doing a PhD because I had had a bad experience with supervision whilst working in a lab for a year during my degree…I got over it but made sure that I got to know my supervisor before I started."**

> **35/4/3 "Another advantage of the Wellcome Trust Four-year Programme is that you get to know your supervisor before. If you don't it can be devastating."**

> **11/4/1 "I was lucky because I chose a supervisor that I had done a ten-week placement with. Therefore I knew that I could get on well with him and approach him easily. Labs vary greatly in their access to supervisors and I purposely chose one that I knew I would have easy access too."**

> **44/4/1 "He made me feel welcome and the work really interested me…a lot of the time you walk into a lab and think 'no I can't work in here'."**

Half of the students in the sample had only one supervisor and most were happy with this. Students could, however, see the potential benefits of having more than one supervisor. The perceived benefits ranged from providing support when one supervisor was perhaps too busy or inaccessible:

> **16/3/2 "I only recently found out that my lab supervisor is actually my secondary supervisor but it's always her I talk to. My supposed first supervisor is in a different lab but also supervises many students."**

> **28/3/2 "My primary supervisor warned me that he might not be able to dedicate enough time to me so I arranged to have a secondary supervisor and it has worked out well."**

…to providing an alternative perspective on the work of the research project:

> **31/4/3 "It's good to interact with two different people. The advantages and disadvantages that each has balance themselves out. Their styles are very different. One is very controlling and monitors you a lot. The other gives you a free hand to get on with things."**

> **12/4/2 "I have two supervisors from different disciplines. I like the interdisciplinarity, seeing things from different angles."**

…and to acting as an additional source of support when one supervisor was felt to be less supportive:

> **1/3/3 "It's a good thing to have two supervisors because if you don't get on then you still have someone to go to."**

> **37/3/1 "It does work well – the main role of the co-adviser is to look at my progress and if I had a problem with my supervisor I would see the co-adviser about it."**

How much access students had to their supervisors depended to an extent on the supervisor's seniority and, hence, their other research and academic responsibilities. Most primary supervisors were relatively senior (Figure 3.7) and often no longer worked 'at the bench', although several liked to 'keep their hand in'. When asked whether their supervisor still worked at the bench there were some interesting responses:

> **20/3/3 "Once a year! He has his own lab coat and pipette but he uses it once a year."**

> **36/3/1 "Less and less now the group has expanded. He did much more when I started."**

> **40/4/2 "Unfortunately yes, he moves everything around!...He checks up on everything regularly...and taught me a lot of techniques on the rotations."**

The absence of the supervisor from the laboratory meant that students often depended for day-to-day assistance on other, less senior, research staff. Most students felt that their supervisor's major contribution to their PhD project was ideas and overall direction:

> **1/3/3 "He makes me think about things that I wouldn't have thought [of] on my own."**

> **19/3/1 "[My supervisor provided] some of the central ideas – I use them as a sounding board, as quality assurance – and technically everything that I've needed so far. I definitely couldn't have done it on my own..."**

44/4/1 "[He] very much helps you develop ideas and where things might be going... he's really, really helpful."

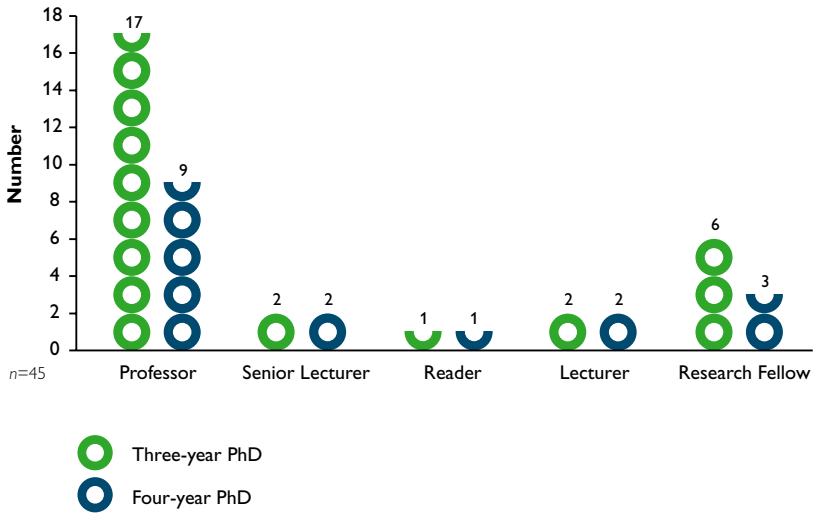
…and intellectual experience:

6/3/1 "Hands-on experience, intellectual experience. She's shown me a lot of techniques directly. She still knows how to do things basically and she's got the 'big plan' in her head. In this way she knows what's realizable."

25/4/1 "Obviously at this stage he contributes experience, knowledge of the field and what needs to be done. If I go to him with a hair-brained idea I know he will be good at guiding me in the right direction."

39/3/2 "The whole design, ideas about what to do and where the project's going. He's helpful at suggesting things and he's quite sneaky...he makes you think you've discovered something when he's put the idea to you…Intellectually he thinks at one million miles an hour."

Figure 3.7 PhD supervisor seniority



Students had firm views on how accessible supervisors should be:

21/4/1 "Basically what my supervisor does but with more time because during term time he is never there."

17/3/3 "Someone who is around more in the lab, and is more in touch with practical results. Someone who has good relations with the postdocs in the lab."

9/4/2 "They should give guidance and be accessible. Accessibility is an issue. At times she can be so distracted by other work that e-mails go unanswered and you don't have anyone to go to if things are going badly. Frankly she doesn't have enough time."

…and what their personal demeanour and approach to students should be:

> **8/4/2 "When something doesn't work I seem to be cross-examined rather than given suggestions."**
>
> **19/3/1 "More criticism. My supervisor is a bit of a softy. Although I know he thinks critically about my work he doesn't actually come out with it."**
>
> **24/3/2 "I'd like to spend more time with him in a casual, chatty way, but he's too busy."**

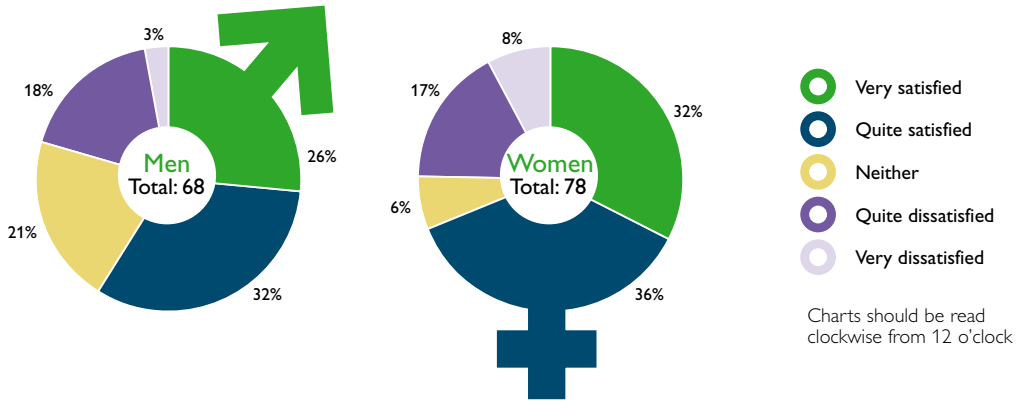
One problem which arose in the Four-year PhD Programmes was that they were not always able to cater for the demand from students wanting to do their full three-year project in the more popular laboratories:

> **34/4/4 "There is a problem with the availability of spaces in labs on projects. The first group of people got the run of the labs. Now some labs won't take any more Trust students because they are already full and tell them to go elsewhere. This is a problem because if you were really interested in a project and had even done a rotation in that lab then you might not get the chance to do your PhD on that project... This situation isn't like what the advert for the course made out to be."**
>
> **26/4/1 "People [four-year PhD students] worry here that if you don't approach the supervisor straight away [after your rotation] then you won't get in. I think in the past they have accommodated people too early. I asked my supervisor after my first ten-week rotation [if I could have a place in the lab] but he said he wasn't in a position to let me know until the end of the year... This year they have a policy not to make any premature deals with students."**

3.5.2 Final-year students 1998 and 1999

In contrast to students questioned in the in-depth survey, who had expressed high levels of overall satisfaction with the supervision of their PhD programmes, almost 25 per cent of final-year students expressed some degree of dissatisfaction with their academic supervision. More men (20 per cent) than women (6 per cent) had a neutral opinion and the women tended to express their dissatisfaction more strongly than the men **(Figure 3.8)**.

Figure 3.8 Opinion on overall PhD supervision



3.6 Completion of the PhD

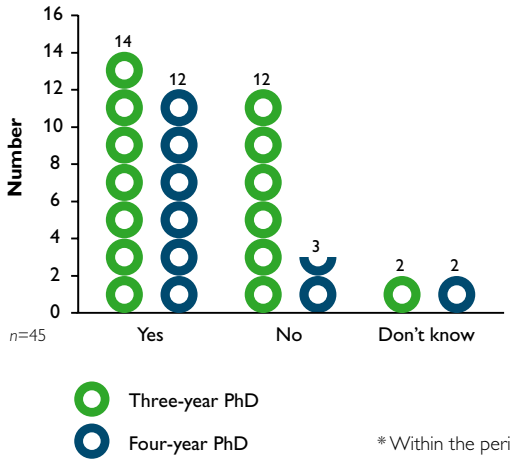
3.6.1 In-depth survey

A majority of the students (26 out of 45) thought they would finish their PhD within the period of their Trust award, with a greater proportion of students on Four-year PhD Programmes confident that they would do so (**Figure 3.9**).

A number of students on Four-year PhD Programmes believed that they were unfairly penalized by their university in being required to complete their PhD within the same four-year period as other students on three-year studentships:

> **30/4/3 "It is the university's policy that all PhD students have to have submitted at the end of the four years. That's fine if you are doing a three-year PhD, but not if you are on a four-year one."**
>
> **35/4/3 "We've been told that if we don't submit on time we're in trouble. I think it's university policy; students are given a maximum of four years to submit."**
>
> **1/3/3 "If you do four years when initially you come to the lab you're expected to be more self-sufficient so you get less help than if you do the three-year programme, the expectations are higher…If you're on the three-year scheme and you overrun, supervisors are keener to get additional funding than for people on the four-year programme who 'should be finished by now'."**

Figure 3.9 Anticipated PhD completion*



* Within the period of the Trust award.

Students at an earlier stage of their PhD training were more likely to say that they would complete in the three-year period. However, some students in only their first or second years doubted that they would complete within three years. Those students who were unsure if they would complete on time had usually experienced project difficulties:

> **3/3/3 "I don't think three years is realistic, it's impossible as far as I'm concerned…it really depends if you've got something that works well all the time, but this just doesn't happen."**

8/4/2 "Because of the slippage I don't know if I can catch up."

32/3/3 "I have overrun because my supervisor wasn't able to devote enough time to me. He had to spend time with another student who was having a lot of problems writing up."

Several students were keen to get their PhD finished and out of the way, so that they could get on with the rest of their careers. For many students, their PhD was seen as simply the first stage of a research career track:

12/4/2 "I feel like there are so many things to learn and to get a good job it's not a good idea to spend five years on one project. After four years you want to move on to do a postdoc and do something new."

24/3/2 "If I don't [complete in three years] I'll be extremely pissed off. I think I've been in this field a long time now and I'd like to move on."

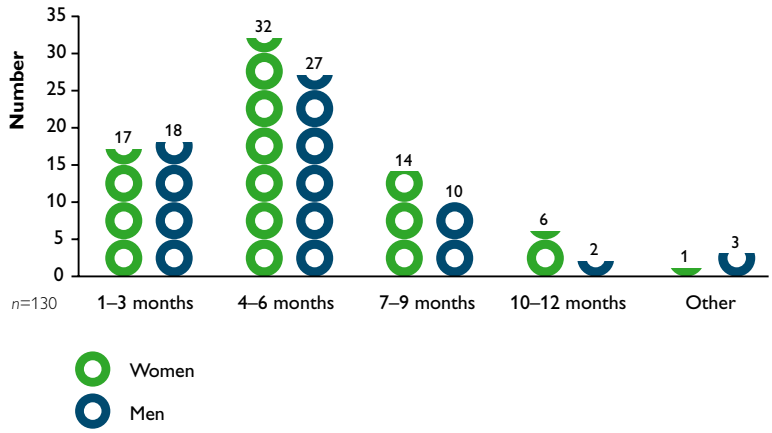
33/4/2 "I hope to finish in three years. I'll need to move on after three years and I don't like having things hanging over me."

3.6.2 Final-year students 1998 and 1999

For the majority of the students in their final year, their Trust award was for three years and was due to finish within three months of the survey. Students were asked when they expected to submit their thesis for examination and well over half the students expected to submit within six months of the termination of their award (Figure 3.10).

There was little or no difference between the anticipated completion time for men and women. The handful of final-year students who had followed a Four-year Programme also expected to submit within six months of the end of their Trust award.

Figure 3.10 Final-year students' estimation of PhD submission time

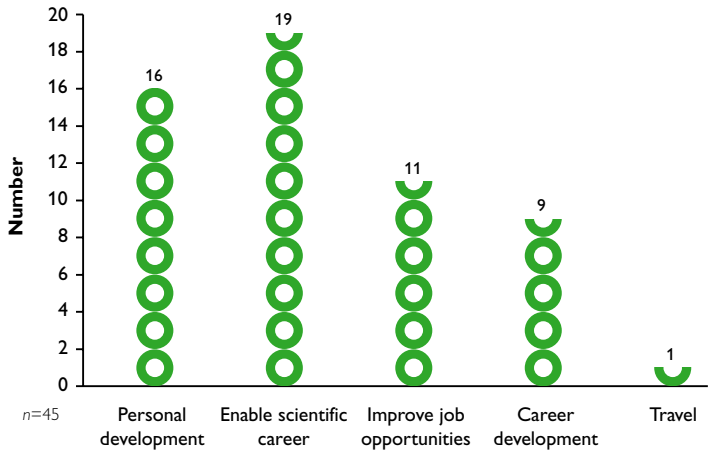


3.7 Future career aspirations

3.7.1 In-depth survey

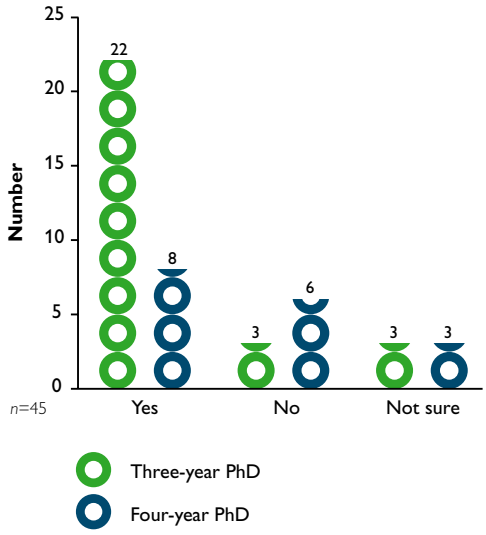
All students were asked what they felt were the benefits of doing a PhD **(Figure 3.11)**. The most commonly described benefit was to enable a scientific career, with 19 students citing this. Sixteen students also described personal development as a major benefit of doing a PhD, and 11 mentioned that a PhD would improve job opportunities.

Figure 3.11 Perceived benefits of a PhD



Students were asked whether they thought they would pursue a career in scientific research and a substantial number, on both three-year studentships and on Four-year PhD Programmes, thought this unlikely **(Figure 3.12)**.

Figure 3.12 Likelihood of a career in scientific research



Almost half of all students (19 out of 45) intended to take a first postdoctoral research position after completing their PhD. Six students hoped to take positions outside the UK, four to the USA and two to Australia. Eleven students were uncertain of what type of position they would seek, although they intended to pursue a research career. Other students were very committed to pursuing an academic career:

> **4/4/2 "I want to do a postdoc. My ambition at the moment is to work in science and maybe get my own group."**

> **38/3/2 "Yes – because despite the hard work and insecurity, when it works the high makes it all worthwhile. I like the people that work in science as a whole."**

> **30/4/3 "I have no desire to do anything else. This isn't something you just slip into. It's a conscious decision that you make that this is what you want to do as a career. I can't believe that someone pays you to do this."**

A number of students who thought they would do some postdoctoral research saw this as a prelude to a different career:

> **17/3/3 "Yes, for the short term, but I don't know about the long term because I can't see myself as running my own lab."**

> **15/3/3 "I thought I would leave academia after my PhD, but I would like to do at least another postdoc but change field slightly to something more applicable. I'm also interested in science policy."**

> **31/4/3 "I have considered doing a postdoc, but because I haven't done anything else yet I would like to try something that is business based. Although coming back to research would be difficult."**

Perhaps unexpectedly, a higher proportion of students on Four-year PhD Programmes (nine out of 17) were uncertain that they would follow a career in scientific research than students on three-year studentships (six out of 22):

> **44/4/1 "I'm not sure...not academia *[Why not?]* I don't want to be in that student environment for the rest of my life."**

> **26/4/1 "I'm not sure, purely and simply because I'm not sure how I'll feel in two or three years' time. If things carry on like they are at the moment then I probably will stay in academic research but I know people get disillusioned with the low pay and the long hours so I'll have to wait and see."**

> **31/4/3 "I don't know. Five to six years from now I'd like to be away from the bench doing something completely different. I enjoy the intellectual side but the practical side is not my forte."**

> **33/4/2 "I don't think I will stay in academic research for more than a couple of years. I don't want to be a lecturer and that's the only way to get a permanent position."**

Some of the students who chose a Four-year Programme did so because they were either unsure about their career path, were less certain of the scientific reasons for doing a PhD, or did a PhD because they weren't sure what else to do.

> **31/4/3 "I applied for jobs for graduate trainees and for PhDs because I didn't really know what I wanted to do. The PhD offers came in before the job offers and since I had worked in a lab before and enjoyed science I decided to do a PhD."**

35/4/3 "I've always done well academically and doing a PhD was really a natural progression. So I thought I'd do a PhD while deciding what to do as a career."

A common reason for not wanting to pursue a career in scientific research related to poor academic salaries and the need to apply for grants to support academic research:

27/3/2 "No, because I'm better at other things and also the money in science is rubbish."

23/3/1 "The problem with academic research is that although it has a lot of freedom, it's difficult to get grants. I don't know if it's worth taking the risk."

41/3/1 "No. *[What puts you off being a postdoc?]* Writing grant applications, the more you get into science you seem to have to work harder. You have to consider your lifestyle in relation to your work."

40/4/2 "I think about where I want to be in ten years' time and I don't want to be scraping around looking for money and funding."

One woman described how an academic career is both uncertain and perhaps incompatible with having a family:

1/3/3 "The things that put me off [a scientific career] are the career path – if I was massively ambitious then I wouldn't stay in the same lab, I'd be off to the States and work in a big lab and then come back here and set my own lab up. Also the insecurity – there's a lot of short-term contracts. If I ever wanted to start a family it doesn't feel like it would fit within the whole thing."

Several students also felt that, although they would like to pursue a career in academic research, the opportunities available to them were likely to be limited:

7/3/1 "I'd like to stay in academia but it depends on the opportunities."

36/3/1 "I would like to carry on with what I'm doing now. I don't know if I'll be able to get funding to do a postdoc, but hopefully I'd like to stay in academia."

Several students felt that a career in academia would be restrictive in a creative sense:

2/3/1 "I'll probably do industrial research because the impression I get from the academic environment is that it is very stuffy and there's no change. I want to stay in research. I enjoy the mental challenge of trying to find the answers and to look for the possible tools to work it out."

11/4/1 "I am open to working in academia or industry. Academia is quite an odd place to work in. There are lots of odd people working there who are very narrow-minded. People in industry have a better idea of what's going on in the world."

In addition a number of students were actively pursuing other career options:

18/3/3 "In the long run I'd like to get some management training, get some venture capital experience and run my own biotech company. I'd like to use my science knowledge to get products to the market place".

19/3/1 "Realistically I have to think about doing other things. But I'm always disappointed when I know someone who's done a brilliant PhD then go on to work for McKinsey's or something!"

…and some a more radical departure than others:

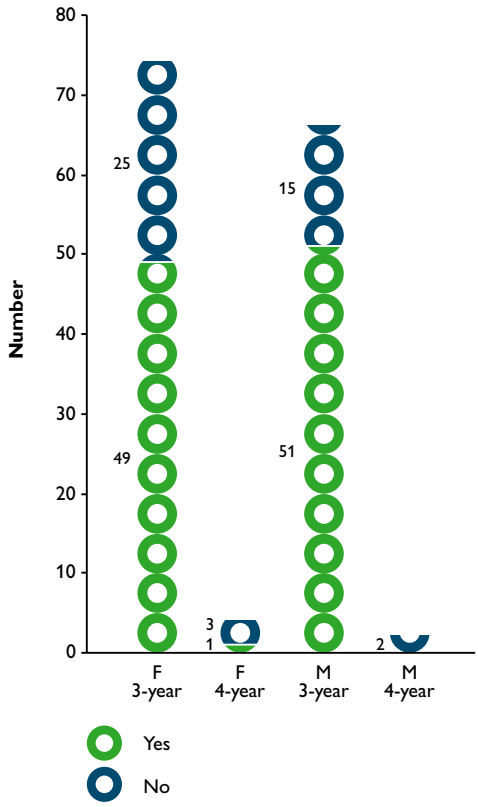
27/3/2 "Possibly the wine trade because I'm rather good with wine. Either that or an IT consultancy or something in government."

39/3/2 "A basketball player? I think I've been so highly trained that it would be difficult to start anything else."

3.7.2 Final-year students 1998 and 1999

Final-year students were asked whether they intended to pursue a career in scientific research and the views expressed were similar to those of the students questioned in the in-depth survey. A substantial majority (69 per cent) of the group as a whole indicated that they would do so, although more men than women (75 per cent compared to 64 per cent) thought this was likely **(Figure 3.13)**.

Figure 3.13 Final-year students intending to pursue a career in scientific research



n=101 (1998); 45 (1999)

3.8 Student perceptions of the ideal PhD

3.8.1 In-depth survey

There was a surprising range of opinion on the relative merits of Four-year PhD Programmes compared to three-year studentships. The majority of students on Four-year PhD Programmes were happy with their choice:

> **8/4/2 "Four years is better because you do learn stuff and you can make a more informed choice. If I'd chosen better mini-projects more relevant to what I'm doing now it would have helped but then I might as well have done a three-year PhD."**

> **9/4/2 "It would be a mistake for them all to be four years, but it was right for me...I'm doing a different PhD to the one I would have chosen if I hadn't done the lab rotations...I appreciated the chance to meet and work around people who would be my potential supervisors. I have a better idea of what other people do in different labs and I can go to them for help if I need... I would be very wary about doing a PhD based on 20 lines in an advertisement."**

> **12/4/2 "I chose four years because I didn't know what I wanted to do. I wanted to do biology but I didn't know the project. Working in different environments and on different projects really helped me decide what I wanted to do... I feel I made the decision about what to do rather than answering an advert in a magazine."**

> **11/4/1 "For those who know what they want to do, or are older and have more experience then three years is ideal. But four years is ideal for those who don't know exactly what they want to do and don't have all of the necessary techniques. The rotation year is useful to get up to scratch on techniques. As it is I am doing a project in a lab which I didn't know anything about and didn't envisage working in, but which used techniques that sounded interesting."**

> **26/4/1 "I'm very glad I've done the Four-year Programme. If I hadn't done the Four-year Programme I could have easily jumped into something I didn't enjoy and that's not what a PhD is about. As a Wellcome student there's no disadvantage to us of doing four years because we're being paid…We're probably going to take a drop in wage to become a postdoc so the extra year is only an advantage."**

Some of the students on three-year studentships would have preferred to have joined a Four-year Programme:

> **20/3/3 "I think the rotation is good. I know if I'd done the rotation I would have stopped my PhD because I wasn't happy in the lab and the atmosphere wasn't really good. At an interview [for a PhD] you don't know about the people who you're going to be working with."**

> **16/3/2 "I think the rotation year allows you to at least have a look at other PhD possible projects, it doesn't commit you and you get a basic training in the first year...I certainly would have liked to do it because the projects are diverse then the techniques you learn would be quite diverse too."**

However, the majority of students on three-year studentships were happy with their choice of PhD training and some were not convinced that they would have chosen to enter a Trust Four-year PhD Programme, as currently structured:

> **3/3/3 "Four years is good if you don't know what to do, although even if we get a lab rotation student I'm not sure what three months will give them, it takes so long to become *au fait* with the techniques…I don't think the rotation students will make the right decisions because they don't really have the ability to make the choices."**
>
> **5/3/3 "I would have preferred to have four years to do my PhD but not on the Four-year Wellcome Programme. Because I had a year out I knew a lot about lab work I didn't want another year being chaperoned, I just wanted to get on with it. I would have liked an extra year to expand my work. It takes a year to get on your feet and to find out what you're doing, so two-and-a-half years to do more research so I could start winding down my research at the end of my third year…People are most surprised abroad if you tell them you did a PhD in three years."**
>
> **32/3/3 "If I had done a year with rotations I wouldn't know what to do because there would be too much choice."**

A number of students on three-year studentships perceived the rotation year offered in Four-year PhD Programmes to be neither necessary nor beneficial:

> **28/3/2 "Because I had already done a Master's I didn't want to spend time doing a four-year course. I did my Master's to see if I wanted to go into research or not, therefore I only had to sign up for one year and not four."**
>
> **41/3/1 "The Four-year Programme has a major advantage that you get to go to a few labs and find out how sociable the supervisors are and how tight they were. It's possible that someone who doesn't know what they want to do gets to see different areas. But it's difficult to get a lot out of a programme in such a short time. I'm not sure how the supervisors would feel about them [rotation students]; it's hard work to teach them everything and then they piss off. I'm not sure if it will piss academics off in the long run, having a lot of people coming through on small projects."**
>
> **10/3/3 "I think that spending an entire year rotating around labs, learning about skills that you might not necessarily use is not very productive. You have very little to show for that year, as anything that you cannot communicate to the rest of the science community means that the time is effectively lost. In the real world work is based on the number of publications that you produce and therefore no publications equals no grants equals no job!"**

Many students on three-year studentships had known exactly what they wanted to do:

> **6/3/1 "Personally I would not have gone for a four-year PhD...If I'd jumped in straight after the degree maybe I would have gone for four years. It depends on individuals: if they're not sure what they want to do then they get to see some labs."**
>
> **13/3/3 "I would have preferred the three years, basically for me, because I knew what I wanted to do. I preferred just getting the practical experience and getting the thesis written at the end of the day. With the rotation they seemed to be writing reports and grant proposals all the time and it seemed really hard work. For me, I just wanted to get into the lab and get on with it."**

29/3/3 "When I heard about the Four-year Programme I thought they sounded like a good idea. You get to move around and work with different people...it sounds like a more ideal start. But I knew my boss and got on with him well, and I knew what I wanted to do so that was alright but some people aren't in that situation."

…and wanted to get on with things because of their age or particular career aspirations:

7/3/1 "Three years is great. It depends on the person. If you know what you want to do three years serves you best and rotations would be a waste of time...One of the reasons why I prefer to do a PhD in the UK is because it is three years. Also because of my age, if I do a postdoc it is getting on."

24/3/2 "If I hadn't done the year out then the four-year PhD would have appealed. For myself I wanted to get in and out of my PhD as quick as possible."

36/3/1 "Three years suits me because with the four-year it's an extra year... I suppose with the rotation year you know the project much better when you start and the chances of starting something you don't like is lower but, on the other hand, it's an extra year."

14/3/1 "For me I was quite keen to get on with things. I didn't have an idea about exactly what I wanted to do so I guess four years might have been good to have a look...but for me I just wanted to get my teeth into things. I think I would have been frustrated by the rotation year."

However, several students on three-year studentships wished that they could be given more time to do more research and to write their thesis:

15/3/3 "Four years would probably be better, if it was structured so that you did three-and-a-half years in the lab and then had six months allocated to writing up. I don't know whether Wellcome would think of flexible extension."

17/3/3 "Probably up to three-and-a-half years; three years for practical work and the rest of the time spent writing up. After my first experience with a PhD supervisor, I think that getting to know your supervisor beforehand is an excellent idea. You really need to know how a lab runs and get to know the supervisor before starting."

43/3/1 "Three-and-a-half years I think! I think three years' full lab work then six months to write up, have the viva, etc., that would be nice."

38/3/2 "Probably three years is sufficient to do the lab work and if you're efficient and read while you go along, probably three to four months to write up."

Students enrolled on Trust Four-year PhD Programmes had constructive criticisms to make:

9/4/2 "Towards the end of the rotation year it was very frustrating going from lab to lab constantly writing reports. And just as you're getting somewhere you are moved on. The third rotation was less useful than the others because you had to choose what your PhD project was going to be beforehand. It's quite difficult getting motivated if you know you are going to change and work on something else. I chose my third rotation more with an eye to gaining techniques or learning about something that I knew nothing about than with an eye to choosing my PhD project."

35/4/3 "It could be more structured in that we should be given lectures or if we got an MSc it would make people work harder at their projects."

42/4/2 "People who know exactly what they want to do might prefer a three-year PhD… But the four-year PhD is very elitist – you have to be very good to get on [the programme]. If you had more Four-year PhD Programmes then you'd have more better students. *[Why do you think they are elitist and the demand is so high?]* I know that when you finish your BSc not many people know exactly what they want to do. The Four-year Programme gives you the possibility to see different labs and areas, and make life easier and safer, in a way. You know exactly what you're getting into."

And several students felt that there was not really one best way to a PhD training:

4/4/2 "Four years isn't for everyone. Some know exactly what they want to do and have the experience and can go straight in. I think you [The Wellcome Trust] should keep a mixture… Some don't want to do four years especially if they have done a Scottish degree or have lab experience. The beauty of the four-year scheme is that you don't have to choose until after the first year instead of relying on a 30-minute interview with people being honest about what is expected of you."

45/4/1 "More flexible schemes so people can do what suits them best. Four-year schemes are good if you're not sure exactly what route you want to take, but three-year schemes are good for people who know exactly what subject they want to do."

19/3/1 "I'm not sure that any PhD student really knows exactly what they want to do. In the end I chose something that I thought I wanted to do and made the best of it. I wonder how many of them [four-year PhD students] actually think they've chosen exactly the right thing."

four

Discussion

Discussion

PhD training and the academic contract

The Wellcome Trust's investment in PhD research training is now considerable, at approximately £10 million per annum in support of about 100 students each year, and it is appropriate that it considers its role and position in the provision of both PhD training and the pastoral support of the PhD students it funds. The numbers of PhD students funded by the Trust is a relatively small proportion of the UK national postgraduate student population but the Trust is nevertheless committed to working with the academic community to assist in the establishment of an evidence-based best practice for postgraduate research training in the biomedical sciences. The UK Research Councils have, in recent years, entered into dialogue with the universities about the nature of their academic contract and, as a consequence, the training requirements attached to Research Council studentships have been considerably increased and made substantially more explicit. To date the Trust has not produced formal requirements for the training programmes of its PhD students, although it shares many of the philosophies that underpin the current Research Councils' contract with the universities.

This results of this survey indicate that Trust-funded PhD students are generally content with the PhD training they receive. Training is predominantly provided at the students' place of research by the supervisor or other research staff, and through graduate training activities run by the university. As a consequence, the PhD training experience of students varies considerably in quality and content. In this survey, holders of Trust three-year Prize Studentships, who were more likely to have had laboratory experience prior to starting their PhD than students recruited to Four-year PhD Programmes, felt that they required little formal research training before beginning their PhD project. In the Four-year Programmes, in contrast, students appreciated the opportunity to learn a range of new research skills in the first year, although some felt that the additional research training provided was unnecessarily broad. Students on both types of programme were, in general, happy with their academic supervision although accessibility to supervisors was a problem for some. Some students felt that more care should be taken in the allocation of students to supervisors and in quality-control assessment of supervisor performance.

In addition to supporting research training directly through its PhD studentship awards, the Trust also indirectly contributes to the numbers of UK PhD students through the salaries it provides for research assistants on its project and programme grants. There are currently more than 400 of these individuals employed by universities on Trust grants, but it is not known what proportion of them are registered for a PhD. There is little accurate information, either at a local or national level, about the numbers of university contract research staff who register for PhDs through this route or on the research training programmes provided for them. A systematic review of the training experience of these individuals and of their subsequent research employment would make interesting comparison with full-time PhD students.

Student career aspirations

The reasons for doing a PhD given by Trust students in this opinion survey were wide-ranging but, for the majority, obtaining a PhD was seen as a logical and necessary step in the path to a career in research.

The Trust's first in-depth study of the subsequent careers of its PhD students, which is published as a companion volume to this report,[1] illustrated a considerable diversity of career destinations and identified important career development issues both for the Trust and for the wider academic community. Substantial numbers of the Trust PhD students from almost a decade ago remain in research today, either in the academic or pharmaceutical/biotechnology sector – findings that are not dissimilar to those of a recent Office of Science and Technology survey of past Research Council-funded

students.[2] However, the student opinions reported here suggest some considerable disillusionment amongst current students about the value of a research career, particularly in an academic setting. It may be that this is an early warning amongst UK students of 'the crisis of expectation' experienced by the current generation of young, limited-tenure, research scientists in universities in the USA described in a recent report from the US National Funding Council.[3] The best and most talented postgraduate students will always have the greatest number of choices and career options, and it may be that the current generation of UK PhD students will leave academic research much earlier and in greater numbers than did their predecessors.

Promoting the public understanding of science

The Trust's Science Communication Course, which provides students with an opportunity to consider how to communicate their science to a wider audience and to the media, was popular with students. However, a significant number of students were not convinced of the value to them of this kind of course, being more preoccupied with their own research, and with the need to prepare their work for publication and for presentation in their PhD thesis. It is perhaps a pity that research students do not accept the importance of better communication between the scientific community and the general public. In the UK there is considerable public mistrust of science following the BSE (bovine spongiform encephalopathy) crisis and, in the current public debate about GM (genetically modified) crops and food, there is a particular need for a better-informed dialogue between the research community and the general public.

Three-year studentships or Four-year PhD Programme?

The Trust's Four-year PhD Programmes were welcomed by many students as an opportunity to gain valuable additional research training and experience. There was, however, little evidence to suggest that every student would prefer to follow such a programme. For students on three-year programmes who were sure of the PhD project they wanted to pursue, who had previous laboratory experience or who were older, there was a clear preference for a three-year programme. The great majority of the Trust's three-year studentships are associated with laboratories already in receipt of substantial long-term Trust funding. Candidates for these awards are required to identify a specific research laboratory project and supervisor before submitting an application to the Trust. Candidates for places on the Trust's Four-year PhD Programmes are, in contrast, selected by the group of senior academics at the host institution which is responsible for the academic management of each Trust Programme.

Since the initial introduction in 1994/96 of formal Trust Four-year PhD Programmes, the UK Research Councils have introduced a number of combined Master's in Research/PhD (MRes plus PhD) programmes which have a broadly similar purpose. There is considerable enthusiasm within the academic postgraduate training community for these kinds of programmes and, increasingly, universities are restructuring some of their own PhD bursaries to create a similar design. However, only a handful of students, nationally, have graduated from programmes of this kind and it is too early to assess their value compared to more traditional three-year studentships.

Postdoctoral research salaries and academic pay

The Trust has for many years paid both the research staff on its grants and its research fellows salaries that are enhanced above national academic pay scales and the Trust's salary scales for research fellows based in the UK were further increased in 1999. The Trust took the lead on this issue in response to overwhelming evidence that academic salaries have been progressively eroded over the past decade and because of a very real Trust concern that the UK was in danger of losing its competitive position in world biomedical research because of low academic salaries. The most recent Trust salary increases were announced shortly before the Government-commissioned Bett Committee published its review of pay and conditions in higher education, which recommended substantial salary increases for staff across the higher education sector.[4]

Ever since the introduction of its formal PhD training schemes in 1986, the Trust has provided its PhD students with a stipend equivalent to the take-home salary of a graduate research assistant. This report has identified that the generous stipend provided by the Trust is important to students and they are very appreciative of it. However, the difference between Trust stipends and those provided by other research bodies is a cause of some embarrassment to some students. More importantly perhaps, the students surveyed were very aware that they would be faced with an immediate reduction in income in their first academic postdoctoral position unless the post was Trust-funded. This is true, in general, of holders of Trust personal awards at every level of academic seniority who either take up academic appointments or obtain fellowship support from other sources. It remains to be seen whether or not this situation can be used constructively by the universities in their lobbying of government for improvements in academic pay in general.

References

1. *Review of Wellcome Trust PhD Research Training: Career paths of a 1988–1990 Prize Student cohort.* London: The Wellcome Trust, March 2000.
2. *Survey of Postgraduates Funded by the Research Councils.* London: The Office of Science and Technology (OST), 1998, www.dti.gov.uk/ost/ostbusiness/index.htm.
3. *Trends in the Early Careers of Life Scientists.* National Research Council. Washington DC: National Academy Press, 1998.
4. *An Independent Review of Higher Education, Pay and Conditions.* Chairman Sir Michael Betts. London: The Stationery Office, 1999.

Appendix

Appendix A

Interview schedule for Wellcome Trust PhD award holders

GENERAL

1. When did you start working on your PhD?
   - 1995 ○
   - 1996 ○
   - 1997 ○
   - 1998 ○

2. What year of your PhD are you in?
   - 1 ○
   - 2 ○
   - 3 ○
   - 4 ○

3. In which department are you currently based?

4. What was your first degree [title and grade]?

5. When and where did you do your undergraduate degree?

   (a) Date/year .....
   (b) University .....
   (c) Department .....
   (d) Country (if not UK) .....

[tick box if current university is different than for undergraduate degree] ○

6(a) . Did you go on to study for your degree immediately after finishing school?

   Yes ○
   No ○ If NO

   (b) How long was there in between?
   (c) What did you do in the time between? .....

7(a). Did you go on to study for your PhD immediately after your undergraduate degree?

   Yes ○
   No ○ If NO

   (b) How long was there in between? .....
   (c) What did you do in the time between? .....

8. How old were you when your began working on your PhD? .....

9. Why did you decide to do a PhD?

- Something I always wanted to do ○
- Interested in continuing research ○
- Offered to you ○
- Encouraged you to apply ○
- Couldn't get another job ○

Other (explain) .....

10. How did you find out about the PhD opportunity that you're currently pursuing?

- Speculative enquiry/letter ○
- Tutor ○
- Colleague ○
- Advertisement ○

Other .....

11. When you chose this PhD project, were you also offered any other options of other PhD projects?

- Yes ○
- No ○

If yes, which and why did you choose this project? .....

12. Did you have a detailed knowledge of the subject area of your PhD?

- Yes – a lot ○
- Yes – a bit ○
- No ○

If yes, where from? .....

If no, what attracted you to this project? .....

13. Were you registered immediately for a PhD?

- Yes ○
- No ○

If no, what did you have to do to become registered? .....

TRAINING

14. What sort of hours do you tend to work?

(a) In the lab
Weekdays . . . . . .
Weekends . . . . . .

(b) Writing/in library?
Weekdays . . . . . .
Weekends . . . . . .

15. When you began work on your PhD, do you have most of the right skills to get started straight away?

Yes ○
No ○

If **yes**, where and how did you learn these skills? . . . . . .
If **no**, what skills did you need to learn? . . . . . .

16. Do you **now** feel that you have the research skills you need to complete your project?

Yes ○
No ○

17. Have you been on any training courses while working on your PhD?

Yes ○
No ○

if yes, please give details . . . . . .

18. Are there any other types of training you feel should be part of your PhD training?

Yes ○
No ○

If yes, please give details . . . . . .

LABORATORY EXPERIENCE

19. Around how many research staff work in your lab/group? . . . . . .

20. How many other PhD students are there working in your lab? . . . . . .

21. Do you know who they are funded by? . . . . . .

22. How much contact do you have with other PhD students? . . . . . .

23. From who do you **generally** get help and advice when doing your PhD lab research?

Supervisor ○
Other PhD students ○
Research fellows/postdocs ○
Research technicians ○

Other (explain) . . . . . .

24. And if you had a problem in the lab, from where do you get most immediate help?

Supervisor ○
Other PhD students ○
Research fellows/postdocs ○
Research technicians ○

Other (explain) . . . . . .

25. Does your supervisor ever do work at the bench?

Yes ○
No ○

SUPERVISION

26(a). How many supervisors do you have?

1 ○
2 ○
Graduate committee ○

Other (explain) . . . . . .

(b) What do you think about this? . . . . . .

27. Did you know your supervisor before starting your PhD?

Yes – well ○
Yes – heard of their name/reputation ○
No ○

Comment . . . . . .

28. Did you meet your supervisor BEFORE you began working on your PhD?

Yes ○
No ○

29. Were you/have you been involved in designing and selecting your PhD project?

	Designing	Selecting
Yes	○	○
No	○	○

[opinion on this?] . . . . . .

30. At what stage of their career is your supervisor?

Professor ○
Reader ○
Senior lecturer ○
Lecturer ○
Research fellow ○

Other (explain) . . . . . .

31. How many other PhD students does your supervisor supervise now?

None	○	4	○
1	○	5	○
2	○	6	○
3	○	7+	○

32(a). How often do you meet with your supervisor to discuss your research?

Daily ○
Weekly ○
Fortnightly ○
Monthly ○

Other (explain) . . . . . .

(b). How easy is it to get access to your supervisor?

Very easy ○
Quite easy ○
Difficult ○

other (explain) . . . . . .

33. Would you say meetings with your supervisor are generally formal or informal?

Formal ○
Informal ○

[Opinion on this?] . . . . . .

34. What do meetings with your supervisor generally involve? . . . . . .

35. Do you find these meetings helpful?

[Explain] . . . . . .

36(a). What do you feel your PhD Supervisor has contributed to your PhD project? . . . . . .

(b). What do you feel should be a Supervisor's role? . . . . . .

AWARD

37. What do you think about the level/amount of your financial stipend?

Very good ○
Satisfied ○
Not enough ○

Other [comment] . . . . . .

38. Do you do any other work for paid/unpaid?

Yes ○
No ○

If yes, prompt 'what do you do? [explain] . . . . . .

39. Have you been able to travel or visit conferences while doing your PhD?

Yes ○
No ○

[Explain] . . . . . .

40. Have you given or produced any of the following?

Departmental seminars [prompt for details] . . . . . .
Conference papers [prompt for details] . . . . . .
Publications [prompt for details] . . . . . .

41. Do you (realistically) expect to submit your thesis within three years/the period of your award?

Yes ○
No ○

[explain] .....

42. On balance, what do you feel is most appropriate length for a PhD research project?.....

[Explain; 'why do you say that?'] .....

ABOUT YOU

43. Do you remember what originally attracted you to science?

Family ○
Friends ○
Teachers ○
Media ○
Personality ○

Other [explain] .....

44. Was/is doing a PhD like you expected?

Yes ○
No ○

[Explain] .....

45. How would you describe 'doing a PhD' to someone else? .....

.....

46. What did/do you think will be the benefits to you of studying for a PhD?

Enable my scientific career ○
Improve my job opportunities ○
Career development ○
Personal development ○

Other [explain] .....

47. Do you think you are going to pursue a career in scientific research?

Yes ○
No ○

[Explain] .....

48. What (other) career areas would you consider? .....

.....

49. What do think have been the best and worst experiences involved in studying for your PhD so far?

(a) Best .....
(b) Worst .....

50. In which of your PhD years do you think you have learned and achieved the most?

1 ○
2 ○
3 ○
4 ○

Why? (explain) .....

51. Do you know what you will be doing after your PhD?

Got a job ○
Holiday ○
Travel ○

[prompt for details] .....

52. Would you recommend studying for a PhD?

Yes ○
No ○

[Explain] .....

53. "Finally, do you have any other comments on any aspect of doing your PhD? or how you think it could be developed or improved?"

54. ANY QUESTIONS you want to ask me/us?

Many thanks for your help.

Appendix B

PhD Final-year Student Meeting – Questionnaire

Please could you fill in the details below and answer the questions that follow.
The data will help to inform the Wellcome Trust about its future provision of PhD training.

All responses will be treated as aggregates and no comments will be attributed to individuals.

CURRENT RESEARCH

Name

Sex (please tick) ☐ Male ☐ Female

Type of Wellcome Trust PhD training award

Current university

Current department

PhD subject area (e.g. genetics, molecular biology, biochemistry)

ACADEMIC QUALIFICATIONS

First degree subject

Degree university

Degree department

Degree dates (start to finish)

Degree class (please tick) ☐ 1st class ☐ Upper second (2:1) ☐ Lower second (2:2) ☐ Third class ☐ Not applicable

A. ABOUT YOUR PHD

1 **(a) When did your Trust award begin?** (Please tick one box only)

☐ 1993 ☐ 1994 ☐ 1995 ☐ 1996 Month (Please specify)

(b) How old were you at the beginning of your Trust award? (Please tick one box only)

☐ 20–24 ☐ 25–29 ☐ 30+

(c) Did you start your PhD immediately after your degree?

☐ Yes ☐ No **If No go to (d)**

(d) What did you do immediately before starting your PhD? (please tick as many boxes as apply)

☐ Worked ☐ Travel ☐ Unemployed ☐ Other (Please specify)

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A. ABOUT YOUR PHD continued

2 **When do you expect to submit your thesis?** (Please tick one box only)

- ☐ in the next 1–3 months
- ☐ in the next 4–6 months
- ☐ in the next 7–9 months
- ☐ in the next 10–12 months
- ☐ other (Please specify) _____
- ☐ don't know

3 **How satisfied were you with the following aspects of your PhD studentship?** (Please tick one box on each line only)

	very dissatisfied	quite dissatisfied	neither satisfied nor dissatisfied	quite satisfied	very satisfied
Your PhD supervision	☐	☐	☐	☐	☐
Amount of contact with your PhD supervisor	☐	☐	☐	☐	☐
Level of contact with other PhD students	☐	☐	☐	☐	☐
Level of contact with other research staff	☐	☐	☐	☐	☐
Access to necessary experimental material (e.g. tissues, reagents)	☐	☐	☐	☐	☐
Access to necessary equipment/facilities	☐	☐	☐	☐	☐
The financial stipend received	☐	☐	☐	☐	☐
Opportunities to attend training courses	☐	☐	☐	☐	☐
Opportunities to attend conferences	☐	☐	☐	☐	☐

4 **How far do you agree with the following descriptions of 'doing a PhD'?** (Please tick one box on each line only)

	definitely disagree	tend to disagree	neither agree nor disagree	tend to agree	definitely agree
Enjoyable	☐	☐	☐	☐	☐
Just like I expected	☐	☐	☐	☐	☐
Increased my personal confidence	☐	☐	☐	☐	☐
Involved long working hours	☐	☐	☐	☐	☐
Stressful	☐	☐	☐	☐	☐
An isolating experience	☐	☐	☐	☐	☐
A good research training experience	☐	☐	☐	☐	☐
Has taught me useful organizational skills	☐	☐	☐	☐	☐
Has taught me useful presenting skills	☐	☐	☐	☐	☐
Will improve my career prospects	☐	☐	☐	☐	☐
Will help me get the job I want	☐	☐	☐	☐	☐
Was part of my career plan	☐	☐	☐	☐	☐
I would recommend studying for a PhD	☐	☐	☐	☐	☐

A. ABOUT YOUR PHD continued

5 **(a) As part of your PhD studentship you should have been invited to attend a Wellcome Trust 'Science Communication' workshop. Did you attend this workshop?** (Please tick one box only)

☐ Yes *Please answer part (b) and then question 6 onwards*

☐ No *Please answer part (c) and then question 6 onwards*

(b) How useful was this workshop according to the following criteria? (Please tick one box on each line only)

	not useful	quite useful	very useful
Improving my communication skills	☐	☐	☐
Improving my presentation skills	☐	☐	☐
Meeting other PhD students	☐	☐	☐

(c) Why did you not attend this workshop? (Please tick one only)

I was not invited ☐

I was not able to attend on the specified date ☐

I did not want to attend ☐

Other (Please specify) ☐

6 **What are you going to do immediately after completing your PhD?** (Please tick one box only that best fits your situation)

I have a job as a postdoc/researcher in academia in the UK ☐ (Please give details)

Department

Group leader or equivalent

University **Start date**

Length of contract **Funding source**

I have a job as a postdoc/researcher in academia outside the UK ☐ (Please give details)

Department

Group leader or equivalent

University **Country**

Start date **Length of contract**

Funding source

contd →

A. ABOUT YOUR PHD continued

6 I have a research job outside academia ☐ (Please give details)

Organization

Position title **Start date**

I have a non-research job outside academia ☐ (Please give details)

Organization

Position title **Start date**

☐ Travel ☐ Don't know

☐ Other (Please give details)

7 **(a) Do you intend to follow a career in scientific research?** (Please tick one box only)

☐ Yes *Please answer question 8 onwards*

☐ No *Please answer part b and question 8 onwards*

(b) Why do you not intend to pursue a scientific research career? (Please tick as many boxes as apply)

☐ I am no longer interested in research

☐ I do not see myself as a career academic

☐ I do not think I am good enough

☐ Academic research does not pay enough money

☐ I want a job with higher status

☐ I want a job with greater job security

☐ Other (Please specify)

8 **How important to you are the following job attributes in your career choice?** (Please tick one box on each line only)

	not important	quite important	very important
Interesting and creative work	☐	☐	☐
Work that makes a positive contribution to society	☐	☐	☐
The chance to do innovative work	☐	☐	☐
High status	☐	☐	☐
Independence	☐	☐	☐

contd →

A. ABOUT YOUR PHD continued

8 **How important to you are the following job attributes in your career choice?** (Please tick one box on each line only)

	not important	quite important	very important
Working as part of a team	☐	☐	☐
Job security	☐	☐	☐
A competitive salary	☐	☐	☐
Opportunities for promotion	☐	☐	☐
Continual skills development	☐	☐	☐
Opportunity to take managerial responsibility	☐	☐	☐
Opportunities for an international career	☐	☐	☐
A competitive work environment	☐	☐	☐
Time to pursue my own interests	☐	☐	☐
Working with people with whom I enjoy socializing	☐	☐	☐
Time to pursue leisure interests	☐	☐	☐

B. ABOUT YOU

9 **What originally attracted you to science?** (Please tick as many boxes as apply)

☐ Basic interest in science

☐ Influence of previous employer

☐ Influence of parents

☐ Influence of siblings

☐ Influence of friends

☐ Influence of media (e.g. TV programme/personality) (Please explain)

☐ Other (Please explain)

10 **How interested are you in the following types of books, TV or radio programmes?** (Please tick one box on each line only)

	not interested	quite interested	very interested
Science	☐	☐	☐
Medical	☐	☐	☐
Documentaries	☐	☐	☐
News and current affairs	☐	☐	☐
Science fiction	☐	☐	☐
Nature and wildlife	☐	☐	☐
Music	☐	☐	☐

B. ABOUT YOU continued

11 **Which of the following magazines and journals do you read regularly (e.g. two out of every three issues)?**
(Please tick as many boxes as apply)

- ☐ BMJ
- ☐ New Scientist
- ☐ Scientific American
- ☐ Nature (and associated publications)
- ☐ Science
- ☐ Lancet

12 **How far do you agree with the following statements about topical issues in science?**
(Please tick one box on each line only)

	definitely disagree	tend to disagree	neither agree nor disagree	tend to agree	definitely agree
(i) "Scientific research should be accompanied by careful consideration of the ethical implications of that research"	☐	☐	☐	☐	☐
(ii) "Society should value the contribution of scientists"	☐	☐	☐	☐	☐
(iii) "More resources should be invested in the public understanding of science"	☐	☐	☐	☐	☐
(iv) "The development of genetically modified plants and animals is required to advance biomedical science"	☐	☐	☐	☐	☐
(v) "There should be free, universal access to all human genome data"	☐	☐	☐	☐	☐
(vi) "The use of animals should be allowed in biomedical experiments"	☐	☐	☐	☐	☐
(vii) "Consideration of other sciences are important to biology"	☐	☐	☐	☐	☐
(viii) "The use of human fetal material should be allowed in biomedical research"	☐	☐	☐	☐	☐
(ix) "Patients should have access to the most up-to-date medical treatments, irrespective of cost"	☐	☐	☐	☐	☐

13 **Do you have any other general comments about your PhD studentship?** (Please write below)

Many thanks for your cooperation

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