

# Jobs – A Crisis for Everyone

**Pierre Averbuch from the Centre de Recherches sur les Très Basses Températures, Grenoble, and until recently the Vice-Director of the Association Bernard Gregory, in commenting on the crisis in the job market for young scientists, argues that the optimism of 50 years ago should not be thrown out of the window for one risks sending young physicists the same way.**

In the years following the 2nd World War, the general opinion, and especially the opinion of funding agencies, was that science represented “the new frontier”, as asserted by the title of a book by Vannevar Bush. Taxpayers agreed, and in consequence politicians, notably members of Parliaments who were responsible for distributing money. Everybody thought that collective investment in research could only be a factor for mankind’s progress.

The number of scientists was not so large, and the attraction of science and a relative increase of the standard of living obliged universities and, for us, the science faculties to expand. So every new PhD could become, at least to start with, an assistant professor. Thesis advisors did not have to worry about the future of their students, and could train them to become identical to their masters. Until the end of the 1960s or the beginning of the 1970s, this was the rule. Of course, some of our research students left their alma mater for industry; it was for them a deliberate choice and there was no need to specially prepare any of them for this change. Furthermore, there were major research departments in many companies, so the switch from university to industry was done without a sudden change, the industrial research centres having an activity not so very different from that of university labs. The purpose of research was different, but the methods were the same, and even if PhDs did not spend their

whole life in their company’s research centres, the transformation into engineers and business-people was an adiabatic one.

During the 1970s, when the expansion of universities was slowing down, the transfer of PhDs to industry became more frequent. In some countries, this was not an easy thing since few professors had the contacts with companies needed to prepare the transfers. And research students were afraid of the industrial world – it was a *terra incognita* for their thesis advisors and, consequently, for them. Company managers were afraid to recruit these young people, whom they knew were qualified, but they did not know for what. In France, there was a need to create a special institution, the *Association Bernard Gregory*, to help promote the hiring of PhDs by companies. In any event, a new “demographic” dynamical equilibrium was created, and it worked until the beginning of the 1990s.

## The Equilibrium is Upset

A few years ago, following the example of United States, many countries, decided to increase the rate of PhD production. The idea was that many university professors were soon to retire. The need to recruit good people induced an increase in the number of PhD grants; it was also assumed that the volume of research done by industrial companies would increase. University professors would be satisfied: they wanted to have as many as possible research students, and they were at least given a few more. As long as one could believe that students were not going to die from starvation it was unnecessary for professors to worry about what would become of their students after their PhDs if they do not stay in university labs. If they took up a postdoc fellowship after a PhD, they would die beyond the horizon, a horizon nobody saw and nobody cared about.

The present status of the job market shows very clearly that this increase in the number of PhD grants was unjustified. One can even suggest an explanation for the source of the error. The professors who

belonged to the committees where the recommendation to increase the number of the PhDs was made, were professors in old, well-established universities. It is true that many of them were soon to retire. There were also many new universities, for the growing number of students obliged governments and local authorities to create them. Their professors, trained in the old ones, were still young, so, on the whole, the percentage of departures to retirement, was not that of a system in a dynamic demographic equilibrium; it was much lower. It should also be recalled that these new campuses absorbed many PhDs in the critical period in the 1970s.

The increase in the flux of new PhDs, created by governments who followed the recommendations of scientists, came at precisely the time when the research activity of many industrial companies was slowing down. It is not so easy to understand why this slowing down happened. The cutback in military programmes that accompanied the end of the cold war does not seem to have been the only cause. Vannevar Bush’s statement clearly became less popular. The general public, which had seen many changes in its way of life owing to innovations, started to be tired by them. Many people discovered that the changes were not cost free; they refused to pay the price and wanted to return to an idealised past. They forgot, of course, that in those old, golden ages, life was harder, energy was scarce and many people could not afford to eat meat as it was too expensive when animals were only fed with grass.

In any event, it is true that research became less popular, with two possible exceptions – astronomy which makes people dream, and medical research because everyone is afraid of disease and death. As for industrial companies, they have to survive in a difficult competitive environment, and they feel that it is not so easy to make long-term investments when they know that they will have to overcome an increasing number of obstacles.

## Data Paint a Difficult Picture

One can look quantitatively at the present status of job market for PhDs. Owing to a normal reflex to see the data as if they describe a steady state, life may in fact be worse than it appears. I start with France, with which I am of course relatively familiar. The production of PhDs is of the order of 9000 to 10000 a year, and increasing (this includes social sciences and the humanities, but not medical PhDs who are not research PhDs). One in three

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**Pierre Averbuch**, a solid-state physicist, and former Chairman of the EPS Metal Physics Section, started to organize a job market for PhDs in the early-1970s. The purpose initially was to help young physicists, but the French Government, informed about what was only an experimental activity, decided upon a generalization, and created the *Mission à l’Emploi Scientifique*. This was later transformed into the *Association Bernard Gregory*, a non-profit organization of which Dr. Averbuch was the Vice-Director until last June. Its activities include job market information, notably via communication with postdocs thanks to Internet (<http://abg.grenet.fr/abg/>). The Association also organizes week-long seminars for French PhD students that are designed to show them how they can succeed in non-research activities by acquiring some essential non-technical skills and knowledge.

of these PhDs is awarded to foreigners, and one in two of these foreigners will return home and not enter the national job market. The number of positions to be found is thus between 7500 and 8000. The universities and the government laboratories offer every year a few more than 3000 positions; the industrial labs about 1000. A further 1000 take up positions in administration and secondary school teaching. So the deficit in the number of permanent positions required each year is somewhere between 2500 and 3000.

Data for other countries are not so very different, the annual production of PhDs being of the order of 45000 in the European Union, and 25000 in the United States, excluding humanities. The figure for the US comes from a report written by a committee appointed by the US National Academy of Sciences, the National Academy of Engineering and the Institute of Medicine. The report tries not only to describe the situation, but makes some suggestions about what to do; its title makes the recommended direction quite clear: *Reshaping Graduate Education*, with the subtitle *Training Them for the Jobs They Can Find*.

### A Tunnel with No Exit

Let us now remind ourselves that the job market is a world market, and that two simple rules describe it: only one PhD in three will find an academic position; only one in two will find a research job (it is unnecessary to use the future tense when one speaks of permanent positions). If the disaster is not evident it is because new PhDs are, generally speaking, taking up postdoctoral positions well away from the place where they were research students. As remarked above, this has the advantage of allowing advisors to avoid worrying about their students' futures. But this solves nothing for the world as a whole.

It has become a fact of life that after a contract, many postdocs have no choice other than to try to find a new one; the case of people older than 40 wandering from yearly contract to yearly contract from the time of their PhD is no longer a singularity.

Some of these postdoc positions are paid for by industry. There is at present a fashion in the world of management "to concentrate the activity of the company on core business where it is making money"; everything else is subcontracted to other specialized firms. This is also the case for the more far-seeing parts of research. On the other hand, many universities lack

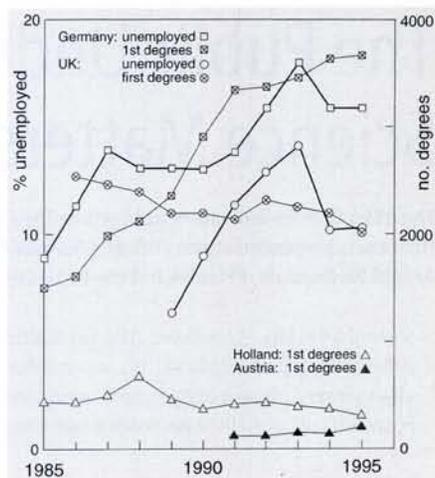
## Physics Employment

Data reported at a special symposium *European Opportunities for Young Physicists: Status and Trends* which was organized at the EPS-10 General Conference (Sevilla; 9-13 September 1996) by young physicists showed that the employment situation differs greatly between countries. For example, while the UK, Holland and Austria have stabilised the number of first degrees awarded annually, the number awarded in Germany has been increasing continuously (see figure). Second, for physicists who started studying within a given period, the percentages unemployed in mid-1994 to early-1995 were as follows: Italy ('88-'92; 1st deg.): 8%; Holland ('79-'86; 1st deg. + PhD): 13%; Finland ('90-'95): 2.4%. On the positive side, one notes that the percentages of physics graduates in Germany and the UK who did not find employment after 1 one year has finally started to decrease following a steady increase (see figure). The next issue of *Europhysics News* will give a full analysis.

money for their own research, the creation of new labs not having been followed by a large increase in research budgets. So the labs are prepared to carry out research under contract to industrial companies. Governments foster such a policy, for they are happy to see that research is done for a practical purpose. And some studies, which would have been undertaken in company labs are now carried out to order by postdoc fellows in university labs.

This would not have been an important change if the PhDs recruited for industry labs spent their whole career in the laboratory. But it is well known that a scientist's lifetime in an industry lab is of the order of five to six years. For they move elsewhere in a company, following a product to development, manufacture and commercialization. Or they simply move because they are offered something interesting. They can be offered such opportunities because they already belong to a company: if they are in a university lab working under contract, nobody proposes anything to them. So, the sub-contracting habit closes a mechanism for the evaporation of scientists to other activities, and it will change drastically the overall dynamic equilibrium of our profession. There is no exit to the postdoc tunnel.

Since this new industrial policy is only a few years old, it can be predicted that in the next two or three years, what the French postdoc forum on the WWW calls "the storage ring of postdocs" will be saturated. There will be a crisis with something like 50000 to 100000 postdocs wandering the world, like tramps during the Depression of the 1930s in United States. And who will care about these qualified people's inability to integrate into what everybody would call a normal activity?



First degrees and the percentage employed after 1 year.

### Adapt According to Reality

One solution depends on the belief that only people who have an absolute need for such-and-such a level of qualification should be allowed to achieve this level. But this is a minimal position, and if things are changing, a lack of qualified people can develop. Another possibility is not to restrict the number of people admitted to a level, but to let them know that there is no guarantee of obtaining a job which is as qualified as they would maybe hope for. This can also create disappointment. In the case of PhDs in science, it means reducing the number of grants. But is this possible? Who will forbid a city council awarding a grant to some young, local, adequately intelligent student? There is in fact no way to escape an overproduction of qualified people, especially PhDs.

There is nothing inherently wrong with this, and many interesting engineering, business and managerial positions are waiting for PhDs, if they are prepared to conquer them. They have to appreciate the true state of the job market, and to adapt their hopes to what is realistic. Great Britain has organized for more than 20 years special weekly training sessions for PhD students to prepare them to make their living in industry; a similar scheme has been experimented with in France since 1994. In United States, where people are not afraid of drastic solutions, the report quoted above speaks of "non-research PhDs". They may be going too far, but in the right direction. The description of the present situation clearly shows that something must be done if one does not want the 50 year-olds who started out with Vannevar Bush's enthusiasm to finish by throwing out science, its products and scientists, especially the younger ones.