A high-profile paper published in *Science* earlier this year is in jeopardy because of events that started out as a simple theft of a laptop, but may end up being a big enough transgression to have it erased from the scientific literature.

The paper, entitled "Environmentally relevant concentrations of microplastic particles influence larval fish ecology," suggests that larval fish (perch, specifically) prefer to eat microplastic particles (pieces of plastic that are < 5mm in size) over their natural food source. Not only that, but, when fish eat the plastic particles, they exhibit abnormal behavior and decreased hatching rates.

However, the paper on microbeads has a major problem - one that *Science* is taking its time dealing with.

Just weeks after the paper was published in June, scientists in the field who knew and worked with the lead author, Dr. Oona Lönnstedt, at Sweden's Uppsala University (UU,) sent a letter stating a suspicion of misconduct and requesting an investigation. The letter details the following four points as evidence.

1. Missing data
2. Inconsistencies in the sample sizes reported and the microplastic exposure concentrations used
3. Issues with the statistical design and analyses
4. Large disparities in the way the experiment has been reported by the authors compared with the reports of eye witnesses.

Although all of the above points are concerning, the first may be the one that digs the grave for this
Lönnstedt reported that the laptop computer that held the sole copy of all of the data reported in this paper was stolen out of her car 10 days after the publication of the paper. Although that may be true, not having a backup of published data is simply not acceptable in the scientific community. In fact, many institutions have automated backup systems in place to ensure that this does not happen. This time, if the dog ate your homework (and you did not make a copy,) you fail. Scientific raw data has to be in existence and available to others. No data. No paper.

Also, if the circumstantial evidence presented by the whistle blowers (the fourth point above) is true, the misconduct seems like a slam dunk. The whistleblowers worked in the same lab space as Lönnstedt while she was conducting the experiments that are included in the paper. They claim numerous inconsistencies between what they saw and what was reported. For example, they claim that she was in the lab from May 4th to May 15th, but the paper includes a three week long experiment. Also, they claim that the lab simply did not have the materials that Lönnstedt would have needed to perform the experiments that she reports in the paper, such as number of perch and in supporting materials such as the number of beakers.

Despite the evidence, an investigation at UU denied any misconduct and went on to not recommend a full investigation.

But, the story is not over. A larger investigation is being done by the Sweden's Central Ethical Review Board. In addition, *Science* published an "expression of concern" this week that reads,  

- *Science* is publishing this Editorial Expression of Concern to alert our readers to the fact that no further data can be made available, beyond those already presented in the paper and its supplement, to enable readers to understand, assess, reproduce or extend the conclusions of the paper.

This story is made even more compelling by the subject of the paper. To say that the topic of microplastic particles is controversial is an understatement. There is growing concern over the accumulation of microplastic particles in the environment. The particles originate from two different sources; the breakdown of larger plastic waste found in the water and the production of microparticles (called microbeads) in cosmetic products such as face soaps and body washes. Although certain groups, such as the story of stuff project[^3] are actively fighting to make microparticles in cosmetics obsolete, the actual impact of the microbeads on aquatic wildlife or the environment is not known.

So, it is easy to understand why the first report of microplastic particles having a negative effect on fish would gain a lot of attention in the media.

But, for the moment, we will have to hold off on making conclusions about how microbeads are harming fish. Until the investigation is complete, Lönnstedt's work amounts to nothing more than a good story.

References: