Plant Elicitors as Bio-Objects

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http://wp.me/p1Bfg0-37S
In his article “From One Community to Many: How Novel Objects in the Crop Protection Field Reveal Epistemic Boundaries”, Antoine Blanchard (2016) presents us with an in-depth and fascinating case study on what is called a ‘plant elicitor’—a technology that is of interest due to its capacity to protect crops, which is also presented as a ‘vaccine for plants’. His analysis is underpinned using both qualitative and quantitative analysis in the form of interviews, document analysis and bibliometrics, which results in a multi-faceted picture of the relations between various communities that are working on this subject.

In line with existing studies on epistemic communities and issues of demarcation Blanchard puts the 'plant elicitor' forward as an object or thing—drawing on work on epistemic things (Rheinberger 1997) and boundary objects (Star and Griesemer 1998). He thereby argues that plant elicitors are indeed fitting in Rheinberger’s frame of epistemic things as they can both be conceptualized as matter and technology, while he shows that plant elicitors are less successful as a boundary object as they not only unite epistemic communities but also divide them, from academic molecular biology research, to more applied agricultural research and industry.

**On Bio-Objects**

However, I would like to go a step further in the analysis of his case, using a novel conceptual framework that not only shows changing knowledge communities around a specific research object (Parker et. al., 2010; Vermeulen et. al, 2013), but also the ways in which this object is changing itself within the context of different socio-epistemic configurations (Vermeulen 2012). I will do this by drawing on the concept of ‘bio-objects’ (Vermeulen et. al. 2012; Taminnen and Vermeulen, 2012)—a concept that is especially suited to discuss novel objects related to life. Bio-objects, or the categories, materialities and processes that are central to the configuring of 'life' today, show how the boundaries between human and animal, organic and non-organic, and being 'alive' and the suspension of living, are questioned, destabilised and in some cases re-established. I find this a useful approach to study developments in the life sciences as it allows to write the biography of novel objects as they emerge, stabilize and circulate through society (see also www.bioobjects.eu).

One common feature of bio-objects is that they challenge and disrupt cultural, social, and institutional boundaries, while their own identity is also formed and transformed in this process. Thereby I will take the multiplicity and plasticity of plant elicitors that the author already hints at more serious, arguing that plant elicitors are an excellent example of a bio-object that emergence in and travels through specific contexts, while simultaneously shaping and being shaped by those contexts. This specific framing of the case then also sheds another light on the question Blanchard asks in his conclusion: why were the plant elicitors not successful on the market, so far?

The history of plant elicitor's takes us back to plant protection practices in Brittany, where seaweed was used to spread over crops, which seemed to make them immune for certain diseases. Although the actual reason and process was not known, it seems like this traditional
practice led to the establishment of a research agenda to understand the mechanism behind this traditional agricultural practice. From the text it becomes not clear what exactly the historical path of the development of this research agenda was, but due to the fact that there are many years between the identification of the practice and the publication of the first research results, it seems to me that there is an interesting story hiding behind the analysis, which will show the establishment of research interest in this field.

In some ways, the story reminded me of the history of yeast research in France, which also took a well known process of alcohol production under the scientific loupe, thereby finding yeast while quarrelling over its nature: was it a chemical component, or was it really alive? (see also Vermeulen and Bain, 2014). Yeast was thereby having different meanings within the biological and chemical communities, and a solution to the debate was found by the creation of biochemistry as a new discipline that spanned the two domains. As such, yeast played a fundamental role in the reconfiguration of relations between the two academic research domains, giving rise to a new discipline that brought two epistemic communities together into a novel socio-epistemic configuration, with its own research objects and approaches.

**Biological and Chemical Understandings**

The case of plant elicitors at hand, not only shows similar connections to wine and champagne industry in France, but also again presents a divide between biological and chemical understandings, but this time in the crop protection field. While biological control aims to help the plant to protect itself, chemical control uses so-called ‘active ingredients’ to reach crop safety, which involves the agro-chemical industry to produce those chemical components, such as the well-known but also contested herbicides. Initially following a biological research trajectory—known as pythopathology which aims to understand the relations between plants and pathologies—the plant elicitor and its actions only became an object of research in the academic realm, involving a public national research lab, which in itself is a combination of different disciplines that analyse different aspects of the object under investigation, to then synthesize this knowledge into a common understanding of the object of concern and the way in which it relates to or acts on the health of crops.

But while within this national laboratory diverse disciplinary approaches of analyses are used to relate to each other, and unite around research objects such as the plant elicitor, outside this lab and its multi-disciplinary environment, the plant elicitor has not been acting as a boundary-object, but in opposite ways: as an object that divides, or that acquires different meanings in separate socio-epistemic communities that do not merge but stay separate having mutually exclusive understandings of the plant elicitor and its role in crop protection strategies (see for another fascinating case study of different strategies of protection Luisa Reis-Castro, 2012).

Namely, in the conclusion of the article Blanchard raises the question of success, defining this as the ability of research object to reach the market. As plant elicitors are not currently in widespread use, he argues they were not successful due to the object not being able to bridge the boundaries between the academic and industrial communities. However, when taking a bio-object perspective it becomes clear that it was not successful as the plant elicitor did not fit in the dominant chemical paradigm of big agro, where the actual marketing takes place.
Conclusion

In academic realms it has been successful, in the sense that an existing agricultural practice—the use of seaweed to protect crops—was taken up as a research agenda to explore the underlying mechanism, which led to the conceptualisation of the plant elicitor as a natural vaccination for plants in several publications (see the bibliometric analysis). Thereby the plant elicitor was being explained in molecular biological terms as well as being translated into chemical understanding as an active compound. As such, the elicitor as bio-object has successfully created a path through different realms, acquiring various understandings.

However, and while it gained ground in SME’s, especially in the wine and champagne sector, there was only one larger agricultural company which incorporated the bio-object within their chemical regime—see the example of Syntenga—and patented it accordingly, but this development stayed marginal and was sold off as soon as possible, because it was still framed as a biological and not as a chemical compound. As such, the bio-object is configured and fits within a biological regime of crop protection, and this is still a marginal regime vis-à-vis the chemical regime. However, with organic agriculture currently winning terrain (see for example the rise of natural wines), it might well be that the plant elicitor will become more central in future socio-epistemic configurations of crop protection. If this will be the case, surely does not only depend on the functionality of the bio-object, but also on relevant social, economic and political relations and the ways in which they are able to mobilise the bio-object as a valid alternative to dominant agro-chemical approaches.

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References


