Innovation, Translation of Modeling in Stem Cell Biology

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Description

The distinction between pursuit worthiness and acceptance of theories has been used to isolate important aspects of theory appraisal aimed at contrasting goals the former concerned with the reasons one might give for tentatively adopting a theory based on its future promise and the latter with an epistemic commitment to a theory based on its past performance.

Stem Cell Biology

Hence, the iPSC case highlights how non-epistemic values in pursuit can impact on the epistemic appraisal of research. However, the change of epistemic standards undermines the policy framing of biomedical innovation as a means to circumvent disagreements over the ethical and social implications of the research. This is evidenced by the increasing debates that "theorize" the ethical, commercial, and legal implication of pursuing iPSCs. Consequently, in practice iPSCs are unlikely to simply replace existing approaches in therapeutic stem cell biology in the near term. Indeed, the integrated and dependent nature of modeling in stem cell biology, comprising networks of representations, further problematizes their supposed practical autonomy. Nevertheless, I will argue that incomplete theorization is still retained as a crucial desideratum in the pursuit of biomedical innovation during policy change.

While the literature on pursuit-worthiness tends to focus more on theorizing than other epistemic modalities such as scientific modeling, the construction of techno scientific objects, and experimentation, gestures towards more comprehensive accounts are particularly important in some of the recent literature. For example, distinguish epistemic and the practical goals of pursuit, and recognize that pursuit-worthiness is not restricted to theories. This paper aims to contribute to the growing literature on pursuit-worthiness by engaging with a case of practical pursuit-worthiness in biomedicine. According while epistemic pursuit is concerned with purely epistemic goals, practical pursuit can comprise both epistemic and non-epistemic aims. It is perhaps understandable that epistemic pursuit has received significant attention.

In order to motivate the importance of pursuit-worthiness as a topic for philosophers of science, one might focus on the ways the epistemology of pursuit differs from the contexts of discovery and justification. Hans R drew a distinction between the process of theory generation that lacks logical analysis and theory testing that is capable of formal analysis and grasped within philosophy. Pursuit arguably shares aspects of both contexts. However, it is also important to expand the scope of studies on practical pursuit where the aims of research, not simply the means, are both epistemic and non-epistemic. This is particularly important in the biomedical sciences where the goals of research may be directed towards therapeutic ends and embedded in public policy making.

There are good reasons, then, to expand the scope of studies of pursuit-worthiness in order to establish what epistemic and practical reasons are brought to bear on the choices that scientists and policy-makers make in nascent, "emerging" or even well-established forms of scientific and technological research and development.

Biomedical Science

The aim of this paper is to explore pursuit-worthiness in biomedical science by investigating the case of induced pluripotent stem cells. Cell fate conversion has become significant in the recent history of stem cell biology due to the possibility of "reprogramming" differentiated adult cells into pluripotent stem cells. Pluripotent stem cells possess the capacity for self-renewal in culture indefinitely and differentiation into cells associated with all three main classes of tissues.

Changing the fate of adult cells by reprogramming has taken on practical significance with implications for regenerative therapies and transplantation medicine, disease modeling, as well as drug discovery and testing. The reprogrammed induced pluripotent stem cells represent an important contribution to translational research comprising stem cell research and clinical medicine. I offer an analysis of practical pursuit because the aims of stem cell biology are therapeutic and so its goals are both epistemic and ethical. I will argue that in the United States under the George W. Bush administration at the beginning of this century, policy framings of biomedical innovation operated as a part of what Nickles calls the "heuristic assessment" of pursuit-

worthiness. Restrictions on the use of federal funds for human embryonic stem cell research tended to result in the idea that iPSCs were pursuit-worthy due to their supposed ability to undercut the ethical constraints on the development of biomedicine. Ethical and regulatory constraints on research "prime" the context for the development of iPSCs in the US and elsewhere.

By probing iPSC research as a case of practical pursuit in biomedicine, I highlight how biomedical innovation has been framed by practitioners and policy-makers as a much sought-after means to tackle controversial ethical issues in the field by purportedly avoiding the need for ova donation and the destruction of human embryos left over from fertility treatment. Although iPSCs have been described as problematic when perceived as a "technical solution" to the ethical problems associated with embryo destruction in stem cell biology, I demonstrate how US policy framings of innovation in biomedicine resulted in the drive to seek innovations that underdetermine conflicting ethical and social values to seek innovations that are "incompletely theorized" by purportedly permitting stakeholders to refrain from engagement with the divisive values that in part created impediments to federal funding of research in stem cell biology.

In other word, iPSCs were pursuit worthy not because they solved an ethical problem but instead offered the possibility to refrain from engagement with divisive stakeholder values altogether. However, as Charis T argues, by presenting iPSCs as an innovation responding to the ethical and regulatory constraints on stem cell biology under the Bush administration it can appear as if these constraints alone are what drive the iPSC innovation. I argue that the desire to avoid engagement with stakeholders conflicting values extends to disagreements over commercial exploitation and the role of intellectual property rights in promoting innovation and not simply the ethics of embryo research.

The second claim I make in this paper is that the heuristics of incomplete theorization subsequently conflict with the development of epistemic standards of preclinical pursuit proposed to ensure the safety and efficacy of any potential therapeutic application of iPSCs. This means that in practical pursuit, shared non-epistemic values associated with the safety and efficacy change the epistemic standards associated with preclinical research used to determine the suitability of the technology for clinical trials that will ultimately bear on the epistemic conditions for its clinical acceptance.