

THOMAS PRADEU, *Les limites du soi: immunologie et identité biologique*, Montréal: Les Presses de l'Université de Montréal et Vrin, 2009, 386 pp., € 36,00.

Philosophy of biology in the English speaking world has focused mostly on the epistemological issues raised by or related to evolutionary biology. This has been rich hunting ground for philosophers trying to explore the multiplicity of scientific approaches and the relative limitations of general explanatory schemas tailored specifically to the problems raised by physics. The focus on population genetics (arguably the core of contemporary evolutionary biology) has highlighted the necessity of taking into account the mathematical *models* of scientific claims instead of focusing solely on the *theories* found in physics. This work vindicated for many a theory-less semantic view of biological explanations. For many independent reasons, a growing number of philosophers has criticised the philosophical over-reliance on evolutionary biology and have argued for inquiry into other biological disciplines (e.g. Microbiology, Developmental Biology, Ecology, etc). This book offers a forceful and compelling case for a realignment of many debates in philosophy of biology along developments found in immunology. With very rare and notable exceptions (e.g. Alfred Tauber), philosophers have so far overlooked immunology as philosophically urgent, but Pradeu will convince most if not all readers that this oversight is inexcusable.

This book has three broad sections. The first part offers a detailed but accessible conceptual and historical reconstruction of the dominant view of immunology based on Frank Burner's Self/Non-Self immunology theory. After explaining what the theory offers and why it was broadly adopted, Pradeu details the severe limitations of this view, namely its difficulty in taking into account auto-immune dysfunction, and the symbiotic integration of many heterogeneous species working as one.

The second part of the book builds upon work Pradeu conducted with immunologist Edgardo D. Carosella and defends in precise scientific and philosophical detail an alternate view, namely *Continuity Theory* where degrees of immune reaction is measured relative to conformity with past antigen patterns (i.e. one compares antigen "topography" across time); immune response is more about detecting differences in interactions than patrolling boundaries for external invaders.

The third part of the book explains why this approach to immunological theory also sheds novel light on the problem of biological individuality. The main limitation of the Self/Non-Self approach was its difficulty in accounting for exogenous elements interacting "positively" with our immune system. The human gut microbiome is built upon ecologically acquired symbionts that interact in complex and necessary ways with our immune system. One of the main benefits of the Continuity Theory is that it can better account for these multi-species interactions. The clear articulation of Continuity Theory is a significant scientific and philosophical contribution on its own, but philosophers will immediately see some of the broader consequences of such an approach. The question of how to define and identify biological individuality beyond phenomenal experience we may have with common organisms is a central concern of philosophy of biology. Many approaches to biological individuality have argued for functional integration as the main criterion for individuality and linked this functional integration to evolutionary processes, but, for better or for worse (I would claim the former, and Pradeu would claim the latter), this account of biological individuality does not seem to account for the specificity of organismality as a level of biological organization. Pradeu explains what specific type of functional integration is necessary for organismality to obtain. By showing how immune response is in part a dynamic multi-species affair, Pradeu offers a way of defining biological individuality specifically at the organismal level while showing that (at least some) organisms are multi-species assemblages. Organisms are community-level individuals of a certain kind: these communities need to have immu-

nological cohesion. This is heady stuff that cannot be detailed here, but the book makes a clear and important case for preserving the (immunological) specificity of organisms in our theories of individuality while enriching our understanding of organisms with the recognition of their fundamental multi-species nature.

This is very important work: *all* philosophers of biology need to read this book. It addresses key issues in biological ontology which will be important to all philosophers of biology, and, as important, the book describes and contributes to the state of the art in a philosophically overlooked but scientifically and socially essential life science, namely immunology. As the author rightly claims at the end of the book, immunology is at the intersection of development biology, microbiology, ecology and evolution. Therefore it behoves all philosophers interested in the life sciences to understand the issues raised by this discipline.

But let us not forget what I see to be the broader appeal of this project: this book should be read by all philosophers of science interested in claims about the explanatory nature of special sciences. Pradeu's book also demonstrates that biology may not be as theory-less as it has been claimed by many philosophers of biology.

This review discusses the initial French publication, but the anglophone reader should know that the work in the meantime has also been translated into English with some improvements and updates (T. Pradeu, *The Limits of the Self: Immunology and Biological Identity*, transl. Elizabeth Vitanza, Oxford: Oxford University Press, 2012).

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THOMAS F. GLICK, *What about Darwin? All sorts of Opinion from Scientists, Sages, Friends, and Enemies Who Met, Read, and Discussed the Naturalist Who Changed the World*, Baltimore: Johns Hopkins University Press, 2010, xxxi + 518 pp., £15.50.

Thomas Glick is well known for having edited a book entitled *The Comparative Reception of Darwinism*. His *What about Darwin?* has rather the same theme: the impact of the man and his work on a wide and diverse audience. A book organized in alphabetical order is generally at best a "good browse," but this one turns out to be a good read as well. The persons whose remarks and reactions are presented often refer to one another, and they formed a system of interlocking "affinity groups." People who made up the literary community in the nineteenth century knew one another and they had a lot of conversation as well. For a book to be successful, it was necessary, if perhaps not sufficient, for it to be discussed.

Glick has drawn heavily on two kinds of documents. First there are quite a range of autobiographical reminiscences containing reactions to Darwin's works. The scientists of course include biologists such as David Starr Jordan, and geologists such as Charles Lyell. But some of the physical scientists, such as Ernst Mach, exemplify Darwin's influence on philosophy. The entries for Alfred North Whitehead and Bertrand Russell show that some professional philosophers took Darwin very seriously indeed. There are a substantial number of clergymen, including serious theologians as well as popular figures such as Billy Sunday and Martin Luther King. Among writers, some, such as Alfred Lord Tennyson and John Steinbeck, were deeply interested in Darwin, whereas others, such as Sholom Aleichem, D.H. Lawrence and Robert Penn Warren, seem not to have been much influenced by him. The politicians include persons like William Gladstone who had important connections with Darwin, and others, like Mahatma Ghandi and Joseph Stalin, who are mainly of curiosity value.