

Dean Johan Tysk
Faculty of Science and Technology
Uppsala University

[Translation of the final and official report written in Swedish]

Preliminary investigation of accusation of research misconduct

Background

The accusation (dated 20 June 2016) concerns research misconduct in a study by researchers at Uppsala University, published in the journal *Science* on 3 June 2016:

Lönnstedt, O.M. and Eklöv, P. (2016), Environmentally relevant concentrations of microplastic particles influence larval fish ecology, *Science* 352, pp. 1213–1216.

The accusation was submitted by: F. Jutfelt, J. Sundin, D. Roche, G. Raby, B. Speers-Roesch, S. Binning and T. Clark.

Dr Oona Lönnstedt is a postdoctoral research fellow at the Department of Ecology and Genetics, Uppsala University. Professor Peter Eklöv is her supervisor and project manager.

On 5 July 2016 the Dean of the Faculty of Science and Technology entrusted the following experts with the task of undertaking the preliminary investigation (UFV 2016/1074):

Professor Birgitta Bergman, Stockholm University; Professor Per Jensen, Linköping University; and Magnus Hallberg, Legal Officer, Uppsala University.

The experts have no conflicts of interest or other disqualifying relationship with the accused or the accusers.

The accusations made in points 1–4 in the document submitted on 20 June 2016 by Jutfelt et al., and in supplementary submissions from these persons (excerpts from email and other correspondence, specification of the sequence of events, photographs, etc.), have been thoroughly examined in the confidential preliminary investigation. Lönnstedt and Eklöv have been given the opportunity to respond in writing to the accusations (points 1–4) and to a number of supplementary questions (20 points, by mail, 16 June 2016) from the accusers, and to make further clarifications requested by the investigators. All communication with both parties has been in writing.

The investigators' assessment of the complaint

In their complaint to Uppsala University, Jutfelt et al. state that they base their suspicions of misconduct on four distinct points. The experts have taken a position on each of these points separately.

(1) Firstly, the complainants consider that the article in *Science* contains several deficiencies of execution and reporting. They point out a lack of raw data, which the text of the article states is available in the 'supplementary materials' accompanying the *Science* article and archived in the

research database at Uppsala University. In addition, the existence of ethical approval for animal experiments is questioned.

The investigating committee finds that these observations were correct, but according to the information obtained by the experts this was due partly to the failure of Science to enter these data prior to publication, as a result of a misunderstanding, and partly to apparent shortcomings in the storage of research data at the Department of Ecology and Genetics, not to their being actively withheld by the accused. However, the authors compensated for this by sending additional data to the editor of the journal and, by mail, to the complainants. All necessary raw data has been freely available to readers for some time, in supplementary data published by Science. Ethical approval has also been obtained.

This point is therefore deemed to have been remedied and consequently research misconduct cannot be deemed to have occurred.

(2) Secondly, reporting problems are pointed out in the publication, concerning the execution of the experiments on which the article is based, e.g. sample size and duration of exposure.

The investigators find that there appears to be some lack of clarity or some carelessness in the description of the procedure in the article in Science. The experiments described in an article should be sufficiently clear that other researchers can repeat the experiments. On the other hand, the amount of space available in these prestigious journals is so limited that it is often impossible to include all details. The accused have provided a number of clarifications and elaborated on the description of the procedure in a highly satisfactory manner, and the complainants have also received this additional information. The investigators find no evidence that the authors have deliberately and intentionally attempted to mislead or conceal anything relating to the execution of the experiment. The complainants should therefore be able to repeat the experiment without difficulty, which was the purpose of the complaint, in particular following the accused's detailed responses to the 20 supplementary and specific questions concerning the execution of the experiment.

The investigators find the authors' responses highly credible and research misconduct can therefore not be deemed to have occurred with respect to this point.

(3) Thirdly, the complainants cite concerns about the statistical processing and analysis of data obtained in the experiments.

With regard to methodology in behavioural studies and statistical analysis, this is clearly described in the article and has been further clarified by the accused in their response to the complainants. It is normal in research processes that different researchers have different views on details of methodology and analysis, but needless to say this has nothing to do with research misconduct. In this respect, moreover, it has to be assumed that Science has rigid and thorough review processes, including statistics experts who do not appear to have had any objections to the statistics published. With regard to this point no research misconduct has therefore occurred.

(4) Fourthly, it is claimed that there are substantial differences between the manner in which the experiments were executed according to the article in *Science*, and how they were actually executed, based on 'eye witnesses' who are not named. Appendices to the complaint refer to reports from witnesses and two photographs that are claimed to prove the suspicions. The problem areas raised concern duration of exposure, number of replicates in terms of the size of the experimental vessels, number of fish, etc.

These accusations have been thoroughly answered and explained in the written document with the 20 questions mentioned above, which address these specific aspects. The investigators find that they have been answered in a satisfactory and credible manner. The photographs cited appear to represent a different experiment than the one reported in the article in Science, and in other respects the investigators find that the witness statements are imprecise and certainly do not constitute incontrovertible evidence that any deliberate misconduct occurred in the research conducted.

Further comments from the investigators

The investigators note that Jutfelt et al. appear to have a very strong desire that the article be examined for research misconduct, but that the large majority of their objections come within the ambit of normal scholarly discussion, which could have been conducted directly with the authors of the article. The most serious accusations, which could potentially indicate misconduct, concern assertions that the experiments were not executed as asserted, and that Lönnstedt and Eklöv thus fabricated their data. The investigators have not found any evidence that this was the case.

However, the investigators note inadequate documentation of the research on the part of the accused, with necessary documentation only stored on one computer (which was subsequently stolen, as confirmed by the report of the theft to the police), and with a lack of back-up storage at Uppsala University. However, this cannot be judged to be a sign of any research misconduct.

Conclusion

To sum up, based on the guidelines and definitions in Section 1 concerning research misconduct (adopted by the Vice-Chancellor of Uppsala University, UFV 2010/664), and a comprehensive review of all the material submitted by the accusers and the accused (UFV 2016/1074), the investigators find no evidence of research misconduct in the article by Lönnstedt and Eklöv published in *Science* (3 June 2016) to which the accusers refer.

Since there is insufficient reason for a full investigation, we recommend Uppsala University not to carry out any further investigation and instead, in accordance with the guidelines in Section 8, to take diligent steps to restore the reputation of the accused.

Date as above,

[signature]

Birgitta Bergman, professor

Stockholm University

[signature]

Per Jensen, Professor

Linköping University

[signature]

Magnus Hallberg, Legal Officer

Uppsala University