



## RULES OF GOOD SCIENTIFIC PRACTICE

- adopted by the Senate of the Max Planck Society on 24 November 2000 -

### *Preface*

*Scientific honesty and the observance of the principles of good scientific practice are essential in all scientific work which seeks to expand our knowledge and which is intended to earn respect from the public. The principles of good scientific practice can be violated in many ways - from a lack of care in the application of scientific methods or in documenting data, to serious scientific misconduct through deliberate falsification or deceit. All such violations are irreconcilable with the essence of science itself as a methodical, systematic process of research aimed at gaining knowledge based on verifiable results. Moreover they destroy public trust in the reliability of scientific results and they destroy the trust of scientists among themselves, which is an important requirement for scientific work today where cooperation and division of labor are the norm.*

*Although dishonesty in science cannot be fully prevented through sets of rules alone, appropriate precautions can nevertheless guarantee that all those involved in scientific activity are regularly made aware of the standards of good scientific practice. This is an important contribution to limiting scientific misconduct.*

*The basic rules of good scientific practice set out here take up the relevant recommendations of the Deutsche Forschungsgemeinschaft of January 1998 and adapt them to the research conditions at the Max Planck Society. They are binding on all persons active in research work at the Max Planck Society. For further information on the background and issues involved, please refer to the paper on "Verantwortliches Handeln in der Wissenschaft" (responsible practice in science) prepared by a working group of the Scientific Council of the Max Planck Society, and approved by the Senate of the Max Planck Society at its meeting of 24 November 2000. This text gives a detailed analysis of the conditions for and specific dangers to good, responsible scientific practice. It is also a plea for cooperation in the further development of the relevant recommendations.*

## **1. General principles of scientific practice**

The following regulations are to be observed as general principles of scientific research at the Max Planck Society:

### a) Regulations governing day-to-day scientific practice

- precise observance of discipline-specific rules for acquiring and selecting data,
- reliable securing and storage of primary data; clear and comprehensible documentation of all important results,
- the rule of systematic scepticism: openness for doubt, even about one's own results and about the results of one's own group,
- a realisation of tacit, axiomatic assumptions; watchfulness for any "wishful thinking" motivated by self-interest or even morals; systematic alertness for any possible misinterpretations as a consequence of the methodically limited ascertainability of the object of research (over-generalisation).

### b) Regulations governing relations with colleagues and cooperation

- no hindrance of the scientific work of competitors, for example by delaying reviews or by passing on scientific results which have been acquired in confidence,
- active promotion of junior scientists' scientific qualifications,
- openness to criticism and doubt expressed by other scientists and team colleagues,
- careful, non-self-interested and unprejudiced assessment of colleagues; avoidance of bias.

### c) Regulations governing the publication of results

- publication on principle of results obtained through public funding (principle of the public availability of the results of basic research),
- publication also of falsified hypotheses in an appropriate manner and admission of mistakes (principle of a science culture open to the possibility of error),
- strict honesty in the recognition and appropriate consideration of the contributions of predecessors, competitors and colleagues (principle of recognition).

## **2. Cooperation and leadership responsibility within working groups**

The head of each institute or research establishment is responsible for a proper organisation which ensures clear allocation, depending on the size of the individual scientific working units, of the tasks of leadership, monitoring, conflict resolution and quality control and guarantees that these tasks can in fact be undertaken.

Cooperation in scientific working groups must be organised in such a way that the results achieved in specialised areas within the particular undertaking can be reciprocally aired, criticised and integrated into the general body of knowledge, regardless of any considerations of hierarchy. This is also of particular significance for training junior scientists in the group towards independence. In larger groups a regulated form of organisation is recommended, e.g. through

regular colloquiums. Reciprocal checking of results is to be assured, even if this entails making one's own results accessible. The primary test of a scientific result is its reproducibility. The more surprising, but also the more desirable a result is, the more important it is - as far as is possible with justifiable expense or effort - that the route to that result be independently repeated within the research group before the results are passed on to the outside.

Leadership roles in working groups can only be performed responsibly in the full knowledge of all relevant circumstances; the leadership of a working group demands expertise in the field, presence and a broad perspective. Where this may no longer be possible to the desired level, because of the size of the group or for other reasons, the leadership functions must be delegated in such a way that the leadership division remains manageable.

### **3. Guidance for junior scientists**

Particular attention should be given to the training and furthering of junior scientists and to guiding them in the observance of the principles of good scientific practice. Attention is drawn here to the special significance of good cooperation with the universities in this context.

In the departments and working groups at the institutes and research establishments of the Max Planck Society, appropriate care should be taken of junior scientists, in particular of undergraduate diploma candidates and doctoral students and younger postdocs and those writing theses to qualify as university lecturers. Primary contact persons should be in place for these junior scientists. In the case of doctoral students it is recommended that in addition to the primary contact person, two other experienced scientists also be involved in their guidance. Appropriate cooperation with the university at which the candidate is to take the doctorate should also be ensured (Thesis Committee).

### **4. Securing and storing primary data**

Primary data as a basis for publications must, as far as possible, be stored for at least ten years on durable, secure carriers in the institutes or research establishments in which they arose. Access to the data has to be granted for persons with a justifiable interest.

Scientific examinations, experiments and numerical calculations can only be reproduced or reconstructed if all the important steps are comprehensible. For this reason, full and adequate reports are necessary, and these reports must be kept for a minimum period of ten years, not least as a source of reference, should the published results be called into question by others.

The institute management is responsible for regulating and setting out in writing all further details and responsibilities, in particular for detailing proper reporting standards and access regulations for the use of data.

## **5. Scientific publications**

Publications are the most important medium for the dissemination of research results to the scientific community and to the general public. Through this medium authors publish results for the scientific reliability of which they accept responsibility. Publications which report on new scientific results, must therefore describe the results and the methods used fully and comprehensibly, and give full and correct credit for own and third-party preparatory work; results which have already been published beforehand should only be repeated to the extent that it is considered necessary for understanding the context. Any findings which support or call into question the results presented should equally be made known.

If several originators are involved in a research effort or in the publication arising out of that effort, the only persons who may be credited as co-authors are those who themselves made a considerable contribution to the design of the studies or experiments, to working out, analysing or interpreting the data and to drawing up the manuscript, these persons also having agreed to its publication. The authors always bear joint responsibility for the content; “honorary authorship” is not permitted. Support from third parties is to be recognised in a note of thanks.

## **6. Appointing an ombudsperson**

An independent, appropriately qualified person of considerable personal integrity should be elected from among the scientific staff at each institute or research establishment of the Max Planck Society to act as an ombudsperson in cases of conflict on matters of good scientific practice. It is the job of the ombudsperson in particular to be available to all concerned as a confidential advisor in cases where there is suspicion of a violation of the principles of good scientific practice. In addition one person should be elected in each of the three sections, to perform the job of ombudsperson for the entire section.

The ombudspersons for the sections should report to the President on their work once per year in anonymous form. Further details on the election and duties of the ombudsperson are outlined separately in guidelines laid down by the Scientific Council. The regulations passed by the Senate on the introduction of an investigation procedure in cases of suspicion of scientific misconduct remain unaffected by this.