

The many dangers of relying on a DNA database

It may be convenient for the police, but the use of DNA as evidence is full of pitfalls.

Sir—Everyone's DNA profile should be included in a database, according to Robert Williamson and Rony Duncan in their Commentary "DNA testing for all" (ref 1.). This approach has much to recommend it to the police and the prosecution, but it will do little to increase the accuracy of any prosecution in terms of justice.

In Correspondence², David Ehrenfeld invokes a 1907 detective story to comment on problems of classical fingerprinting still relevant today³. If such problems are still arising after nearly 100 years, how much more likely are problems with a universal DNA-profile database only a few years after the introduction of this technology?

One such problem concerns depositing DNA by touch when items are handled. It is possible to detect such handling successfully⁴, a fact already used in a criminal case in Canada⁵. Who can remember every item that he or she has touched for longer than one minute in the past week? When the knife you used in a restaurant is identified as a murder weapon, what is going to be your defence?

There are other major problems associated with a universal DNA-profile database. Would foreign visitors be profiled on entry? What happens if the person who matches the crime-scene DNA

profile has an alibi at a distant place? The database proposal places a reverse onus on accused people to show their innocence, even when there is no other evidence to link them to the crime. What are the error rates for each step in the DNA-profiling procedure? Because the probability of a duplicate match is so low, bayesian theory suggests that when there is no other evidence, error is likely to be a higher probability than a correct match.

Although the safeguards Williamson and Duncan suggest are implementable in the United Kingdom, Australia and other industrialized countries, they are impossible in countries such as South Africa because the cost of independent forensic laboratories is prohibitive. In many countries, most sample collection is done by police officers, not scene-of-crime scientists, and a lack of resources makes independent testing impossible. Samples from suspects, even in the United Kingdom, are taken at police stations. Would independent DNA-testing stations be set up?

Finally, of course, computerized DNA databases are no more immune to hacking than any other database.

The criminal-justice system is weighted against the defendant in many countries.

The defendant often uses a legal-aid lawyer with little or no knowledge of DNA profiling; he or she is in front of a judge with little or no experience of DNA evidence; the defence is only informed of any DNA evidence a couple of days before the trial starts, resulting in little or no chance to verify independently data presented to the court, let alone reprofile the sample.

I accept without reservation that DNA evidence is a very useful tool in criminal prosecutions. However, the police and forensic services in the United Kingdom have at times failed to obey the rules with regard to DNA evidence (see, for example, cases referred to the Court of Appeal Criminal Division, refs 6 and 7). Even now, the system has faults that need to be addressed before any future developments are considered.

Ralph Kirby

Department of Biochemistry, Microbiology and Biotechnology, Rhodes University, PO Box 94, Grahamstown, South Africa 6140

1. Williamson, R. & Duncan, R. *Nature* **418**, 585–586 (2002).
2. Ehrenfeld, D. *Nature* **418**, 583 (2002).
3. Cyranoski, D. *Nature* **417**, 676 (2002).
4. van Oorschot, R. A. H. & Jones, M. K. *Nature* **387**, 767 (1997).
5. R. v. Xie [2000] ABOB 478.
6. R. v. B [2000] EWCA Crim. 42.
7. R. v. Weir [2000] EWCA Crim. 43.

Could we trust every future government?

Sir—R. Williamson and R. Duncan's inference in their Commentary recommending DNA testing (*Nature* **418**, 585–586; 2002), that governments can be trusted throughout people's lifetimes, is demonstrably false. Their proposed independent DNA database and laboratories could be safeguarded against many, perhaps all, misuses, but could never be protected from coercion by the state.

In the recent past, homosexuality was illegal in the United Kingdom and being a Jew was illegal in Germany. Neither of these attributes is deducible from someone's DNA, of course, but it is not outside the realms of possibility that, in future, traits that have been declared 'illegal' could be detectable in this way. Names and addresses of people falling into some 'illegal' category would then be instantly accessible.

Freedom is valuable because it has taken many generations to build, yet it can be demolished in the time it takes to fight a

war or the single day necessary to hold an election. A state cannot be trusted to host independent records of people's DNA for their entire lifetimes, particularly if we cannot remember abuses against freedom that happened within living memory.

Adrian Bowyer

Department of Mechanical Engineering, University of Bath, Bath BA2 7AY, UK

Planted 'evidence' weakens case for DNA

Sir—R. Williamson and R. Duncan in their Commentary (*Nature* **418**, 585–586; 2002), recommend universal testing "as a deterrent from crime for all members of the community [that] would make the task of catching criminals easier for police".

The obvious flaw in this proposal is the ease with which biological material can be moved from one place to another. Anyone with criminal intent could simply collect biological material (cells from a toothbrush, perhaps?) and plant the evidence at the scene of their crime. In the society proposed by Williamson and

Duncan, respect for DNA evidence would be total, and thus innocent people would more easily be convicted.

Oliver Flint

Bristol-Myers Squibb, PO Box 5400, HW17-2.04, Princeton, New Jersey 08543, USA

Free consanguinity testing for all

Sir—In their recent Commentary (*Nature* **418**, 585–586; 2002), R. Williamson and R. Duncan discuss the use of universal neonatal DNA screening for forensic purposes. Such an approach would take a huge investment for at least 20–30 years before showing any benefit in terms of crime prevention. It also seems bizarre to treat each individual as likely to commit a serious crime from the time of birth!

Free DNA testing for all is essential, but for very different reasons. In most cultures, at least a small percentage of children are born through infidelity. Added to that, as many as 10% of couples now use assisted reproduction, often involving the use of gametes from unknown donors. Children

born through such practices are likely to be of similar age and to grow up in the same area. A significant percentage of couples may, unknowingly, be closely related.

These serious problems have not received sufficient attention, and are likely to be contributing to the birth of children with serious genetic conditions. It is therefore essential that the availability of wider reproductive choices in modern society should be coupled to education about the risks of consanguinity and the provision of free DNA testing for all people of reproductive age, competently administered by an independent authority under strict regulations. This would empower every couple to make an informed choice, based on their genetic relatedness, on whether to proceed with childbearing or to seek alternative solutions. Such a service will result in immediate benefits for both the participating individuals and society at large.

The information acquired through consanguinity testing should be archived by the testing authority to facilitate long-term follow-up. The consanguinity database could be made accessible to the police authorities searching for matches with samples taken from crime scenes, but the identity of any positive samples should be revealed to the police authorities only after proper, independent authorization.

Consanguinity testing can thus complement DNA profiling of convicted individuals by police authorities, without the negative connotations of neonatal DNA screening.

Panos Ioannou

*Cell and Gene Therapy Research Group,
Murdoch Children's Research Institute,
Royal Children's Hospital, Flemington Road,
Parkville, Victoria 3052, Australia*

Why response-mode research loses out

Sir— Knowledge inferred from DNA sequences can make an important contribution to taxonomy, as discussed in Correspondence by Diethard Tautz *et al.* (*Nature* **418**, 479; 2002). But I fear that structural research-funding problems stand in the way of initiatives such as this, at least in the United Kingdom.

No charitable foundation is dedicated to the support of work in non-medical evolution and taxonomy; the UK's Natural Environment Research Council (NERC) is the main funding agency. However, as witnessed by my drawerful of alpha-rated but unfunded proposals, it does not appear to have enough money to go around. Systematic sequencing is a long-haul activity that needs long-term, modest

funding. But proposals for the continuation of any line of work have to compete with the entire range of what is newest and best in the field (in my case, the whole of marine science), a competition that no proposal to do “more of the same” can possibly win, no matter how rare or how choice the samples.

Worse still, despite all the evidence that centralization leads to waste and failure, NERC sequesters a large proportion of its funds in thematic programmes, which many believe distort the research enterprise and give preferential funding access to largely self-selected coteries. Two questions that cannot be answered are these: “How many funded thematic projects would have succeeded in open competition?” and “Do thematic programmes provide better science than the (many more) response-mode proposals that would otherwise have been fundable?” History provides the best guide to an answer. Before research councils were invented and before they started controlling research direction, British science was internationally well-regarded and successful. Is it still? How about a decade or two of response-mode-only funding, with all proposals in equal and open competition?

Bernard L. Cohen

*Institute of Biomedical and Life Sciences, Division
of Molecular Genetics, University of Glasgow,
Pontecorvo Building, Glasgow G11 6NU, UK*

Europe is not yet ready for a research council

Sir— The suggestion of a European Research Council (ERC) is again in the news (*Nature* **419**, 108–109, 2000; *Nature* **418**, 259, 2002). In the context of continued underfunding of basic research in many European Union (EU) countries, with the possible exception of the United Kingdom, and the limitations of EU Framework funding, an alternative source of funds for competitive grants has to be welcomed. However, there are many problems to be anticipated if the ERC is to be effective.

Setting up an ERC now would be premature. First, the chronic state of underachievement by most EU countries in the basic sciences desperately needs attention. Governments and national funding agencies must spend substantially more money, and seriously promote more democratic and satisfying career structures, permitting scientists to fulfil their potential. Failing this, we shall never be able to compete at the European level with the United States. There seems little sign that EU member states realize the seriousness of the situation.

In principle, an ERC with an adequate level of funding and a mechanism for administering funds could at some stage make European science more competitive. But an ERC with a life-science budget less than that of the NIH, or similar to that of the UK's Wellcome Trust, for example, will be inadequate and counterproductive. Equally, an ERC that is subject to the constraints of the over-bureaucratic Framework programmes would be a disappointment. To be effective, an ERC would also need to have the means, the will, the power and the independence to change attitudes. It would need to set standards of training, career development and salaries for young scientists in much the same way as the Wellcome Trust over the past 15–20 years has dramatically raised standards in the United Kingdom.

It seems inconceivable that EU member states, many of whom underfund and fail to democratize their own national research bases, will sufficiently fund a supra-national agency which they could perceive as undercutting their control over scientific policy. Any significant input of funds from the current Framework programmes, already inadequate in relation to demand, also seems unrealistic.

If insignificant amounts of money are made available to an ERC, why bother with it? It would be just another peripheral funding body, allowing member states to shrug off the more serious problems at home. In the life sciences, member governments could more effectively simply increase their contributions to the Human Frontier Science programme (well administered but chronically short of funds), or to the European Molecular Biology Organisation (EMBO) to allow expansion of its excellent graduate-student and postdoctoral programmes.

I. Barry Holland

*Institut de Génétique et Microbiologie,
UMR-CNRS 8621, Bat. 409, Université Paris XI,
91405 Orsay cedex, France*

See also the Commentary, pages 249–250 of this issue — Editor, Correspondence

Element of confusion

Sir— I enjoyed your News Feature “A very brief encounter” (*Nature* **418**, 815–816; 2002) on the very heavy elements and their reactivity. I was a little perplexed, however, by the periodic table on page 816 that identified element 110 as H, particularly as H is already included elsewhere in the table (correctly) as element 1, hydrogen. Element 110, of course, is not yet named.

Richard Joyner

*Department of Chemistry and Physics,
Nottingham Trent University, Burton Street,
Nottingham NG1 4BU, UK*