



Hildt: favours idea of ombudsmen.

stress the importance of issues such as establishing clear lines of responsibility in a research team, of conducting experiments in an open way, of good lab notebooks and archiving of data, the value of mentors and the teaching of good practice to young researchers, and responsibility in publishing.

In addition, the DFG guidelines recommend the appointment of an institution ombudsman, a sort of official 'uncle' with whom young researchers could discuss in confidence their concerns about dishonesty in their laboratories. The Herrmann and Brach affair had revealed how dangerous the hierarchical culture of a German laboratory can be, since most young scientists are afraid to challenge the all-powerful figure of the professor.

But, while most researchers accept that codes of good practice are important in raising awareness, they also accept that such codes cannot in themselves eliminate misconduct: the culture of a particular laboratory, and its individuals, can always connive to ignore or undermine them.

According to Eberhardt Hildt, the whistle-blower in the Herrmann and Brach case, it would have helped if there had been an ombudsman at the Max Delbrück Centre for Molecular Medicine in Berlin, where he worked with the two researchers. It was Hildt's PhD supervisor in distant Munich who acted in this capacity and helped him to bring the affair to the attention of a disbelieving community. But, he says, good notebook keeping would not have helped.

In contrast, one young PhD student, who declines to be identified for fear of retribution, says that an ombudsman would not have helped him to expose the wrongdoing he witnessed. He was nearly driven out of research by his undergraduate experience of regular, and unexposed, manipulation of data by group leaders in a big university laboratory in Germany where he conducted his final-year project.

Young scientists in the laboratory where the young PhD student witnessed misconduct judged the risk too high to make it worth exposing what they saw as "minor misconduct" — the exaggeration of the number of controls, or the omission of data points to clean up a graph, to speed the path to publication.

He says the laboratory chief, a successful but demanding task master, is almost certainly unaware that his group leaders are massaging data, and conducting experiments that they do not report at lab meetings, in order to have results to show him in a dry period. "For

the group leaders it is not fraud or deviation from good practice: it is good tactics," says the student.

Enforcing good practice

The DFG predicted that most universities, which guard their independence closely, would need a serious incentive to introduce procedures for handling fraud allegations and encouraging good scientific practice. So it states in its own guidelines that institutes which do not have rules by 2002 will not be eligible to receive its funds.

The threat seems to have worked: ten out of 82 universities have brought out guidelines and, according to Josef Langer, general secretary of the German Universities Rectors Conference, the others have all agreed to do so.

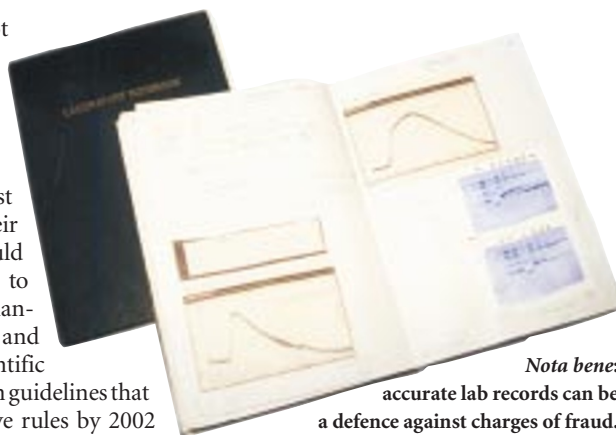
Britain's research councils have developed a less direct way of persuading universities to adopt codes of practice. By requiring grant holders to sign a statement that the work will be carried out in institutions with acceptable codes of practice, they transfer responsibility to the grant holder if misconduct occurs.

So far French universities are not being pressured to adopt codes of practice. A spokesman for the French University Presidents Conference insists that such codes are not necessary "as university science is intrinsically honest". A similar situation exists in Italy.

US research organizations operate an assurance system in grant giving, similar in principle to the new system of the UK research councils. To be eligible for grants, institutions must agree to their research being conducted and monitored according to a long list of conditions, which include the substance of the good practice codes being discussed in Europe. The enthusiasm with which good practice is enforced varies greatly between institutions, however. The NIH encourages awareness by offering training grants for young scientists with the stipulation that they must be taught research ethics.

Reparations

Most institutes try to ensure that papers are retracted when a scientific misconduct case is proven. But research organizations in Ger-



Nota bene: accurate lab records can be a defence against charges of fraud.

many in particular have made it a priority to devote substantial energy to isolating and repairing damage to the research community incurred by scientific fraud.

To disentangle truth from lies in the Herrmann and Brach affair, for example, the DFG and the Mildred Scheel Foundation — which had both given grants to the two researchers — set up an investigation to trace the history of the fabricated data, and determine if the alleged practice of fabrication had spread to other institutes from Herrmann and Brach. The investigators used software to analyse the components of data presented in the 550 papers and 80 book chapters written by Herrmann and Brach, and some former colleagues (see figure opposite). It will take 18 months to complete, and the results, detailing the corrected record, will be published in an international journal.

In a similar fashion, the Max Planck Society required its Institute for Plant Breeding in Cologne to repeat all the experiments reported in papers that had relied on assays that a technician later admitted she had manipulated (see *Nature* 393, 293; 1998).

This task was completed within a few months with the help of researchers from within the institute and from outside. The results, and the list of papers that contained data that cannot be reproduced, are being published this month in the *Plant Journal*.

Research organizations in other European countries, as well as in the United States, have expressed admiration for this commitment to damage limitation. But none has, as yet, decided that it should do the same. □

Guidelines on the web

The following websites include further details of guidelines on good scientific practice or guidelines for handling allegations of scientific misconduct, in English.

- US Office of Research Integrity
ori.dhhs.gov/regguide.htm
- UK Medical Research Council
www.mrc.ac.uk/mis_con.pdf
or www.mrc.ac.uk/w_n1.html

● UK Biotechnology and Biological Sciences Research Council

www.bbsrc.ac.uk/opennet/structur/hrg/sciconco.html

● Germany's Max Planck Society

www.mpg.de/fehlengl.htm

● Deutsche Forschungsgemeinschaft

www.dfg.de/aktuell/self_regulation.htm

● Danish Committee on Scientific Dishonesty

www.forskraad.dk/spec-udv/uvvu/